SIZE AND VALUE PREMIUM, PERFORMANCE AND DYNAMIC LINKAGES OF PENNY STOCKS IN MALAYSIA

T. SHANMUGAM A/L THANGAVELU

FACULTY OF BUSINESS AND ACCOUNTANCY
UNIVERSITY OF MALAYA
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T. SHANMUGAM A/L THANGAVELU

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ORIGINAL LITERARY WORK DECLARATION

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Name of Degree: **Doctor of Philosophy**

Title of Thesis ("this Work"): **Size and Value Premium, Performance and Dynamic Linkages of Penny Stocks in Malaysia.**

Field of Study: **Finance**

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ABSTRACT

This thesis presents three related empirical studies on: (1) performance of the Malaysian penny stocks; (2) risk-return analysis of Malaysian penny stocks; and (3) the impact of macroeconomic and non-macroeconomic determinants on Malaysian penny and non-penny stocks. The period of analysis covers a total of 72 months stretching from July 2009 to June 2015 in the post-revamp period of Bursa Malaysia. The first 12-month period from July 2009 to June 2010 was set as formation period to compute a justifiable price benchmark to identify penny stocks and to further construct relevant portfolios. This research adopted the criteria of stocks with the price of RM0.31 and below to be penny stocks ($Pr \leqslant$ RM0.31) while the rest are categorized as non-penny stocks ($Pr >$ RM0.31). This study was conducted during the second 5-year period from July 2010 to 2015. The first part of the thesis deals with a comprehensive analysis of the financial characteristics and the performance of penny and non-penny stocks during the study period. The findings reveal that Malaysian based penny stocks are characterized by smaller market capitalization, higher beta, higher book-to-market ratio, and higher idiosyncratic volatility on the average. The second part of the research undertakes to verify the variation of risk premiums in each portfolios' rate of return with differing asset pricing models. Three findings have emerged: (1) The magnitude of change in portfolio alphas of penny and non-penny stocks are marginal and economically small to explain the return variations in the respective portfolios; (2) All risk premiums except profitability factor are significant; (3) The single factor CAPM, 3-factor, 4-factor and 5-factor models are significant and able to capture the return variations for penny stocks. The compounding implication of knowing the prominent risk premium can be exploited for trading strategies of penny stocks in an effort to gain abnormal returns by potential investors. The third study examined the relationships between selected macroeconomic and non-macroeconomic variables with penny and non-penny stocks' returns by using the ARDL bounds testing for cointegration. The direction of the causality between the variables were investigated by applying the VECM Granger causality approach. The results have revealed that the variables are cointegrated for long-run relationship. Independent macroeconomic variables of GDP and price index of Malaysia together with non-macroeconomic forces representing political events and global oil price plunge moves in tandem with the hypothesized reaction to the returns of penny stocks. As for the short-run elasticities, the coefficient of the ECM_{t-1} for all independent variables are significant and reinforces the existence of the long-run relationship among the variables. The causality analysis confirms the existence of unidirectional causality from all independent variables to the returns of dependent variables in the long-run with the statistically significant ECT_{t-1}. The GDP and the stock price index of Malaysia are a significant Granger-cause to the returns of all price sorted portfolios in the short- and long-run. The empirical results of this study may be used as valuable information by local and global stock investors in developing a view of the Malaysian economy and to facilitate their financial and investment planning process.

ABSTRAK

Tesis ini melibatkan tiga kajian empirikal yang berkaitan, iaitu: (1) analisis prestasi stok *penny* negara Malaysia; (2) analisis risiko-pulangan stok *penny*; dan (3) kesan penentu-penentu makroekonomi and bukan-makroekonomi ke atas stok *penny* dan bukan-*penny* di pasaran stok Malaysia. Jangkamasa analisis merangkumi sejumlah 72 bulan bermula dari bulan Julai 2009 sehingga bulan Jun 2015, iaitu dalam tempoh-pasca rombakan Bursa Malaysia. Tempoh pertama dari Julai 2009 sehingga Jun 2010 (12 bulan) telah ditetapkan sebagai tempoh menggubal satu tanda aras harga yang munasabah untuk mengenal pasti stok *penny* di Malaysia dan seterusnya membina portfolio-portfolio yang berkaitan untuk kajian ini. Kajian ini menetapkan aras harga stok di bawah RM0.31 ($Pr \leq$ RM0.31) sebagai stok *penny* manakala kesemua stok yang melebihi paras ini digolongkan sebagai stok bukan-penny ($Pr >$ RM0.31). Jangkamasa yang kedua iaitu dari bulan Julai 2010 sehingga bulan Jun 2015 yang merangkumi tempoh 5-tahun (60 bulan) merupakan tempoh kajian. Kajian pertama tesis ini merupakan analisis komprehensif berhubung dengan ciri-ciri kewangan dan prestasi stok *penny* dan bukan-*penny* di pasaran stok Malaysia dalam tempoh kajian. Dapatan dari bahagian ini menunjukkan bahawa stok *penny* di Malaysia bermodal kecil, berbeta tinggi, nisbah buku-kepada-pasaran yang tinggi dan purata volatiliti idiosynkratik yang tinggi. Kajian kedua menguji variasi premium risiko terhadap kadar pulangan setiap portfolio dengan menggunakan model penentuan harga aset modal yang berbeza. Tiga dapatan utama dikenal pasti: (1) Kadar perubahan dalam nilai *alpha* ini adalah agak rendah dan kecil dari segi ekonomi untuk menerangkan variasi dalam kadar pulangan portfolio-portfolio ini; (2) Kesemua premium risiko kecuali faktor keberuntungan adalah signifikan; (3) Model-model faktor-tunggal CAPM, 3-faktor, 4-faktor dan 5-faktor agak signifikan dan merupakan model penentuan harga modal yang terbaik untuk memerangkap variasi pulangan untuk stok *penny*.

Pengetahuan tentang premium risiko yang ketara ini dapat dieksploitasikan oleh bakal pelabur untuk menyusun strategi-strategi pelaburan untuk stok *penny* dan bukan-*penny* dalam usaha meraih pulangan abnormal. Kajian ketiga menguji hubungan antara variabel makroekonomi dan bukan-makroekonomi terhadap pulangan stok *penny* dan bukan-*penny* dengan menggunakan kaedah analisis ARDL untuk pengujian batasan ko-integrasi. Arah *causality* antara variabel disiasat dengan menggunakan pendekatan VECM Granger *causality*. Analisis kajian menunjukkan bahawa kesemua variabel mempunyai ko-intergrasi jangka panjang. Variabel bebas makroekonomi yang merangkumi GDP, harga indeks saham negara Malaysia bersama-sama dengan variabel bukan-makroekonomi seperti peristiwa politik tempatan dan penurunan harga minyak dunia adalah antara variabel yang bergerak seiring dengan apa yang telah dihipotesiskan. Untuk keanjalan jangka pendek, pekali ECM_{t-1} untuk semua variable bebas adalah signifikan. dan mengukuhkan hubungan jangka panjang antara variabel kajian. Analisis *causality* mengesahkan wujudnya *causality* sehala dari semua variabel bebas dalam jangka panjang dengan ECT_{t-1} signifikan. KDNK dan harga indeks pasaran saham Malaysia adalah *Granger-cause* kepada semua portfolio stok *penny* dan bukan-*penny* untuk jangka pendek dan jangka panjang. Kajian empirikal ini memberi maklumat yang agak berguna kepada pelabur-pelabur tempatan dan luar negara untuk mendapat gambaran tentang ekonomi Malaysia dan impaknya terhadap pulangan stok *penny* dan bukan-*penny* dan seterusnya menyusun proses perancangan kewangan dan pelaburan mereka.

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T. SHANMUGAM

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TABLE OF CONTENT

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS AND SYMBOLS

ABBREVIATIONS

3F	Three-Factor
4F	Four-Factor
5F	Five-Factor
ADF	Augmented Dickey-Fuller
AGNPS or AGNP	Aggregate Non-Penny Stock
AGPS	Aggregate Penny Stock
AMEX	American Stock Exchange
APM	Asset Pricing Models
APT	Arbitrage Pricing Theory
ARDL	Autoregressive Distributed Lagged
B/M	Book-to-market
BCI	Business Conditions Index
C/P	Cash flow-to-price
CAPM	Capital Asset Pricing Model
CMA	Conservative Minus Aggressive
CPI	Consumer Price Index
CSI	Consumer Sentiment Index
CUSUM	Cumulative Sum of Recursive Residuals
CUSUMsq	Cumulative Sum of Squares Of Recursive Residuals
DCC	Dynamic Conditional Correlation Model
E/P	Earning-to-price
ECM	Error Correction Model
EPS	Earnings Per Share
ER	Exchange Rates
FDI	Foreign Direct Investment
FER	Foreign Exchange Reserves
FF3F	Fama-French Three Factor
GDP	Gross Domestic Product
HML	High Minus Low
ICAPM	Intertemporal Capital Asset Pricing Model
INF	Inflation
IPO	Initial Public Offering
IPI	Industrial Production Index
IR	Interest Rates
J-B	Jarque-Bera
KLCI	Kuala Lumpur Composite Index
M	Mean
M2	Money Supply
Med	Median
MFM	Macroeconomic Factor Model
MIDAS	Mixed Data Sampling Model
MYR	Malaysian Ringgit
NASDAQ	National Association of Securities Dealers Automated Quotations

NPS or NP	Non-Penny Stocks
NYSE	New York Stock Exchange
OTC	Over-The-Counter
OTCBB	Over-The-Counter Bulletin Board
PI-CHI	China Stock Price Index
PI-JPN	Japan Stock Price Index
PI-MSIA	Malaysia Stock Price Index
PI-US	US Stock Price Index
PP	Philips-Perron
Pr	Price
PS	Penny Stocks
ROA	Return On Assets
RMW	Robust Minus Weak
ROE	Return On Equity
S&P	Standard & Poor's
SD	Standard Deviation
SEC	Securities and Exchange Commission
SG	Singapore
SMB	Small Minus Big
TDS	Thomson DataStream
UECM	Unrestricted Error Correction Method
UK	United Kingdom
US	United States
USD	United States Dollar
VDA	Variance Decomposition Analysis
VECM	Vector Error Correction Model
WML	Winner Minus Loser

SYMBOLS

£	Pound
$	Dollar
R_f	Risk free return
R_i	Asset return
R_i -R_f	Risk adjusted return / excess return
Rs	Indian Rupee

LIST OF APPENDICES

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Trading in financial markets in any part of the world has changed substantially in line with the evolving economics over the past decade. As the economic backdrop of many economies have changed with the evolving growth story, equity markets around the world have followed suit and have grown exponentially with daily trading amounting to trillions of dollars (Vlastelica, 2017). Today, nearly every country has its own stock exchange market and all of the major economic powers in the world have highly developed new exchange technologies and cohesive regulations (Ahmed, Coulibaly & Zlate, 2017). Nevertheless, the stock markets' traditional image of listing only reputable, financially stable and long-established constituent companies that have impressive trading price range are shredding with the emergence of low-priced stocks. Over the past decade, one of the vital existences in the financial markets is the influx of low-priced stocks with market trading price quoted in very low amount or just in few cents (White, 2016). Since a significant part of stocks traded in the Asian stock markets have small price denominations, their price movement and trading activities have important impacts on the whole market (Pavabutr et al., 2014) and yet the economic impact of these stocks remained unexplored by academic research in this part of the region citing reasons of data biasness (Hwang & Qian, 2010). Studies on penny stocks in Asia are inconclusive from academia and this study is an effort towards analyzing the prevalence of risk-return relationship of penny stocks in the context of Malaysia.

1.1.1 Recognizing Penny Stocks

The U.S Securities and Exchange Commission (US SEC) has defined penny stocks as low priced, speculative security of a very small company that trades below USD5.00 (with minimum listing price of USD1.00) in the US financial markets ("Penny Stock Rules", 2013). With the exception to this official definition, all other descriptions given to penny stocks are unofficial or merely a commonly excepted expression that is confined to a particular market trading environment of a country. Notably, people in the financial sector categorize these low-priced shares in a variety of ways and parameters, depending on who is doing the defining and why (Leeds, 2016). He further adds that what one trader may consider a penny stock may not qualify under the definition of another person.

Notwithstanding, the description given to penny stocks differs from country to country too. In the UK financial markets, the unofficial descriptions of penny stocks are based on share price and market capitalisation of the company where the penny shares are referred to shares with price of less than £1 or share of companies with market capitalisation pf less than £100 million ("What are Penny Shares?" 2014). In the Asian markets, the existence of penny stocks is acknowledged without an official definition from the respective stock markets or securities' commissions. Nonetheless, investors in some Asian countries have perceived an unofficial price threshold to identify penny stocks. Quoting from media sources, penny stocks in Malaysia and Singapore for example, are quoted securities that are traded below the RM1 and SG$1 mark per share respectively (The Forbes, 2011). In the Indian stock market, penny stocks are quoted below Rs10 ("Definition of Penny Stock," n.d.).

Even previous academic studies are inconsistent in their identification criterion for penny stocks. The studies of Liu, Rhee and Zhang (2011,2013,2015) involving listed penny stocks in the US have steadfastly adopted the USD5.00 thresholds as penny stocks regardless of listing status (“Penny Stock Rules”, 2013). In another notable study by Nofsinger and Varma (2014) involving penny stocks (as a gambling like investment), the USD1.00 threshold was adopted. The study by Bhattacharyya and Chandra (2016) on the Indian penny stocks took the unofficial quote of Rs10.

1.1.2 Brief Characteristics of Penny Stocks

Based on the notable studies of Seguin and Smoller (1997), Randolph and Padma (2003), Daniel et al. (2006), Liu et al. (2011, 2013, 2015), Rhee and Wu (2012), Ang, Shtauber and Tetlock (2013), Nofsinger and Verma (2014), Eraker and Ready (2015), Urbański, Jawor and Urbański, (2015), Bhattacharyya and Chandra (2016), Brüggemann et al. (2016), and White (2016), some of the distinct characteristics that are commonly associated with penny stocks are speculative, high risk, high illiquidity, high price volatility and low trading volume compared to large cap stocks (detailed characteristics of penny stocks are explained in Chapter 2).

The conforming characteristics of penny stocks as high risk investment are also related to the price manipulation activities by their promoters. According to Leeds (2016), as penny stocks are more thinly traded and prices are much lower per share, these stocks tend to be the easy targets for price manipulations. Activities such as internet frauds, e-mail spams, short and distort schemes, boiler-room operations, pump and dump, gambling-like investments in the US are just some manipulative ways of driving up the shares of a financially weak company or promoting near bankrupt companies in positively (Liu et al., 2015). These unethical activities may raise the prices of penny stocks unrealistically, thus putting investors at significant risk of the real value of their investments (Nofsinger &

Verma, 2014). In addition, the studies of Urbański et al. (2015) and White (2016) indicate that speculative stocks are mostly penny stocks and speculative activities are rampant in their trading at significant risk. These speculative activities coupled with the volatile returns of penny stocks have also rendered the lack of investment interest for these stocks among the institutional investors.

1.1.3 Acceptance of Penny Stocks Among the Academics

With the negative connotations and pejorative perceptions accorded by investors against penny stocks (Liu et al., 2011), academics have also been biased in their acceptance of penny stocks for research purposes. The confined characteristics of penny stocks with low liquidity and high price volatility have made academics to ignore penny stocks' prices or their returns in their empirical studies citing reasons of data biasness (Hwang & Qian, 2010) or lack of information and transparency (Liu et al., 2013). Correspondingly, only a handful of studies (refer Appendix 1A and 1B) have given importance to penny stocks in the area of asset pricing, behavioral finance, financial disclosures, and market microstructure analysis.

Academic literature involving penny stocks are divided into two distinct categories based on the manner in which they are traded, namely listed and unlisted stocks. A brief review of the academic literatures shows that the bulk of the studies have focused on investigating various issues related to unlisted penny stocks (refer Appendix 1A). These stocks are traded on the Over-The-Counter (OTC) markets particularly stocks that are quoted in the Over-The-Counter Bulletin Board (OTCBB) and the OTC marketplace (formerly known as Pink Sheets). The burgeoning academic literature that is related to the unlisted penny stocks stems from the concerns of market regulators (SEC) on the trading environment in the OTC markets (Liu et al., 2015). As trading in the OTC markets are dominantly held by retail investors (Eraker & Ready, 2015; White, 2016), market regulators are concerned with the lack of transparency to investors and their declining confidence as the trading environment (the OTC markets) is notorious for deception, manipulation, frauds and spam campaigns (Davis et al., 2016).

Studies involving US based listed penny stocks (refer Appendix 1B) thus far, have been spearheaded by Lui et al. (2011, 2013, 2015) and Rhee and Wu (2012). These commendable studies are the efforts to investigate the largely overlooked segment of the listed penny stocks in the US equity markets. Focusing on the New York Stock Exchange (NYSE) formerly known as American Stock Exchange (AMEX) and National Association of Securities Dealers Automated Quotations (NASDAQ), studies of Liu et al. (2011, 2013, 2015) have given conclusive characteristics of US based listed penny stocks. These studies have found US listed penny stocks are characterized by small size, high beta, high return, high idiosyncratic volatility, high book-to-market ratio, poor past performance. Also, the liquidity costs of penny stocks are significantly higher than the high-priced stocks.

There are only two notable studies on listed penny stocks that are available for Asian markets. The first study focuses on market microstructural analysis in the Asia Pacific equity markets (Pavabutr et al., 2014) while the second study proceeds to analyse the asset pricing and behavioral biases involving penny stocks in the Indian stock market (Bhattacharyya & Chandra, 2016) (refer to Appendix 1B). The only study involving penny stocks outside the US and Asia is the study by Urbański et al. (2015) on Warsaw Stock Exchange (Poland) that involves an analysis of asset pricing and portfolio testing. Empirical evidence of penny stocks from other Asian stock markets or other continents involving other areas of financial aspects are inconclusive.

Broadly, the range of issues studied on unlisted and listed penny stocks from the US have given promising insight to these academically neglected stocks. Though these studies have explored loads of information on the financial characteristics and asset pricing properties, the findings of these studies cannot be generalized for the Asian markets based on two focal points:

i. Penny stocks in the US are traded on the OTC markets such as the OTCBB and the OTC marketplace as well on the listed stock exchanges (NYSE, AMEX and NASDAQ). In Asian markets, penny stocks are listed stocks traded on the electronic securities exchanges. In the exchange markets, there is a regulator through which transactions are completed thus ensuring the security of the transaction and less price manipulations. OTC markets are more prone to fraud and dishonest traders and lack of good public information (Ang et al., 2013; Bhattacharyya & Chandra, 2016). In addition, OTC based companies are permitted to disclose less (Brüggemann et al., 2016, Bushee & Luez, 2005, Jiang et al., 2014, Leuz et al., 2008, Litvak, 2009, Luft et al., 2001) and because of this, transparency is not comparable to financials for exchange-listed companies as in Asian markets.

ii. The Asian equity market structure is independent of one another and vary on the uniqueness of securities traded (Khan et al., 2015). Even the clientele compositions among the Asian equity market are predominantly institutional in the developed countries (Australia, Hong Kong, Japan, Singapore) and largely retail in emerging markets in China, Korea, Malaysia, Taiwan, Thailand (Pavabutr et al., 2014). Almost all emerging and advance markets in Asia show a high composition of penny stocks (refer to Table 1.1 and Figure 1.1). As such, both institutional and retail investors play a vital role in the trading of penny stocks in Asian markets. This is in contrast to the US markets where on average only 29% of the listed penny stocks are held by institutional investors (Liu et al., 2015). Such a difference in clientele structure is bound to affect the inter-relationship among trading variables in each market as small and large investors have heterogeneous preferences in trading.

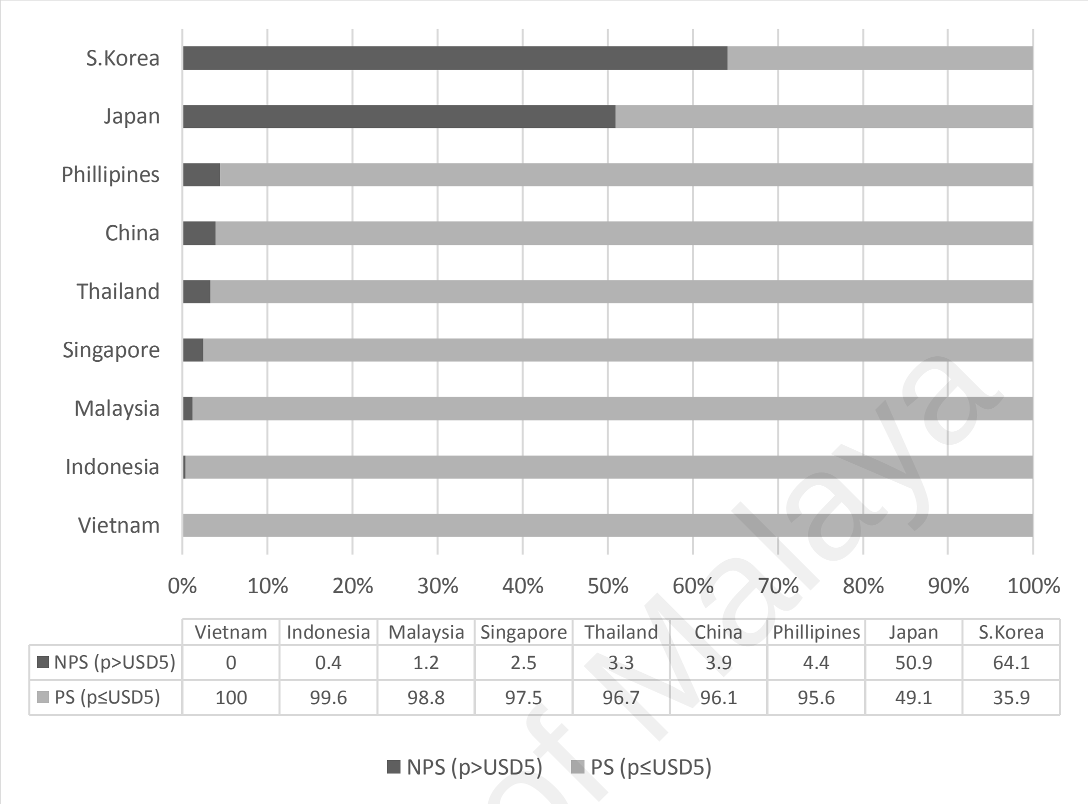
This implies that since a significant part of stocks traded in the Asian stock markets are penny stocks (refer Figure 1.1), their price movement and trading activities have important impacts on the whole market. As such, the equity market structure upon which penny stocks exists in the Asian markets are different from the US. The findings from the unlisted penny stocks from OTC market or even the listed penny stocks from the US cannot be generalized for Asian markets. Furthermore, Asian equity markets are not created equal and they are distinguished by differentials in performance, growth and style (Khan et al., 2014). The uniqueness of these markets certainly warrants individual studies in each market in terms of market trading prices and performances.

Table 1.1: Summary of Decile and Composition of Penny Stocks (PS) and Non-Penny Stocks (NPS) in Selected Asian Stock Markets

	Vietnam			**Indonesia**			**Malaysia**			**Singapore**			**Thailand**			**China[3]**			**Philippines**			**Japan[3]**			**S. Korea**		
Decile	**N**	**Mean** ***(USD)***	**Med** ***(USD)***	**N**	**Mean** ***(USD)***	**Med** ***(USD)***	**N**	**Mean** ***(USD)***	**Med** ***(USD)***	**N**	**Mean** ***(USD)***	**Med** ***(USD)***	**N**	**Mean** ***(USD)***	**Med** ***(USD)***	**N**	**Mean** ***(USD)***	**Med** ***(USD)***	**N**	**Mean** ***(USD)***	**Med** ***(USD)***	**N**	**Mean** ***(USD)***	**Med** ***(USD)***	**N**	**Mean** ***(USD)***	**Med** ***(USD)***
1	35	1.29	1.16	48	1.45	0.68	82	3.01	2.04	59	7.59	3.11	66	7.92	3.47	166	5.23	4.44	27	9.12	2.64	78	159.42	21.73	81	289.41	178.44
2	35	0.82	0.82	48	0.28	0.26	82	0.87	0.86	59	1.35	1.34	66	1.01	0.95	166	2.52	2.50	27	1.01	0.93	78	12.25	11.63	81	61.27	59.02
3	35	0.66	0.66	48	0.16	0.16	82	0.56	0.55	59	0.87	0.87	66	0.56	0.55	166	2.01	2.01	27	0.35	0.34	78	8.62	8.61	81	31.50	29.86
4	35	0.55	0.55	48	0.10	0.10	83	0.39	0.40	59	0.65	0.65	67	0.36	0.35	166	1.71	1.71	27	0.19	0.19	78	6.89	6.87	81	18.79	18.32
5	35	0.49	0.49	49	0.07	0.06	83	0.29	0.29	59	0.50	0.49	67	0.25	0.26	167	1.49	1.49	27	0.12	0.12	78	5.64	5.59	81	11.78	11.90
6	35	0.43	0.43	49	0.04	0.04	83	0.22	0.22	59	0.36	0.36	67	0.17	0.16	167	1.30	1.30	27	0.08	0.08	79	4.63	4.65	81	7.36	7.28
7	35	0.39	0.39	49	0.03	0.03	83	0.17	0.17	60	0.27	0.27	67	0.12	0.11	167	1.13	1.12	27	0.05	0.05	79	3.68	3.68	81	4.92	4.80
8	35	0.35	0.35	49	0.02	0.02	83	0.13	0.13	60	0.19	0.19	67	0.08	0.08	167	0.96	0.96	27	0.03	0.03	79	2.76	2.73	81	3.67	3.76
9	36	0.30	0.30	49	0.02	0.02	83	0.09	0.09	60	0.11	0.10	67	0.05	0.05	167	0.81	0.82	28	0.02	0.02	79	2.01	2.05	81	2.16	2.16
10	36	0.22	0.24	49	0.01	0.01	83	0.05	0.05	60	0.04	0.04	67	0.03	0.03	167	0.56	0.59	28	0.01	0.01	79	1.00	1.10	81	0.97	0.98
Total	352	0.55	**0.46**	486	0.22	**0.05**	827	0.57	**0.25**	594	1.19	**0.43**	667	1.05	**0.20**	1666	1.77	**1.39**	272	1.09	**0.10**	785	20.58	**5.06**	810	43.19	**9.19**
NPS *(P>USD5)*	0.0%			0.4%			1.2%			2.5%			3.3%			3.9%			4.4%			50.9%			64.1%		
PS *(P≤USD5)*	100.0%			99.6%			98.8%			97.5%			96.7%			96.1%			95.6%			49.1%			35.9%		
Total	100.0%			100.0%			100.0%			100.0%			100.0%			100.0%			100.0%			100.0%			100.0%		

Data source: Datastream (Author's computation)

1. *Mean and Median stock price are average monthly closing prices from the respective equity markets for the period of 2010-2015*
2. *Composition of PS and NPS is based on the standards of US SEC. Stocks traded below USD5.00 benchmark are categorized as PS.*
3. *Stock data of China and Japan covers only Shanghai Stock Exchange and Tokyo Stock Exchange respectively.*



Country	Vietnam *(%)*	Indonesia *(%)*	Malaysia *(%)*	Singapore *(%)*	Thailand *(%)*	China[2] *(%)*	Philippines *(%)*	Japan[3] *(%)*	S.Korea *(%)*
NPS *(pr > USD5)*	0	0.4	**1.2**	2.5	3.3	3.9	4.4	**50.9**	**64.1**
PS *(pr ≤ USD5)*	**100**	**99.6**	**98.8**	**97.5**	**96.7**	**96.1**	**95.6**	49.1	35.9
Median Stock Price *(USD) (refer Table 1.3)*	**0.46**	**0.05**	**0.25**	**0.43**	**0.20**	**1.39**	**0.10**	**5.06**	**9.19**
Stock Market Capitalization[1] *(USD Trillion)*	0.05	0.35	**0.38**	0.64	0.37	4.46[2]	0.24	4.41[3]	1.27

1.Stock Exchange Market Capitalization as at 31 Dec, 2015.
Total value of market capitalization of all 17 stock exchanges in Asia : USD23.04 Trillion
Total value of market capitalization for 9 selected Asian countries above : USD12.7 Trillion (54.9%)
Source : http://money.visualcapitalist.com/all-of-the-worlds-stock-exchanges-by-size/
2.Market capitalization for China covers only Shanghai Stock Exchange
3.Market capitalization for Japan covers only Tokyo Stock Exchange.

Figure 1.1: A Composition of Penny (PS) and Non-Penny Stocks (NP) in selected Asian Stock Markets
Source: Datastream (Author's computation)

1.2 PROBLEM STATEMENT

1.2.1 Vital Existence of Penny Stocks in Asian Market Region

The pronounced existence of low-price denomination stocks in recent decade in equity markets particularly in the Asian region is prominent. It is found that most of the stock exchanges in this region have an average median stock price of below USD1.00 with more than 90% of their stocks priced below USD5.00. Table 1.1 shows the computation of mean and median stock prices for a selected group of Asian stock markets comprising of South Korea (Korea Stock Exchange); Japan (Tokyo Stock Exchange); China (Shanghai Stock Exchange); Philippines (Philippine Stock Exchange); Thailand (Stock Exchange of Thailand); Singapore (Stock Exchange of Singapore); Malaysia (Bursa Malaysia); Indonesia (Indonesia Stock Exchange); and Vietnam (Ho Chi Minh Stock Exchange). The total market capitalization of these selected equity markets sums up to USD12.7 Trillion (as at 31 Dec 2015) which is almost 55% of total market capitalization of all stock exchanges in Asia (USD23.04 Trillion) and is representative of major equity markets in the Asian region (Caproasia, 2015). As shown in Table 1.1, the average stock prices for the period between 2010 and 2015 were computed and grouped into ten deciles for easier comparison and interpretation. With the exception to South Korea and Japan, the average median stock price for the period of 2010 to 2015 are below USD1 for equity markets of Malaysia, Singapore, Thailand, Indonesia, Philippines and Vietnam. By comparing with the standards of US SEC on minimum listing price of USD1.00, almost 80% to 90% of listed stocks in these equity markets would have been delisted. Even China, ranked within the top five largest stock exchanges in the world (Caproasia, 2015; Carpenter, Lu & Whitelaw, 2015) and categorized as one of the main drivers of global trading activity for year 2015 (WFE, 2016) has an average median price of USD1.39 with 30% of its listed stocks below the median price of USD1.00. By adopting the standard of US SEC where the stocks with trading price of below USD5.00 are benchmarked as penny stocks, the same selected markets show a glaring existence of penny stocks of between 95% and 100% with the exception of the Japanese and South Korea equity markets (refer Figure 1.1). Nonetheless, almost 40% to 50% of stocks in Japan and South Korea are under the category of penny stocks.

Although there are spur wide-spread interests on penny stock among the investors in the Asian market region especially in Malaysia market, studies on penny stocks in Asia are inconclusive from academia namely in the areas of asset pricing implications, market microstructures and penny stock Initial Public Offering (IPO) perspectives. Empirical evidence of listed penny stocks from other Asian stock markets are inconclusive. The studies involving Asian markets can be traced to two pertinent studies namely Pavebutr et al. (2014) and Bhattacharyya and Chandra (2016). Pavabutr et al. (2014) studied the microstructural factors in Asia Pacific equity markets while Bhattacharyya and Chandra (2016) studied the return dynamics of penny stocks from corporate governance perspective in the Indian stock market. Nevertheless, both studies did not specifically elaborate the stringent characteristics of penny stocks in the Asian market. In the Asian market, a significant part of the stocks is observed to have small price denominations, as such, their trading activities and price movements seem to have important impacts on the whole market (Pavabutr et al., 2014). Studies of penny stocks in the Asian markets should not be maligned and economic impact of these stocks remained unexplored by academic research in this part of the region. This study is an effort towards analyzing the prevalence of risk-return relationship and the economic forces of penny stocks in the context of Malaysia.

1.2.2 Choice of Malaysian Stock Market as The Focus of Study

Despite the volatile global financial environment and domestic uncertainties, Malaysia has been rated by Bloomberg as the world's 5th most promising emerging markets in 2015 and is the 1st among the ten ASEAN countries ("Keynote Address at Invest Malaysia 2015", 2015). In recent years, Malaysian economy has been characterized by trends towards greater openness to world trade, greater financial development, increasing liberalization and higher degree of financial integration (Choo et al., 2011; Tuyon & Ahmad, 2016).

1.2.2.1 Malaysia Capital Market

Malaysian capital market grew considerably from MYR2.08 trillion in 2010 to MYR3.20 trillion in 2017 (Securities Commission Malaysia 2017 Annual Report). The figure which is equivalent to 2.4 times the size of the domestic economy, also reflects the good performance of Malaysian economy during this period ("Why Malaysian Equities", n.d). Based on this improvement, Malaysian capital market has been ranked the fifth largest in Asia on a Gross Domestic Product (GDP) adjusted basis (Securities Commission Malaysia 2017 Annual Report). Despite the challenges in maintaining public trust and confidence of the investors in the market, the Malaysian capital market has remained resilient. The continuous growth of the Malaysian capital market of 53.8 percent between 2010-2017 reflects the importance of the capital market as the source of financing and corporate fundraising for firms in Malaysia (Securities Commission Malaysia 2017 Annual Report). Evidently, the importance, seriousness and the commitment of the Malaysian government to improve the financial markets has gained global recognition as Malaysian capital market has been placed 1st for Financial Market legal rights; 4th for

Financial Market Development and 8th for ease of financing through the equity market as in the World Economic Forum of Global Competitiveness Report 2016 ("Keynote Address at Invest Malaysia 2015", 2015; "Global Competitiveness Report 2015", 2016).

1.2.2.2 Malaysia Stock Market

The Malaysian stock market that is known as Bursa Malaysia is one of the most prominent emerging markets in the Asian region (Tuyon & Ahmad, 2016). Bursa Malaysia's market capitalization rose rapidly from RM 1285 billion to RM 1695 billion between 2011 and 2015 (Bursa Malaysia Annual Report 2015, p.12). It was ranked as the top ASEAN fundraiser with the total fund raised amounting to USD5.45 million for 2015 (Bursa Malaysia Annual Report 2015, p.9). Table 1.2 and Figure 1.2 show the stock market capitalization of Bursa Malaysia in USD billion and the percent of GDP between 2010 and 2015. It is important to note that Bursa Malaysia has steadfastly played its function as a vital avenue for fundraising and investing and has maintained its ranking as the 3rd in terms of stock market capitalization in percentage of GDP after Hong Kong and Singapore between 2010 and 2015 ("Malaysia: Stock market capitalization percent of GDP", n.d).

Table 1.2: Bursa Malaysia Market Capitalization from 2010 – 2015

	2010	2011	2012	2013	2014	2015
Stock Market Capitalization *(Billion USD)*	408.69 [7]	395.62 [7]	466.59 [7]	500.39 [7]	459.00 [8]	382.98 [8]
Stock Market Capitalization *(Percent of GDP)*	160.26 [3]	132.78 [3]	148.39 [3]	247.90 [3]	135.76 [3]	129.29 [3]

Data source: The World Bank ("Malaysia: Stock market capitalization ..", n.d) (Author's computation)

Figures in parenthesis shows the ranking of Malaysia among other equity markets in Asia.

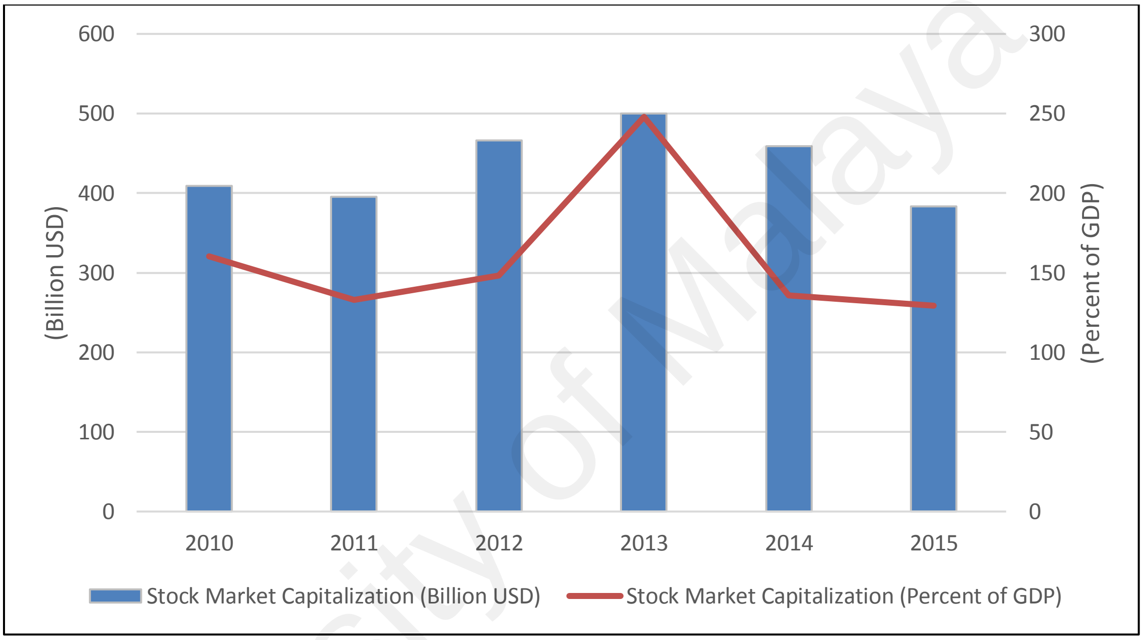


Figure 1.2: Bursa Malaysia Market Capitalization from 2010 – 2015

Source: *The World Bank ("Malaysia: Stock market capitalization ..", n.d)]* (Author's computation)

Although Bursa Malaysia provides an organized platform for those who wish to participate especially in selling and purchasing of equities, it is filled with low priced stocks. Table 1.3 shows the average stock prices from 2011 to 2015 in USD at Bursa Malaysia. It is evident that low price stocks dominate the Malaysian stock market as average median price of stocks at the Bursa Malaysia is below USD0.30 between 2011-2015. It is noted that the median stocks in the upper price decile comprising of 10% - 15% are slightly over USD2.00. By adopting the benchmark pricing of penny stocks as set by US SEC at USD5.00 and below, it is found that almost 98% of stocks traded at

Bursa Malaysia are penny stocks with a market capitalization of between USD380 – USD490 billion. (refer Table 1.3 and Figure 1.3)

Table 1.3: Bursa Malaysia Average Stock Prices From 2011-2015

Decile	2011			2012			2013			2014			2015		
	N	**Mean Price *(USD)***	**Median Price *(USD)***	**N**	**Mean Price *(USD)***	**Median Price *(USD)***	**N**	**Mean Price *(USD)***	**Median Price *(USD)***	**N**	**Mean Price *(USD)***	**Median Price *(USD)***	**N**	**Mean Price *(USD)***	**Median Price *(USD)***
1	94	2.805	2.142	92	3.115	2.115	90	3.356	2.147	90	3.352	2.191	90	2.999	2.120
2	94	0.929	0.891	91	0.908	0.865	90	1.062	1.052	90	1.075	1.047	90	1.042	1.044
3	93	0.553	0.545	91	0.543	0.529	90	0.640	0.625	90	0.695	0.682	89	0.637	0.630
4	93	0.380	0.375	91	0.379	0.380	90	0.444	0.446	90	0.486	0.477	89	0.437	0.438
5	93	0.265	0.262	91	0.269	0.267	90	0.316	0.322	90	0.368	0.371	89	0.330	0.331
6	93	0.207	0.209	91	0.199	0.198	90	0.220	0.221	89	0.268	0.268	89	0.248	0.251
7	93	0.152	0.152	91	0.145	0.145	90	0.160	0.159	89	0.202	0.200	89	0.179	0.180
8	93	0.111	0.111	91	0.109	0.107	90	0.116	0.115	89	0.147	0.146	89	0.125	0.124
9	93	0.072	0.072	91	0.072	0.073	90	0.078	0.080	89	0.093	0.092	89	0.080	0.078
10	93	0.033	0.033	91	0.034	0.036	90	0.037	0.039	89	0.040	0.041	89	0.032	0.031
Total	**932**	**0.553**	**0.233**	**911**	**0.580**	**0.232**	**900**	**0.643**	**0.257**	**895**	**0.675**	**0.312**	**892**	**0.614**	**0.282**
NPS ***(pr>USD5)***	1.2% [USD4.75]			1.2% [USD5.60]			1.6% [USD8.00]			1.5% [USD6.9]			1.1% [USD4.2]		
PS ***(pr≤USD5)***	98.8% [USD390.9]			98.8% [USD461.0]			98.4% [USD492.4]			98.5% [USD452.1]			98.9% [USD378.8]		
Total	**100.0%**			**100.0%**			**100.0%**			**100.0%**			**100.0%**		

Figures in parenthesis represents stock market capitalization of the respective stock (Billion USD.

Data source: Datastream (Author's computation)

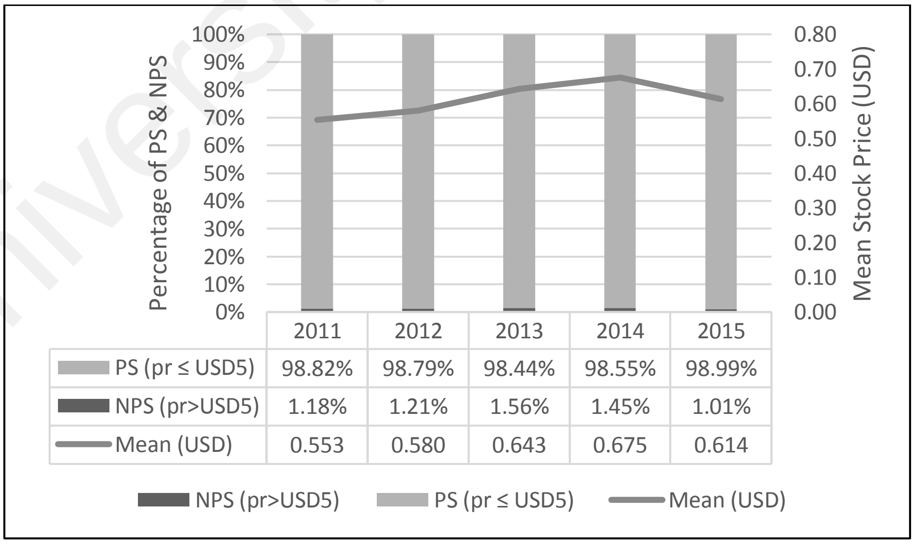


Figure 1.3: Bursa Malaysia Market Capitalization from 2010 – 2015
Data source: Datastream (Author's computation)

On a broader look at the Asian markets, the prevalence of penny stocks (if we adopt the definition of US SEC) is not an isolated phenomenon faced by Malaysia. As depicted in

Figure 1.1, with the exception of Japan and South Korea, the glaring composition of penny stocks is also a common sight in those selected Asian markets. Even China, noted to be the relatively advanced and top-ranking market in the region has an average median price of below USD5.00 with 30% of its listed stocks below median price of USD1.00. With the influx of penny stocks in these markets, it's perplexing to note that Bloomberg's news on best emerging markets of 2014 has listed China, South Korea and Malaysia as the best emerging market countries with the average growth of GDP of 5% and above ("The 22 Most Exciting Emerging Markets in The World", 2014).

The preponderance of stocks with low price denominations in the Malaysian stock market is closely related to two pertinent reasons, namely clientele preferred trading range and cheap IPOs. As an emerging market, Malaysian clientele composition is predominantly retail (Pavabutr et al., 2014). Studies by Amihud, Mendelson and Uno (1999) and Pavabutr and Sirodom (2010) have documented the preference of the retail investors' for small price denomination securities. They have concluded that this preferred trading range is an important attribute to the significant existence of low priced stocks as it is seen as huge potential for profits by high risk investors (ibid). Penny stocks are deemed high risk mainly because of low liquidity, information asymmetry, and uncertainty related to the fundamentals of the offering companies (Liu et al., 2011, 2013, 2015). The asymmetric information leads to under valuation and low priced stocks. Low priced stocks essentially enable aggressive investors to opt for the right kind of penny stocks that exhibit huge profit potential. Penny stock are highly risky but they may also carry high potential for returns and cheaply available, hence, they can be invested easily by even small retain investors. Therefore, penny stocks are regarded as a tempting investment choice among the small retain investors in Malaysia.

Notwithstanding, the prominent presence of penny stocks in the Malaysian equity market is also closely related to cheap IPOs. Yong (2016) in his studies of cheap IPO in Malaysia observes that fixed-priced IPO in Malaysia serves as a unique situation upon which the price of an IPO is fixed cheaply prior to its offering to attract more potential buyers especially small or retail investors. Such offering as observed by Yong (2016) results in more speculative trading activities due to its "cheap" perception, hence there is higher initial return and higher price spread compared to IPOs with high offer price. The results of Yong's study imply that investors can benefit significantly from investing in IPOs with low offer price and this justifies the clientele preferred trading range as mentioned by Amihud et al. (1999) and Pavabutr and Sirodom (2010) for Malaysia. It is clear that the composition of the clientele of the Malaysian stock market comprises of both institutional and retails investors trading with a significant part of stocks being penny stocks. Such differences in terms of stock composition is bound to affect the inter-relationship among the trading variables such as price movement, trading activities and economic forces.

The Malaysian stock market witness dramatic growth over the years, making it a leading stock exchange in ASEAN (Bursa Malaysia Annual Report 2015). However, there are hardly any empirical studies thus far on Malaysian based penny stocks. Although related studies on Malaysian stock market depicting large and small stocks, but none of these studies have directly or indirectly discussed the existence nor the economic impact of penny stocks in Malaysia. Studies of Choo et al. (2011) relates to the spillover effect between large and small stocks in Bursa Malaysia but the sample data adopted to depict the large and small stocks is questionable. Choo et al. (2011) defines stocks listed in the KLCI main board as large stocks versus KLCI second board as small stocks, thus ignoring the description of stock pricing Studies of Ong et al. (2018) also found small firms to generate extra returns as compensation for the size risk premium but no direct reference is made to link small firms and penny stocks in Malaysia. As a rapidly growing emerging market with unique political and cultural settings, Malaysia's stock prices may behave differently from those of developed stock markets with the single-cultural setting (Bialkowski et al., 2012; Chui et al., 2010). The existing literature pertaining to risk-return analysis for Malaysia's stock market has several limitations, namely these studies do not identify stocks of different sizes and prices when explaining the stock market returns. Notwithstanding, finance literature on penny stocks are biased towards US. Though empirical evidence on listed penny stocks from the US from Liu et al. (2011, 2013, 2015), Rhee and Wu (2012) have given conclusive insight to these academically neglected stocks, but these findings are confined to US financial markets and cannot be generalized for the Asian markets due to inherent differences in the financial environment prevalent in Asian markets. The dominance of penny stock in Malaysia is explicit and will have an important impact on the whole stock market and yet their impact on the market is largely unknown. As such, it is imperative to understand the prevalence of risk-return relationship and economic forces in the case of cheap and low priced stock in Malaysia. This study is therefore conducted to fill the research gap in the financial literature of penny stocks in Malaysia.

1.3 RESEARCH OBJECTIVES AND QUESTIONS

The existence of penny stock in the Asian equity markets is preponderous (as seen in Figure 1.1), with the exception to China, Japan and South Korea. The dominance of penny stocks in the Asian equity markets is not a new phenomenon but is a prolong resurgence of low priced stocks which have become part and parcel of the trading environment in Asia (Pavabutr et al., 2014). The uniqueness of Asian equity market trading prices (penny stocks) certainly warrants individual studies in each market in terms of market performances and asset pricing implications.

The empirical evidence on various issues involving penny stocks is fragmented and biased towards the US market venues. Though these studies encapsulate the characteristics of listed penny stocks in a specific manner, it is defined according to the market conditions and regulations in the US. Generalizing these characteristics to other equity markets namely in Asia would be preposterous. The Asian equity market's independent structure, varying uniqueness of securities traded and difference in clientele composition is bound to affect the trading activities and price movements of the whole market (Pavabutr et al., 2014). As such, the equity market structure on which penny stocks exists in the Asian markets are different from the US. The scarcity of existing literature on penny stocks especially in the Asian markets has further spurred the interest to fill the gap of in knowledge in this region in the area of risk and returns, asset pricing implications and other economic attributes.

Though the prominence of penny stock is evident in the Asian market region, studies involving penny stocks have received little research interest until very recently. Only two studies have attributed to the prevalence of penny stocks in the Asian stock markets. Study by Pavabutr et al. (2014) is a cross-country comparison of the market microstructure aspects in the Asia Pacific region. The only individual study involving penny stocks is by Bhattacharyya and Chandra (2016) that has explored the implications of asset pricing theories and behavioral biases on the Indian penny stocks. Though these studies have contributed to the scarcity in literature on penny stocks in Asia, wider spectrum of financial details and characteristics of penny stocks in the Asian market region need to be documented. As the Asian markets differs in their uniformity and are distinguished by differentials in equity market performance, differential growth in stock market valuations and by style (Khan et al., 2015), individual empirical evidence involving penny stocks from Asian stock markets should be prioritized.

Malaysia has an impressive economic performance consolidating its position within the top 20 in the world among the most competitive economies and is highest ranked among the developing Asian economies since 2011 (WEF, 2016). Nevertheless, Malaysia is also one of the Asian equity markets that is also plagued by the phenomena of low priced stocks. The persistent existence of low priced stocks in Malaysia raises pertinent question on the characteristics of Malaysian based penny stocks. Do Malaysian penny stocks differ much with the US pennies in terms of performances? Is there any significance in the size, value and momentum premiums between penny and non-penny stocks in Malaysia? And is there any significant impact from macroeconomic forces for penny stocks in Malaysian markets? These are some of the intriguing details this study wishes to answer. Notwithstanding, this study is an effort to contribute more individual empirical evidence for penny stocks in the emerging market for Malaysia. These objectives are discussed in detail in the following sections.

1.3.1 First Part

To Investigate the Performance of Penny and Non-Penny Stocks in Malaysian Stock Market in Terms of Return and Risk Premiums

Capital markets of any economy of the world play a crucial function in the monetary intermediation by stabilizing the financial sector and provide an essential investment channel for domestic and foreign capital (Ali et al., 2015). As such, the stock market serves as a valuable tool for the mobilization and allocation of capital that is critical to the efficiency and growth the economy (Nkoro & Uko, 2013). In this context, the Malaysian stock market known as Bursa Malaysia is one of the most prominent emerging markets in the Asian region (Tuyon & Ahmad, 2016) and have steadfastly played its function as a vital avenue for fundraising and investing between 2010 and 2015 (Malaysia: Stock Market Capitalization, n.d). Nevertheless, an impending scenario that has plagued Bursa Malaysia is the dominance of low priced stocks with an average median price of below USD0.30 between 2011and 2015. In fact, it has been found that almost 98% of stocks traded at Bursa Malaysia during this tenure are penny stocks (refer to Table 1.3 and Figure 1.3).

Malaysia does not stand alone in the phenomena of low priced stocks that has plagued the stock markets in Asia (except for Korea and Japan) (refer Table 1.1). The composition of low priced stocks (or penny stocks) at the Bursa Malaysia and the evaluation of its market performances has seldom been a subject of study. The paucity of information and scarcity of research on penny stocks in the Malaysian market has spurred the interest of this study to conduct and compare details of the performance of penny and non-penny stocks.

As there is hardly any study on penny stocks in Malaysia, this study seeks to provide an identification criterion for penny stocks by means of a price rule. The selection of this price rule will be maintained and adopted in the creation of penny and non-penny stocks' portfolio to examine the effect of the price level on stock performances and financial characteristics. The portfolios are classified into three penny stock portfolios and three non-penny stock quintile portfolios based on the identification criteria for penny stocks and ranking of average monthly closing prices. Besides the excess returns or risk-adjusted returns (R_m -R_f), other financial characteristics addressed are risk premiums as highlighted in the asset pricing theories such as beta (risk), size premium (Small Minus Big), value premium (High Minus Low), momentum premium (Winner Minus Loser), profitability premium (Robust Minus Weak) and investment premium (Conservative Minus Aggressive) without controlling these variables for various risk factors. Primarily, this part investigates the returns and risk premiums that can explain the degree of strength and differences between the penny and non-penny stocks' portfolios in the Malaysian stock market.

The research questions for this part are:

1. Is there a significant difference in returns between penny and non-penny stocks in the Malaysian stock market?
2. Is there a significant difference in the risk premiums between penny and non-penny stocks in the Malaysian stock market?

1.3.2 Second Part

To Analyze the Returns and Risk Premiums between Penny and Non-Penny Stocks in Malaysian Market

There has been great concern on the pricing of common stocks in the finance literature. The well documented asset in pricing literatures has thus far, given importance in analyzing and explaining the price impacts of financial assets namely the easily tradable large capital liquid assets. The traditional single-factor model of asset pricing such as Capital Asset Pricing Model (CAPM) assumes that assets, particularly stocks, are easily traded with very little price impact against trading (Sharpe, 1991). However, this traditional view is no longer viable as researchers have begun to consider several anomalies such as size (market capitalization), value (book-to-market), liquidity and momentum effects by developing multi-factor asset pricing models. The Asset Pricing Models (APM) such as three-factor, four-factor and even the five-factor over the years have empirically taken into account the risk premium attributed to several factors (Banz, 1981; Carhart, 1997; Fama & French, 1992, 1993, 2015; Jegadeesh & Titman, 1993;

Rosenberg, Reid & Lanstein, 1985; Rouwenhorst, 1999). One of the confounding findings from these models is the attribution of risk factors to price fluctuations and return differentials among stocks of different sizes (Bhattacharyya et al., 2016).

It is a known fact in the traditional asset pricing theory that for every risk factor, there is be a risk premium and there is an association between risk and expected returns. Synthesizing this relationship, it is imperative that higher the risk associated on that asset, the higher should be the expected returns. However, Buffa, Vayanos and Wolley (2014) have observed that many asset managers have generated a negative relationship between risk and return as they raise the volatility of overvalued assets. Correspondingly, Buffa et al. (2014) find the positive risk-relationship holds true across markets for the large-cap and mid-cap stocks that are highly liquid in terms of tradability with little price impact, but when it comes to stocks that are not so liquid, this notion is invalid. The stocks which are less liquid, cheap and that are much sort after by investors may essentially show a different pattern of behavior. With this background, it becomes imperative to understand if this positive risk-return relationship prevails in the case of stocks which are cheap and known as penny stocks.

Although asset pricing literatures have documented the role of several risk factors as well as behavioral factors in determining the returns, there are very few studies have focused on penny stocks. Typically, researchers tend to ignore the examination and explanation of the small, low-valued stocks for their dynamics of risk-return, citing the reasons of data biasness (Hwang & Qian, 2010) or lack of information and transparency (Liu et al., 2013). In the same manner, this issue is rarely investigated in the Malaysian stock market. As such, this research is one of the first attempts to explore how these factors interplay in penny and non-penny stocks. Furthermore, the results are distinct and will show how even for a small sample of listed penny stocks, these traditional as well as unique risk factors are important indicators on the behavioral tendency of such stocks. By using the three asset pricing models, namely three-factor (Fama & French, 1993), four-factor (Carhart, 1997) and five-factor (Fama & French, 2015) and together with a modified six-factor model, this study will test and compare the variations of risk-return dynamics in terms of size, value, momentum, profitability and investment premiums of penny and non-penny stocks that are traded on the Bursa Malaysia. The models are tested on portfolios formed on price threshold characteristics set for penny and non-penny stocks in this study.

The research questions for this part are:

1. Which risk premium is able to explain the return variations for penny and non-penny stocks in the Malaysian stock market?

2. Which asset pricing model is able to capture the return variations for penny and non-penny stocks in the Malaysian stock market?

1.3.3 Third Part

To Investigate the Impact of Macroeconomic and Non-Macroeconomic Variables on Penny and Non-Penny Stocks in the Malaysian Market

Notably, stock markets play a dynamic role in the economic growth. They are also crucial in developing a stable and well-organized financial structure of an economy (Eston 2016; Patel, 2012). The dynamic role of stock market is twofold namely promoting economic growth by serving as a veritable source of capital circulation for an economy (Asaolu & Ogunmuyiwa, 2010; Haroon & Jabeen, 2013; Mankiw, 2011; Rezazadeh, 2016) and acting as an intermediary between investors and borrowers to smoothen the reallocation process of funds (Ismail et al., 2016; Issahaku, Ustarz & Domanban, 2013).

This increasing role of stock markets in an economy encourages academics to investigate the relationship between the stock markets and the economy. It has been noted that economic factors have a significant impact on the performance of stock markets (Basci, 2013; El-Nader & Alraimony, 2012; Ismail et al., 2016; Venkatraja, 2014). This observation is supported by empirical evidence that macroeconomic variables have significant impact on the stock prices (Abdullah & Hayworth, 1993; Alam, 2013; Antonios, 2010; Babayemi et al., 2013; Bilson et al., 2001; Chen et al.,1986; Dhakal et al., 1993; Fama,1981,1990; Flannery & Protopapadakis 2002; Gan et al., 2006; Geetha et al., 2011; Hooker, 2004; Humpe & Macmillan, 2009; Khan et al., 2015; Lekobane, 2014; Mukherjee & Naka, 1995; Mahmood & Dinniah, 2009; Muradoglu et al., 2000; Naik & Phadi, 2012; Nikkinemi et al., 2008; Nisha, 2015a; Park & Ratti, 2000; Peiró, 2016; Ratanapakorn, 2000). These macroeconomic variables have explanatory power to reveal the variations in stock returns in both developed and developing markets (Chaudhuri & Smiles, 2004). It is beyond any doubt that stock markets of all countries are affected by different macroeconomic variables in different intensity according to the country's openness, development level, geographical location and political regimes (refer to Appendix 2A, 2B, 2C and 2D).

Malaysia has an impressive economic performance consolidating its position within the top 20 most competitive economies in the world and is also one of the highest ranked among the developing Asian economies since 2011 (WEF, 2016). Malaysia's stock market, known as Bursa Malaysia has been accorded the advanced emerging market status since 2011 in the FTSE Global Equity Index Series (Azman, 2017; The Editor, 2010). It is considered as one of the largest stock markets in South East Asia with 829 listed companies offering a wide range of investment opportunities to both domestic and international investors (Bursa Malaysia, 2012). Convincingly, the dynamism and sustainability portrayed by Bursa Malaysia has underscored the attractiveness of the

Malaysian capital market as a listing destination and a regional hub to access the 625-million strong ASEAN market place (Azman, 2017). Although Bursa Malaysia garners tremendous opportunities, it is also one of the Asian equity markets that is plagued with the influx of low priced stocks (refer Figure 1.1). The prominent existence of low priced stocks in the Malaysian stock market raises pertinent questions on the viability of the vital of these low priced stocks in the economic prosperity of Malaysia namely in fostering capital formation and sustaining economic growth. Stock prices are widely believed to be the predictor of economic activity (Janor et al., 2005). The formation and the variation of stock prices is considered as a barometer for national economies and as a manifestation of the economy and business performance (Karacaer & Kapusuzoǧlu, 2010; Sukruoglu & Nalin, 2014). On this pretext, the interdependence among the macroeconomic factors and these low priced stocks in the Malaysian stock market deserves to be probed. The question is, to what extent and in what ways will these low priced stocks or penny stocks react to changes in macroeconomic variables as compared to non-penny stocks in a developing country like Malaysia? This is the intriguing question this study attempts to answer by examining the relationship between penny and non-penny stocks at the Bursa Malaysia with a range of macroeconomic and non-macroeconomic variables.

In view of the research gap identified for studies in the macroeconomic-stock returns literature for an emerging market like Malaysia, the third objective of this thesis aims to extend the existing studies by analyzing the relationship between macroeconomic and non-macroeconomic variables on the returns of penny and non-penny stocks for the Malaysian stock market.

The research questions for this part are:

1. Whether the returns of penny and non-penny stocks react differently to similar selected macroeconomic and non-macroeconomic variables?

2. Whether there is a long-run relationship between the selected macroeconomic and non-macroeconomic variables with the returns of penny and non-penny stocks in the Malaysian stock market?

3. Whether there is a short-run causality between the selected macroeconomic and non-macroeconomic variables with the returns of penny and non-penny stocks in the Malaysian stock market?

1.4 CONTRIBUTION OF THE STUDY

This research is undertaken to investigate the determinants of performance of penny and non-penny stocks in the Malaysian stock market from the asset pricing theory's perspective. The detailed analysis and the findings from this study will fill an important gap in understanding the factors that influence the performance of penny and non-penny stock in an emerging market. Such an understanding is important to equip financial managers with applied knowledge on the determining factors that affect the performances of firms based on pricing differences and to undertake appropriate measures in the portfolio management. From an empirical point of view, it provides an important data for comparing determinants of performance of penny and non-penny stocks between developed and developing economies.

Firstly, in the absence of a formal criteria to identify penny stocks, this study is undertaken to create its own identification criterion for penny stock in the context of Malaysia. The selection of the price threshold for penny stocks in Malaysia is based on theoretical importance and empirical justifications. The selection of this price rule was further adopted in the creation of three penny stock portfolio and three non-penny stock quintile portfolios based on the ranking of average monthly closing prices to examine the effect of price level on stock performances and financial characteristics. Notwithstanding, the detailed analysis of Malaysian based penny and non-penny stocks provides important characteristics of these stocks for comparison purposes of penny stock from other market regions. Evidently, this serves as a distinct empirical and theoretical contribution in the penny stock financial literature.

Secondly, this study helps to understand the risk premium that adequately explains the variation for penny and non-penny stocks' return in the Malaysian stock market context. Effectively, the collective use of the three asset pricing models namely three-factor, four-factor and five-factor together with a modified six-factor models is used to test and compare the risk-return dynamics. As this is the first study using this model, it can enlighten on the risk premiums involving penny and non-penny stock returns in Malaysia. Since Malaysia is one of the emerging economies, the risk premiums identified will provide knowledge to the potential investors about the key factors which affect share prices in Malaysia and accordingly assist them in optimizing their investment strategies and diversification benefits for this class of financial assets. The use of the modified six-factor model in this study serves to contribute to the literature of the theoretical aspects of asset pricing literature too.

Thirdly, this study differs from previous studies in the empirical analysis to investigate the impact of macroeconomic and non-macroeconomic variables affecting penny and non-penny stocks in Malaysian stock market. It adopts the non-macroeconomic forces with the common macroeconomic variables in analyzing their significance towards the stock returns of penny and non-penny. This dynamic approach is combined with the advanced methodological approach of the Autoregressive Distributed Lagged (ARDL) model. Both the statistical and economic significance of the factors affecting penny and non-penny stock in an emerging market like Malaysia was given due emphasis.

Notwithstanding, this study is also an effort to analyze how returns on penny and non-penny stock portfolios of different categories or groups react to different types of macroeconomic and non-macroeconomic forces. The empirical results of this study may be used as valuable information for local and global stock investors in developing a view on the economy so as to facilitate their financial planning process.

1.5 ORGANISATION OF THESIS

This thesis is organised in the following manner. Chapter one provides an introduction and background of the study. Chapter two discusses the theoretical background adopted in the analysis of this study namely, the Capital Asset Pricing Model and Asset Pricing Theories. This chapter also summarizes the existing literature on the characteristics of penny stocks, the various factor models adopted in asset pricing theories and the impact of macroeconomic variables on stock analysis. Chapter three describes the methodology, sampling and data collection of three sections. Chapter four, five and six presents the empirical results for the three sections respectively. Chapter seven discusses the results and provides the implication and further recommendations.

CHAPTER 2

THEORETICAL AND LITERATURE REVIEW

2.1 INTRODUCTION

This chapter undertakes to review evidence from the relevant asset pricing theories and empirical literatures. It begins with introduction of the related asset pricing theories employed to model the relationship between the risk and return of stocks. Subsequently, it presents literature related to the Three-Factor Model, Four-Factor Model and Five-Factor Model for the time series regression approaches along with their implications for asset pricing, focusing mainly on the empirical results rather than econometric methodologies. Next, the existing literature related to economic explanations of stock returns and the asset pricing models are discussed and evaluated. Finally, the chapter discusses the perspectives of behavioral finance in asset pricing, especially in explaining size, value, and momentum anomalies.

2.2 DEVELOPMENT OF FACTOR PRICING MODELS

Factor pricing models have steadfastly explained the risk premiums which can be observed in the market. These models are built from the assumptions of rational investors whose utility increase in consumption but at a decreasing rate (Cochrane, 2005). An investor with a high wealth level is said to have a higher marginal benefit of consumption during bad economic times compared to good times. This is compounded by the fact that firms that do well during bad times are highly valued by the rational investors who eventually seek opportunities to obtain a proportional stake in it to increase his wealth level and corresponding consumption. Subsequently, the high demand of assets that can provide high returns during bad economic times (categorized as low beta assets) will eventually increase the prices of these assets. In the same note, prices of assets with high beta or low returns during bad economic times will see the fall of their prices. These dynamics explain the creation of risk premiums which is deemed as a compensation to investors for taking the risk when investing in high beta assets.

Markowitz (1952) has published the earliest model of portfolio selection that is based on the assumption that investors are risk averse and a portfolio selected by the said investors at time *t* will generate expected returns at time *t+1*. Further, he continues to elaborate that the selection of portfolio should be applied on a mean-variance efficiency as risk averse investors are mainly interested in the mean and variance of their stock returns (ibid.). The efficient portfolio that is suggested by Markowitz (1952) compels investors to identify a portfolio that maximises the expected return within a specified portfolio variance.

2.2.1 Capital Asset Pricing Model

Treynor (1962), Sharpe (1964), Lintner (1965) and Mossin (1966) have adopted the seminal work of Markowitz's theory of portfolio selection (mean-variance preferences and portfolio diversification). They have proposed in their separate studies a conventional model to explain the cross sectional variation in stock market behaviour called the Capital Asset Pricing Model (CAPM) (ibid.). CAPM is an attempt to give a theoretical explanation for risk premiums and utilizes intuitive and easy to use predictions quantifying the systematic risk while highlighting the relationship between the systematic risk and expected returns.

CAPM has two basic underlying assumptions integrated within the theory. The first is expectations of all investors about the state of the economy is the same and the second is the same interest rate is possible for risk-free lending and borrowings. These two underlying assumptions are coupled with another assumption that says all investors possess diversified portfolios to create an existence of a perfect capital market. These investors trade at the risk-free rate of return though in reality this is rarely the case.

According to CAPM, an efficient portfolio involves a combination of a risk-free asset and a single risky tangency portfolio (market portfolio). Thus, investors have the option to spread the unsystematic risk of their investment (which is the diversifiable risk inherent in each investment) by adjusting their investment volume in the risk-free asset. Consequently, Sharpe (1964) and Lintner (1965) assume that the market portfolio must be in line with the minimum-variance frontier. The minimum-variance condition for N number of assets is given by this equation:

$$E(R_{i,t}) = R_{f,t} + [E(R_{M,t}) - R_{f,t}]\beta_{i,M} \qquad i = 1,2,.....N \qquad .... (1)$$

In the above equation:

- $E(R_{i,t})$ is the expected return on asset i;
- $R_{f,t}$ is the risk-free rate;
- $E(R_{M,t})$ is the market portfolio's expected return; and
- $\beta_{i,M}$ is the market beta of asset i.

Correspondingly, $\beta_{i,M}$ is the covariance of return on the i^{th} asset with the market return $[COV(R_i, R_m)]$ divided by the variance of the market return $\sigma^2(R_{M,t})$ or $[\beta_{i,M} = \frac{COV(R_i, R_m)}{\sigma^2(R_{M,t})}]$. According to CAPM, it can be deduced that the expected return on the asset is equivalent to the risk-free asset plus a market risk premium. Figure 2.1

below illustrates the investment or portfolio opportunities as described in the CAPM model.

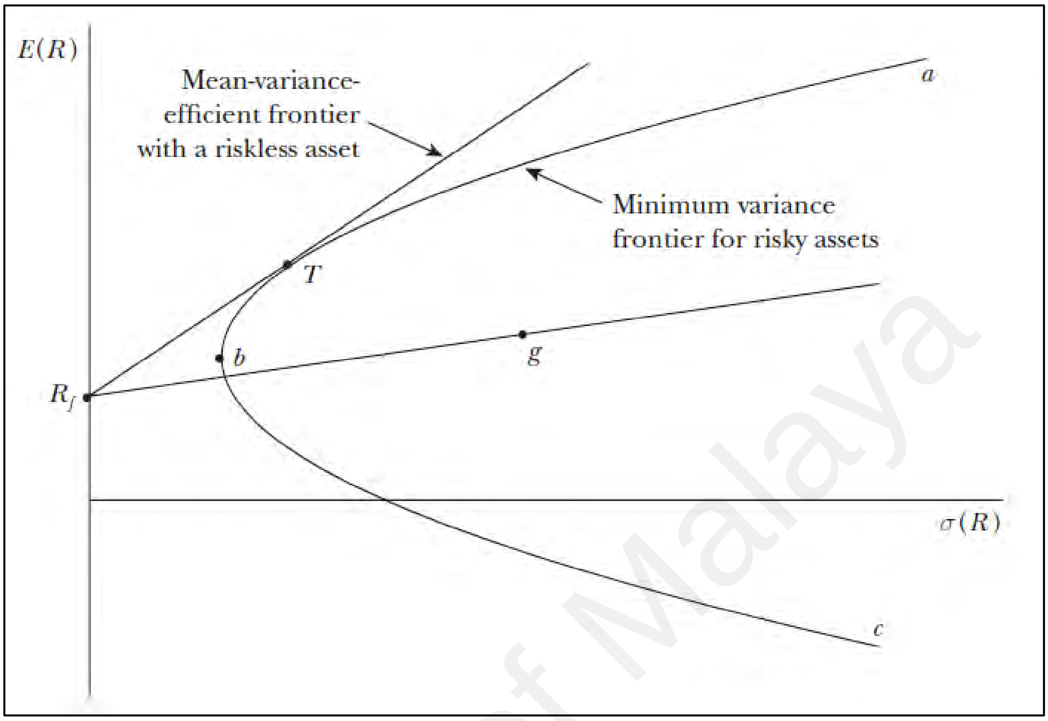


Figure 2.4: Investment Opportunities under CAPM
Source: Fama, E. F., & French. K.R, (2004). The Capital Asset Pricing Model: Theory and Evidence. Journal of Economic Perspectives, 18(3), 25-46.

The vertical and the horizontal axes in Figure 2.1 show the expected return [*σ(R)*] and portfolio risk (measured by the standard deviation of portfolio return) [*E(R)*] respectively. The curve *abc* represents the minimum variance frontier which denotes the combination of the expected return and the risk for portfolios of the risky assets depicting minimum return variance at different levels of expected return. Assuming that there is no risk- free borrowing or lending, then an investor with high expected return at point a is faced with the prospects of high volatility. Inversely, point T reflects an intermediate expected return with lower volatility. In the same breath, only portfolios above ***b*** along the ***abc curve*** are construed as mean-variance-efficient as these portfolios maximize expected return with the given return variances. Once the risk-free borrowing and lending is added, then the efficient set converts into a straight line from R_f through ***g*** as shown in Figure 2.1.

2.2.2 Black's (1972) Version of CAPM

Black (1972) modified the CAPM to exclude risk-free transactions by permitting the short sale of risky assets without any restrictions in his research on capital market equilibrium. His seminal work was based on the assumptions that efficient assets will make up an efficient portfolio, and accordingly the market portfolio is construed as efficient too. The essential take-away from modified CAPM by Sharpe (1964), Lintner (1965) and Black (1972) is that the difference in expected returns are only affected by the market beta. CAPM takes into consideration the systematic risk and upon which an investor with an effective diversified portfolio is able to eliminate the unsystematic risk. Though CAPM has been subjected to constant empirical research and testing, it is still a well-established theoretical model depicting the relationship between a stock or portfolio's expected return and the systematic risk. Even after almost half a century, CAPM has been considered a reliable model to quantify discount rate for investment appraisal and the cost of equity in contrast to other methods namely the dividend growth model and the weighted average cost of capital methods.

Though CAPM is considered a better model for investment appraisals, however, the use of a single risk factor for market portfolios has brought in a barge of criticisms and is often called an "empirical failure" (Fama & French, 2015). This limitation of the CAPM has raised objections as researchers believe that a single risk factor is inadequate to accurately capture systematic risk (Merton, 1973). In addition, Fama and French (2004) have argued that the empirical failure of CAPM is based on its theoretical basis with over-simplified assumptions and empirical implementation difficulties. Their argument is that CAPM involves the risks of the assets are quantified relative to the market portfolios, omitting various other theoretical factors such as financial assets, real estate, consumer durables and human capital. However, it is virtually impossible to construct a portfolio integrating all the above-mentioned factors. Another question put forth on the failure of the CAPM model is whether the market portfolio is limited to the inclusion of assets of one country or from other countries around the world.

2.2.3 Alternative Models to CAPM: Intertemporal Capital Asset Pricing Model and Arbitrage Pricing Theory

Harping on the weakness of CAPM, two main theoretical approaches have been developed namely Intertemporal Capital Asset Pricing Model (ICAPM) and Arbitrage Pricing Theory (APT).

Developed by Merton (1973), the ICAPM explains that the single-period CAPM is a special case of the ICAPM when investment opportunities are deemed to be constant. Merton (1973) also highlights that the interest rate, which is a component of investment opportunities is stochastic which means that the ambiguity and possible fluctuations of interest rates are unavoidable. As such the ICAPM concludes that the assumption of CAPM of constant investment opportunities is not plausible and a single market portfolio is inadequate to identify systematic risk. Weighing on this, Merton (1973) has developed an equilibrium model to illustrate the expected return that is a function of exposure to market and other risks that arise from changes in the opportunities in future investment. A crucial feature of ICAPM as compared to CAPM is that the expected excess return of an asset will never be zero as long as it has a zero-market beta.

The second theoretical alternative to CAPM known as the Arbitrage Pricing Theory (APT) was developed by Ross (1976). This model assumes that asset returns are a linear combination of the returns of multiple systematic risk factors and asset-specific return. Ross (1976) elaborates that the idiosyncratic risk can be diversified by holding portfolio instead of single assets and the returns will only incorporate the asset's exposure to factor risk. He further sums up that in the absence of arbitrage, an asset's excess return is the total of the factor risk premiums, weighted with the degree to which it co-varies with the respective factor. The setback of both ICAPM and APT models are the unknown state variables which define the systematic risk and the subsequent risk premiums (Treynor, 1993).

2.2.4 Identified Anomaly Variables

Validity test on the standard CAPM by two notable groups of researchers namely Jensen et al., (1972) and Fama and MacBeth (1973) shows the competency of this model in explaining the cross-sectional stock returns and the market portfolio and the ability to propitiously capture the systematic risk. It has become apparent that the two-step cross sectional regression methodology which has been proposed by Fama and MacBeth (1973) is known as the standard technique of testing cross-section of stock returns due to its econometric appeals. Nevertheless, this method is inadequate and cannot be applied in various corporate finance settings when assets are held for long periods of time.

Inadvertently, researchers have unearthed pertinent problems with CAPM's inability to explain the various anomaly variables identified by them. Among the identified anomalies includes size effect, earning-to-price (E/P) ratios, book-to-market (B/M) ratios, leverage and dividend yield. The size effect on stock βs as reported by Banz (1981) shows higher returns that are associated with stocks of small market capitalizations as compared to larger market capitalized stocks. Basu (1977, 1983) found that stocks with higher E/P ratio garners higher positive abnormal returns as compared to stocks with lower E/P ratio. In the same breath, Rosenberg et al. (1985) has further substantiated another anomaly by discovery of identical outcomes with the B/M ratio. A notable research by Bhandari (1988) has disputed the theories of CAPM by pointing out that the leverage (total book value of debt divided by the market value of equity), is crucial in the explanation of average stock returns and is unaffected by market beta and size. In the same manner, Campbell and Shiller (1988); Fama and French, (1988,1996) have verified that the dividend yield (dividend-to-price ratio) has the ability to forecast the expected stock returns. The aforementioned ratios contain the market price of stocks as a common variable in their computations. As the stock's price illustrates the possible outcomes of future cash flows, volatile prices may result in the fluctuating returns and CAPM should be able to explain these fluctuations in average returns. However, this inability only proves that β alone is inadequate to identify the fluctuations in average equity returns. It can be concluded that the one factor market portfolio in CAPM has failed to capture the systematic risk.

Further, by taking different approach compared to previous studies, Fama and French (1992) conducted a comprehensive study to determine if CAPM can explain the abnormal returns on all the identified firm-specific anomalies in previous research. After subjecting CAPM to a series of tests and a detailed review of all the firm-specific anomalies, they have arrived at the conclusion that market β is irrelevant and has no role in explaining the average stock returns. Moreover, they have also concluded that the variables such as size, B/M, E/P, and leverage have significant explanatory power on stock returns when applied individually. And leaping further into the multidimensional view on the risk-return relation in rational asset pricing, Fama and French (1992) have found significant explanatory power in the cross-section of the stock returns involving multivariate regressions of size and B/M ratios.

2.2.5 Fama and French (1993)'s Three-Factor Model

Extending their earlier seminal studies, Fama and French (1993) have developed an empirical asset pricing model, named the Three-Factor Model (3F). The standard asset pricing models work forward that is from assumptions about investor tastes and portfolio selections to predictions about the measurement of risk and the said relation between expected return and risk. But in the 3F model developed by Fama and French (1993), a different take is noted. Based on the theoretical foundation of Dividend Discount Model, the unique feature of the 3F model is that it is an empirical model that works backwards as it takes the pattern of average returns and propose models to capture them. So, the 3F model is designed to capture the relation between average return-size and average return-B/M anomalies.

Average Return-Size Anomaly (Size Effect)

One of the market anomalies highlighted in the 3F model is the size effect. Size effect refers to the inverse or negative relation between asset returns and the market value of the asset. The said relation explains that small capitalization stocks have higher mean returns than large capitalization stocks. The description here is that the small capitalization stocks are riskier as compared to large capitalization stocks due to the lack of information and the discrepancy in capturing the standard measurement of risk of these stocks. The first to highlight the size effect was Banz (1981) who has reported that smaller firms have higher risk adjusted returns on average than the larger ones. Banz (1981) conjectures the size effect to the lack of available information about small firms which hinder investors to hold their stocks and limit their diversification, thus giving higher return for the undesirable stocks of small firms. Additionally, Fama and French (1992) reported that firm size has given a good explanation of cross-sectional stock returns in the US market. Later, Fama and French (1993, 1995) highlighted that a negative firm size effect seemingly on the basis that of the firm size and the B/M ratios are mere proxies for non-diversifiable factor risk. Their research findings also relate that small firms are more sensitive to economic changes and are more effected by adverse economic conditions. Subsequently, small firms are riskier than the larger ones and the risk of these firms (smaller firms) may not be captured by a market index.

Average Return-B/M Anomaly (Value Premium)

The other form of market anomaly is the value premium that refers to the higher return of value stocks over growth stocks. Briefly, the assets with higher B/M ratio (value stocks) are said to outperform assets with low B/M ratios (growth stocks). This argument is supported by Fama and French (1992) who have explained that value premium is the compensation for bearing risk. In their subsequent study, Fama and French (1996) noted that stocks with high B/M ratios are more susceptible to financial distress, hence are riskier that growth stocks.

A host of empirical findings support the notion that value stocks outperform growth stocks. Capaul et al. (1993), Haugen and Baker (1996) and Bauman et al. (1998) found that the value stocks outperform growth stocks in several developed markets. Notwithstanding, Fama and French (1998)'s out-of-sample test in 16 emerging markets confirmed this notion too. Nevertheless, studies in Asian markets have yielded mixed findings. Study on Japan stock market by Chan et al. (1993) found significant positive relation between value effect and expect return, however, the return predictability cannot be ascertained in the asset pricing model. Bauman et al. (1998) reported insignificant value premium for Singapore and Hong Kong. Ding et al. (2005) reported mixed findings with regard to the value premiums in their studies on the value and growth portfolios in 7 East Asian countries prior to the Asian Financial Crisis. They found insignificant (zero) value premiums in Taiwan and Indonesia; negative premium for Thailand and positive significant value premiums for Japan, Singapore, Hong Kong and Malaysia. Interestingly, the post-crisis period studies by Brown et al. (2008) in four developed Asian markets of Taiwan, Korea, Hong Kong and Singapore found the value premiums to be greater. They concluded that high volatility during the crisis period understates the value premium (ibid.). An explanation to the average return-B/M anomaly or the mispricing pattern can be deduced to long periods of time. Shleifer and Vishny (1997) argued that this market anomaly may diminish when investors become knowledgeable about the return patterns and the strategy being used. Eventually, the anomalies are easily accepted when the horizon is short and the return pattern is not volatile.

Three-Factor Model and Its Application

To capture the size (market capitalization) and B/M anomalies, Fama and French (1993) have constructed the Small Minus Big (SMB) and the High Minus Low (HML) factors for size and value premiums respectively by using a 2x3 double sort portfolios based on size and B/M ratio. The following equation describes the relation between the returns and risk as forwarded in the 3F model.

$$R_{it} - R_{Ft} = a_i + b_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + e_{it.} \quad \text{..……..} \quad (2)$$

In the above equation:

- R_{it} is the return on security or portfolio i for period t;

- R_{Ft} is the risk-free return; R_{Mt} is the return on the value-weighted (VW) market portfolio;
- SMB_t is the return on a diversified portfolio of small stocks minus the return on a diversified portfolio of big stocks and commonly known as (Small Minus Big);
- HML_t is known as (High Minus Low) is the difference between the returns on diversified portfolios of high and low *B/M* stocks; and e_{it} is a zero-mean residual.
- s_i and h_i are the slopes of the multivariate regression of $R_{it} - R_{Ft}$ on SMB_t and HML_t If the sensitivities b_i, s_i and h_i to the portfolio returns in (2) capture all variation in expected returns, the intercept a_i is zero for all securities and portfolios ***i***.

Using monthly time-series regressions, Fama and French (1993) provided empirical evidence that the 3F model can successfully capture average returns on 25 Size-B/M sorted portfolios. In addition, Fama and French (1995) demonstrated that weak firms with incessant low earnings tend to have high B/M with positive slopes on HML as compared to strong and persistently high earning firms with negative slope on HML. Primarily, they concluded that HML captures the variation of the risk factor related to earnings performance. In their subsequent study, Fama and French (1996) applied the 3F model to identify existing asset pricing anomalies (ibid.). Adopting their similar approach of the time-series regression, they found the 3F model is able to explain the variation in the average portfolio returns sorted on single sorts of E/P, B/M, cash flow-to-price (C/P), five-year sales growth and the long-term past return variables and double sorts of sales growth and E/P, B/M and C/P variables. Also, it is noted that stocks with low long-term returns (defined as loser stocks) have positive SMB and HML slopes and higher future average returns. They are smaller and financially distressed firms. Inversely, the winner stocks with high long-term returns have negative slopes of HML and low future returns.

Nevertheless, Chan et.al. (1996) and Jegadeesh and Titman (2001) pointed out that the 3F model has a shortfall in explaining the momentum returns as documented by Jegadeesh and Titman (1993).

2.2.6 Carhart (1997)'s Four-Factor Model

Considering the shortcomings of 3F model to explain the momentum returns highlighted by Jegadeesh and Titman (1993), Carhart (1997) made further improvements on the model by introducing an additional factor namely momentum. Added with the ability to capture the momentum anomaly, the modified model was named as Four-Factor Model (4F).

Momentum Effect

The momentum anomaly refers to a temporal pattern of prior stock returns which have the explanatory power in the cross section of stock returns. Simply, the momentum effect states that a strong uptrend in the past returns will possibly continue to move up in the near future. Additionally, stocks with an impressive performance between 3 to 12 months tend to perform continuously well in near future. It is perceived that once the investors are hyped in the acceleration of a stock's price and the earnings, they are likely to take a long or short position in that stock with the hope that its momentum effect will continue either in an upward or downward direction (Carhart, 1997).

Jegadeesh and Titman (1993) examined the short-term momentum in stock returns and found that stocks with higher returns for the past 12 months (called the winner stocks) tend to have higher future returns as compared to stock with lower returns (loser stocks) in the same tenure. Correspondingly, Jegadeesh and Titman (1993, 2001) also found that a positive return of 1% per month over 3 to 12 months holding period is generated by momentum strategies and these abnormal returns are independent of market, size or even value factors. Defining in the spirit of Jegadeesh and Titman (1993), Carhart (1997) has extended Fama and French (1993)'s 3F model to include a momentum factor in addition to market, size and value premiums. The coefficient of the momentum factor is positive and statistically significant.

Empirical evidence of momentum is abundant in the asset pricing literatures. To begin with, momentum in industry return has been reported by Moskowitz and Grinblatt (1999) and it has been found that high momentum industries outperform low momentum industries in the next 6 months. Studies by Rouwenhorst (1999) in 12 European stock markets, Lui et al. (1999) in UK stock market, Lee and Swaminathan (2000) in US stock market and Chui et al. (2000) in 7 Pacific-Basin countries have reported the success ventures of momentum strategies in the respective markets. However, it is also found that momentum strategies generate profits in the sub-sample due to over-reaction of the asset prices, thus suggesting that returns on winners' portfolio as compared to the losers' portfolio that are due to their higher risk. On the Asian front, studies by Kang et al. (2002) and Naughton et al. (2008) have also found evidence of substantial momentum profit in China.

Four-Factor Model and Its Application

The momentum factor which is identified as Winner Minus Loser (WML) is calculated by the difference between winner and loser stock portfolios. Both these models have been examined in depth by researches using both time and cross-sectional regression tests with the application of the two-step approach of Fama and MacBeth (1973). The augmented model's equation is thus represented as below:

$$R_{it} - R_{Ft} = a_i + b_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + w_i WML_t + e_{it.} \quad \ldots\ldots\ldots\ (3)$$

WML stocks in the equation (3) above represents the momentum factor as advocated by Carhart (1997) whereby it is the expected return on the zero-cost portfolio capturing the momentum anomaly and w_i is the time-series slope from the multivariate regression.

2.2.7 Fama and French (2015)'s Five-Factor Model

In 2015, Fama and French revamped their well-known 3F asset pricing model in explaining stock returns. Two additional factors namely profitability and investment were added to the original 3F model which became known as Five-Factor model (5F). The inclusion of these two factors stemmed from the evidences which show the shortcoming of 3F model as it did not account for profitability and investment in regard to the variation in average returns. Fama and French (2015) revisited the 3F Model and infused two new factors to develop the five-factor asset pricing model. The profitability factor is a proxy representing stocks of companies with a high operating profitability that perform better. The investment factor denotes stocks of companies with high total asset growth that have below average returns. Both the new factors are concrete examples of what are popularly known as quality factors. The equation of the 5F model is presented as below.

$$R_{it} - R_{Ft} = a_i + b_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + e_{it.} \quad \ldots\ldots\ (4)$$

Referring to equation (4) above, the two additional factors introduced by Fama and French (2015) namely the profitability and investment factors are represented by *RMWt* (the return spread of the most profitable company minus the least profitable) and *CMAt* (the return spread of firms that invest conservatively minus firms that invest aggressively) respectively. r_i and c_i are the time-series slopes of the multivariate regression.

One of the important findings of the new model is that companies that are small, profitable and value companies with no major growth prospects seem to attain the highest expected returns (Fama & French, 2015). The 5F model has two main setbacks. Firstly, the model is unable to capture the low average returns on small stocks whose returns are projected like big invested firms in spite of their low profitability. Secondly, the performance of the model is indifferent to the way its factors are defined (Fama & French, 2015).

2.3 TIME-SERIES AND CROSS-SECTIONAL ASSET PRICING TESTS

2.3.1 Time-Series Tests On 3F, 4F and 5F Models

The relationship between risk and return have long been a topic for research in the finance literatures. Researchers have been seeking financial models that quantify risk and have translated that risk into estimates of expected return on equity (Mullins, 1982). On this note, since the introduction of the CAPM, continuous efforts have been taken by researchers to evaluate the validity of this model, thus bringing in unique breakthrough and valuable contributions to the finance literature. It is noted that several empirical studies gave supports to the principles of CAPM, however, there are a few studies gave constructive criticisms and contradictions to the model (Petros, 2012). These differences have served as a major stimulating factor to Fama and French (1993) to integrate the SMB and HML factor into their 3F model. These two factors were identified based on returns from six portfolios in which sorted out by Fama and French (1993) into two size groups and three B/M groups. They have identified the factors by using the median size and have sorted out the 30th and 70th percentiles of B/M ratio of all NYSE stocks for size and the B/M breakpoints respectively. The SMB returns are is based on the differences of the equally-weighted average of the three small size portfolios and the equally-weighted average of the three big size portfolios. Likewise, the HML returns are the difference between the equally-weighted average of the two high B/M portfolios and the two low B/M portfolios. Their reasoning behind the use of the NYSE stocks as a basis for B/M and size is to avoid the factors being overwhelmed by small stocks on the NASDAQ.

As mentioned earlier, the inability of the 3F model to explain momentum profits prompted Carhart (1997) to augment the 3F model with Jegadeesh and Titman (1993)'s one-year momentum factor to evaluate the performance of mutual funds. Known as the Carhat (1997)'s 4F model thereon, it was reported that the average returns on 27 portfolios sorted out on size, B/M and momentum have lower pricing errors in the time-series regression approach compared to both the CAPM and 3F models. However, improvements on the construct of SMB, HML, and WML factors have been discovered and discussed in the finance literatures, especially in countries outside of the US. The prime argument for the divergence from Fama and French (1993)'s method is the lack of NYSE equivalent proxy stocks (with big market capitalization) in countries other than the US (Aretz et al., 2010; Griffin, 2002; Hou et al., 2011; Liew & Vassalou, 2000). There are also differences in international studies with regards to the definitions of B/M, size, and momentum factors. Additionally, discrepancies on in sorting out stocks into portfolios have also been raised as accounting methods and financial year end dates varies among countries (Aretz et al., 2010; Daniel et al., 2001; Hou et al., 2011; Liew & Vassalou, 2000; Petros, 2012).

Notwithstanding, the Fama and French (1993) approach to factor construction has been challenged. Daniel and Titman (1997) produced a counter argument for the initial results of Fama and French (1993, 1996) and proved that firm characteristics, such as size and B/M ratio are better suited to explain average stock returns rather than the factor mimicking risk factors of SMB and HML (ibid.). To prove their points, Daniel and Titman (1997) have divided 45 portfolios into three B/M, three sizes, and five pre-formation factor loading groups (either the SMB or HML). The results obtained have shown that the returns are identical for portfolios with similar characteristics but have differed for SMB and HML factor loadings. Furthermore, they have concluded that the expected returns and the factor loadings are not interrelated and do not have any positive relation after the controlling of the B/M and size variables. Daniel and Titman (1997)'s arguments on the factor construction approach clearly contradicts the argument put forward by Fama and French (1993, 1996). Further, they pointed out that returns to the characteristics arise because they are proxy for the non-diversifiable factor risk and that the characteristics themselves are responsible for cross-sectional variation in stock returns.

In a twist to the findings of the characteristics-based model of Daniel and Titman (1997), Davis et al. (2000) have put forth their arguments that the 3F model best fits the explanation of average stock returns compared to Daniel and Titman (1997)'s model. Using the monthly US data of 68 years from 1929 to 1997, Davis el al. (2000) argued that the empirical evidence adduced by the characteristics-based model of Daniel and Titman (1997) is sample-specific as it is based on short sample periods. Similarly, Lewellen (1999) reported the same results using models based on the B/M ratio and has explained that the 3F model is more well-equipped to identify the time-varying average returns compared to the B/M ratio.

Moving on, compounding evidence from other researchers have suggested that the original 3F model has been deficient as it does not account for profitability and investment in relation to the variation in average returns. Triggered by this evidence, Fama and French (2015) have added two additional factors namely profitability and investment to their original 3F model and have renamed it as 5F asset pricing model. According to Fama and French (2015), the 5F model is able to reveal between 71% and 94% of the cross-sectional variance of expected returns for the size, value, operating profit, and investment factors in the examined portfolios. For analysis that involves abnormal returns, Fama and French (2015)'s investigation revealed that when the value factor is excluded from the 5F model, the model with 4F performs as well as the 5F model. Unpredictably, it has been discovered that the value component in the 5F model is redundant for illustrating the average returns because the value return is captured by the exposure of value to other factors. Nevertheless, the 5F model is still a point of reference for value screen (Blitz et al., 2016). Despite the 5F model failing the Gibbons, Ross and Shanken statistical test (Gibbons et al., 1989), it does perform well because the unexplained average returns for individual portfolios are nearly all close to zero (Rossi, 2015).

2.3.2 Test of the 3F, 4F and 5F Models with International Data

By using the time-series approach and data from 23 developed countries, Fama and French (2012) tested their models and concluded that the regional 3F and 4F models best explain the average excess returns of regional Size-B/M and Size-Momentum portfolios as compared to global versions of the models. Additionally, by excluding microcaps for Asia Pacific and North America, the regional 4F model has proven to explain successfully explain the average excess returns on the regional 25 Size-B/M portfolios for Europe and Japan and 20 Size-B/M portfolios. It is also able to explain the average excess returns of

25 size-momentum portfolios in Japan and 20 portfolios in Japan. Nevertheless, both the global and regional models are still unable to account for the excess returns on size-momentum portfolios of Asia Pacific and Europe. Moreover, Fama and French (2012) have shown showed that only the global 4F model is able to explain the average excess returns on global 25 Size-B/M and 25 Size-Momentum portfolios, excluding microcaps.

Fama and French's (2012) empirical results on the failures of the global models to explain regional average returns show the weakness in terms of integration in asset pricing models across countries. The cause of such shortfall can be due to different accounting data and reporting standard in each country, laws and regulations on trading of equity exchanges culminating into different market structures and differing economic exposures. In addition, the results also how that the asset pricing models may not integrate at a regional level due to their inability to explain regional size-momentum portfolios and microcaps. As such, country specific models may be superior or outperform to regional models.

Griffin (2002) has also subjected the region specific and world versions of the 3F model to a series of tests aiming to identify the average stock returns in the UK, US, Canada, and Japan. His world model factors are the weighted averages of region specific factors weighted by total market capitalisation. The findings prove that region specific 3F model is more suitable to convey average stock returns in contrast to the world model. Griffin (2002) has only subjected his analysis to the 3F model and has made no effort to look into the 4F model. Concurring to this, Hou et al. (2011) have performed a parallel investigation to Griffin (2002) and have concluded that in comparison the world factors are unable to explain local average stock returns.

Fama and French (2015) developed the 5F model directed at capturing the size, value, profitability, and investment patterns in average stock returns. Although a GRS test rejects the model, but for applied purposes it provides an acceptable description of average returns. Empirical test on international markets of North America, Europe, and Asia Pacific provide evidence of an increase in average stock returns with the B/M and profitability but are inversely related to investment. As for Japan, a strong and significant relation is noted between average returns and B/M, but average returns show little relation to profitability or investment. The model's main setback is its failure to capture fully the low average returns of small stocks with returns like those of low profitability firms (Fama & French, 2015, 2016).

2.4 ASSET PRICING LITERATURE BASED ON ECONOMIC THEORY

Following Merton (1973)'s work on ICAPM, Ross (1976) introduced the Arbitrage Pricing Theory (APT) model. Ross (1976) believes that additional risk factors are to be integrated for a more accurate representation and has further argued that the determining factor for average returns can be the covariance of common risk factors with stock returns. Therefore, the higher level of co-movement implies that the factor is representative of systematic risk (ibid.). ICAPM and APT both can assimilate macroeconomic variables as they are essentially the underlying systematic risk factors. Cochrane (2001) has conveyed that the ICAPM and APT models are distinct by their general choice of risk factors. To illustrate, the ICAPM selects state variables which mention the conditional distribution of future returns whereas APT argues for a covariance analysis of returns and macro variables.

The APT model does not require a market portfolio, that can be tested empirically as shown by Roll and Ross (1980). They have used the Principle Component Analysis (PCA) method to discover four pricing factors in APT's return generating process by using individual equity data. It has been revealed that the results are in line with Ross's (1976) prediction which states that the expected returns are dependent on the estimated factor loadings. Burmeister and McElroy (1988) have also proved that APT's risk factors are based on the economic theory.

Chen et al. (1986) have proposed that various factors which do not exhaust the investor's opportunity set have are a possibility to be integrated into the ICAPM model. Factors that affect cash flows or discount rates and others that describe deviation in investor's opportunity set can be considered as variables of ICAPM. They claim that variables such as term spread, shocks to industrial production, real interest rates, and default spread that render market index insignificant, are crucial to explain expected stock returns.

2.5 ASSET PRICING LITERATURE BASED ON BEHAVIORAL FINANCE

A branch of financial knowledge is behavioural finance which is a relatively new field that seeks to explain the reasons for making irrational financial decision. It offers an alternative to traditional finance by taking on a supporting role to explain psychological factors of financial decision making that traditional finance is unable to explain. Traditional finance assumes that people will always undertake rational and profitable actions. However, this assumption is rarely true as investors often undertake irrational and impulsive decisions as documented by behavioural financial economists.

One of the main subjects of behavioural finance is the expectations gap by investors when it comes to stock growth and potential future earnings. Lakonishok et al. (1994) have explained that investors are reliant on past data when assessing viability of stocks and this tends to mislead investors to overvalue stocks. The flip side is also true that investors undervalue stocks leading to lost opportunities. Overall, these value stocks will outperform the growth stocks in later years leading to losses incurred by investors.

Further, Daniel et al. (1998, 2001) have introduced a factor of investor behaviour in financial decision-making stating that the investors overconfidence affects the patterns of stock returns. With an overreaction to private information and subsequently underreaction to public information, anomalies such as the B/M effect occurs. Moreover, they have proved that the continuing overreaction leads to the momentum effect as a positive return autocorrelation that has occurred. In this context, Gervais and Odean (2001) have proposed that investor overconfidence has stemmed from the role of self-attribution bias. The level of self-attribution which leads to overconfidence varies with the amount of success and failures which causes the investor to revise their perception for the reasons behind them, namely their own abilities. Conjuring with the explanation on the confidence of investors by Daniel et al. (1998), Asem and Tian (2010) have stated that higher profits have been reported when the market transits to a different state.

Another facet of behavioural finance has been proposed by Barberis et al. (1998) which is a model of investor sentiment which focuses on the way investors form beliefs. It has been proposed that investors believe in the continuity of the patterns of the small sample they observe while overreacting to random extracted sequences. On the other hand, there is also a possibility of underreaction which occurs when investors underestimate the value of new information which leads to momentum effect.

Hong and Stein (1999) have introduced the positive feedback trading model, where two rational thinking groups of investors interact, but only process a subset of information. It has been proposed a gradual diffusion of private information takes place causing momentum profits. This is due to the fact that investors gain from each other's private information as per the gradual diffusion theory. Hong et al. (2000) support the model as the momentum effect is existent in stocks with small size and low analyst coverage. They argue that this is the cause of slow diffusion of information from the stock firms. This is further supported by Doukas and McKnight (2005) who have found identical results from the sampling of 13 European stock markets. The behavioural co-movement of stock returns theory was proposed by Barberis and Schleifer (2003). The underlying assumption in this theory is that investors group homogenous stocks into specific categories. For example, large-cap stocks are grouped together and investors diversify their investments with stocks of different categories. It can be assumed that noise traders adopt a similar technique, thus the price pressure created results in the common factors in the stock returns. Furthermore, stocks in the same categories co-move together and new stocks are added to the category that will be influenced by the movement of other stocks in the category. To substantiate the theory, Barberis et al. (2005) have provided empirical evidence by illustrating that when included in (excluded from) the Standard & Poor's (S&P) 500 index, the beta of a stock fluctuates with respect to the S&P500. This is due to investors classifying stocks of S&P500 together in a single category.

Ali et al. (2003) have shown that stocks with arbitrage risk have a higher value effect due to their higher idiosyncratic return volatility, lower ownership sophistication and higher transaction cost. Baker and Wurgler (2006) have substantiated the statements of Ali et al. (2003) by proving that these stocks are difficult to arbitrage that leads to mispricing which are also immediately related to investor sentiment.

As to conclude, one of the great concerns in the financial literature is the pricing of common stocks. These concerns have given importance in analysing and explaining the price impacts of financial assets namely the easily tradable large capital liquid assets. Based on the above discussion about the related theories of asset pricing, the traditional single-factor model of asset pricing such as CAPM assumes that assets, particularly stocks, are easily traded with very little price impact against trading. However, this traditional view is no longer viable as researchers have begun to consider several anomalies such as size (market capitalization), value (book-to-market), momentum, investment and profitability effects by developing multi-factor asset pricing models. The Asset Pricing Models such as three-factor, four-factor and even the five-factor over the years have empirically taken into account the risk premium that is attributed to several factors. One of the confounding findings from these models is the attribution of risk factors to price fluctuations and return differentials among stocks of different sizes.

2.6 ACADEMIC RESEARCH INVOLVING PENNY STOCKS

Academic literature involving penny stocks are divided into two distinct categories based on the manner upon which these stocks are traded namely listed and unlisted stocks. A listed security is securities that have been accepted to trade on authorized stock exchanges and meet all of the listing requirements. Bidding and asking prices are posted to an exchange floor and transacted among the basic-to-intermediate investors (CollegeStock, 2017). Exchange styled stock markets or centralized exchanges as its commonly known, are dominant around the world and impeded by a regulator (White, 2016). Notwithstanding, ownership among the institutional investors are predominantly higher than the retail or individual investors for stocks that are listed and traded on an exchange (Liu & Wu, 2012; Pavabutr et al., 2014; White, 2016). The distinction of having higher institutional investors has important implications on the performance of stock exchanges due to the impedance of better disclosure and governance practices among the companies (White, 2016). The impending presence and crucial role of institutional investors are linked to greater monitoring of companies' management (Aghion, Van Reenen & Zingales, 2013), better stock liquidity through increased firm disclosure (Boone & White, 2015), larger stock repurchases and dividend payout (Crane, Michenaud & Weston, 2016) and increased firm value with stringent corporate governance policies (Appel, Gormley & Keim, 2016).

Inversely, unlisted stocks are stocks that do not meet the requirements to be listed on the stock exchanges such as NYSE and NASDAQ (Renault, 2017). It is another broad set of stocks, consisting primarily from smaller firms that are quoted on OTC markets in the US (White, 2016). OTC markets are decentralized markets and securities are quoted and traded through interdealer quotation services. In an OTC market, dealers are active market makers and quote prices which they will buy and sell. Trades that are made between two parties can be discrete without others knowing the price (CollegeStock, 2017). Prices are negotiated and trades are made through various communication modes such as computer networks (emails, social media and applications), phones, and proprietary electronic trading systems ("Over-the-Counter Market", 2013). OTC venues usually have both the customer markets where dealers deal with corporations and institutions and inter-dealer markets where dealers trade with each other. The market structure of OTC venues is divided into two categories and are briefly explained below:

i. Over-the-Counter Buletin Board (OTCBB) is an electronic interdealer system operated by Financial Industry Regulatory Authority (FINRA). Companies seeking eligibility for OTC-BB are required to register the class of securities with the SEC, US and fill-in periodic financial reports to SEC and banking or insurance regulators ("OTCBB", 2017).
ii. Over-the-Counter Markets is another broker-dealers' quotation system that is privately owned by OTC Markets Group Inc[1]. Broker and dealers subscribe to quote

[1] OTC Markets Group was formerly known as the National Quotation Bureau (NQB), established in 1904 to compile, aggregate and publish price information for OTC traded securities. Stock information was distributed on pink sheets of paper; thus this market was referred to as the Pink Sheets. The NQB was sold in 1997 and reappeared in 2000 as Pink Sheets LLC and subsequently to Pink OTC Markets Inc. in 2008 (Davis et. al, 2016). Further structural changes were incorporated in 2011 and became known as OTC Markets Group Inc.

their securities on the OTC Markets through a linked interdealer quotation system (White, 2016). With less stringent discloser requirements, OTC Markets are known as a notorious trading environment with widespread market manipulative activities, frauds and deception (Davis et al., 2016). In view of this, OTC Markets Group have established a tiered system as an effort to provide greater transparency to enhance investor confidence of trading in the OTC marketplace. With the structural changes, OTC securities were organized into one of the three tiers namely OTC-QX, OTC-QB and OTC-Pink on the basis of a self-established eligibility requirement together with initial and ongoing reporting and standards of financial disclosure (White, 2016). The OTC Markets information tier designations are:

- OTC-QX Tier: Companies in this category meet the highest financial standards set forth by the OTC Markets Group – companies need to be current in their disclosures; submit an initial third-party advisory letter verifying the company's disclosure; pay ongoing fees; and have a bid price of at least USD0.10 ("OTCQX U.S. Disclosure Guidelines", 2014). Companies in this tier are not required to register with the SEC as SEC Rule 12g3-2b allows registration exemptions (Davis et al., 2016);

- OTC-QB Tier: Companies in this tier are designated for early-stage and developing U.S companies that do not qualify for OTC-QX tier. Securities on this tier requires companies to be current in their financial reporting; undergo annual verification and management certification process; pay ongoing fees; have a minimum bid price of USD0.01; and are not bankrupt ("The Markets: OTCQB-The Venture Market", 2017).

- OTC-Pink Tier: Those quoted securities that are not designated to the OTC-QX or OTC-QB tiers trade in the OTC Pink marketplace. Bankrupt, development stage and shell companies take into this marketplace where there are no disclosure requirements or financial qualifications ("The Markets: Pink-The Open Market", 2017). OTC Pink companies have variable reporting standards and are either unwilling or unable to provide adequate financial information and better transparency (Davis et al., 2016). With the variable of reporting standards, companies within this tier are further categorized into three sub groups based on the quantity and quality of information disclosed to the investors via the OTC Disclosure and News Service (a platform provided by the OTC Markets Group). The three sub groups ("The Markets: Pink-The Open Market", 2017) are:

a. Pink Current Information – companies in this group follow one or more of the allowed reporting standards and make their fillings publicly available through OTC disclosure platforms.
b. Pink Limited Information – companies under financial distress (facing bankruptcy), financial reporting problems are grouped into this category. These companies still undertake to provide limited financial information through OTC disclosure platforms.
c. Pink No Information – companies in this group are defunct and dark companies with questionable disclosure and management practices. These companies are either unwilling and unable to provide information or the filed information are older than 6 months.

The market structure of OTC venues and its information tier clearly depicts a trading environment which lacks in transparency to investors (Davis et al., 2016).

Academic studies involving unlisted and listed penny stocks are shown in Appendix 1A and 1B respectively. Reviewing the list of academic literature from the appendices, it's imperative that the bulk of the studies have focused on investigating various issues related to unlisted penny stocks that are traded on the OTC markets particularly stocks that are quoted in the Bulletin Board (OTCBB) and the OTC marketplace (formerly known as Pink Sheets).

The burgeoning academic literature related to unlisted penny stocks stems from the concerns of market regulators (SEC) on the trading environment in the OTC markets (Liu et al., 2015). As trading in the OTC market is dominantly held by retail investors (Eraker & Ready, 2015; White, 2016), market regulators are concerned with the lack of transparency to investors and their declining confidence as the trading environment (in the OTC markets) are notorious for deception, manipulation, frauds and spam campaigns (Davis et al., 2016). Researchers have reacted promptly to these concerns and the focus of these studies (on unlisted penny stocks) are shown in the Table 2.1.

Table 2.1: Summary of Area of Research on Unlisted Penny Stocks

No	Area of Research	Academic Study
1	Analyzing the market microstructure and market quality of OTC markets namely the OTC-BB and Pink Sheets and the newly incorporated OTC Markets Group (OTC-QX, OTC-QB and OTC-Pink)	Bollen and Christie, (2009), Brüggemann et al. (2016), Davis et al. (2016), Harris et al. (2008), Luft et al. (2001), Macey et al. (2008)
2	Application of asset pricing theories involving risk and returns	Ang et al. (2013), Bouraoui et al. (2013), Davis et al. (2016), Eraker and Ready (2015), Harris et al. (2008), Leuz et al. (2008), Jiang et al. (2014), Litvak (2009), Luft et al. (2001), Luft et al. (2004), Macey et al. (2008), Massoud et al. (2016), Nelson et al. (2013), Renault (2017)
3	Effects of financial and information disclosure on prices and market quality of OTC markets	Brüggemann et al. (2016), Bushee and Luez (2005), Davis et al. (2016), Jiang et al. (2014), Leuz et al. (2008), Litvak (2009), Luft et al. (2001)
4	Externalities of market manipulation activities by fraudsters with misleading and false information to attract investors	Aggarwal and Wu (2006), Böhme and Holz (2006), Bouraoui et al. (2013), Frieder and Zittrain (2007), Hanke and Hauser (2008), Jain and Jain (2017), Massoud et al. (2016), Nelson et al. (2013), Renault (2017)

5	Behavioural finance involving analysis of OTC market investor characteristics	Brüggemann et al. (2016), Eraker and Ready (2015), Jain and Jain (2017), Jiang et al. (2014), Luft et al. (2004), Nofsinger and Varma (2014)
6	Regulatory proposals for greater transparency to OTC market investors	Bollen and Christie (2009), Brüggemann et al. (2016), Frieder and Zittrain (2007), Leuz et al. (2008), Macey et al. (2008)

There is only a handful of studies involving listed penny stocks (refer to Appendix 1B) in the finance literature. Bulk of the studies involving listed penny are US based and thus far, have been spearheaded by Lui, Rhee and Zhang (2011, 2013, 2015) and Rhee and Wu (2012). These commendable studies are the efforts to investigate a largely overlooked segment of the US equity markets' listed penny stocks. Focusing on NYSE, AMEX and NASDAQ, studies of Liu et al. (2011, 2013 and 2015) have given conclusive characteristics of US based listed penny stocks. These studies have found US listed penny stocks are characterized with small size, high beta, high return, high book-to-market ratio, high idiosyncratic volatility, poor past performance and the liquidity costs of penny stocks and are significantly higher than high priced stocks. Another salient finding of Liu et. al. (2013, 2015) is the high institutional ownership of penny stocks at 29% with each penny stock is owned on average by 27 institutional investors. Other noteworthy findings of Lui et. al. (2011,2013,2015) are the various trading strategies involving the listed penny stocks as compared to non-penny stocks. This finding contradicts the general perception that institutional investors avoid listed penny stocks. Rhee and Wu (2012) provide the empirically perception that institutional investors avoid listed penny stocks and evaluate the effects of the NASDAQ stock market's listing of the maintenance criteria of USD1.00 that is minimum bid price threshold (known as the *one-dollar rule* (ibid.). This study justifies the controversial rule which was introduced in 1991 as it observed the dramatic decline in extreme loss probability among the low-priced (relative to USD1) stocks before and after the rule was introduced. The study also conforms the USD1.00 benchmark as an appropriate cut off point in screening the listed stocks on the exchange evaluates the effects of NASDAQ stock market's listing maintenance criteria of USD1.00 minimum bid price threshold (known as the *one-dollar rule*). This study justifies the controversial rule which was introduced in 1991 as it observes the dramatic decline in extreme loss probability among the low-priced (relative to USD1) stocks before and after the rule was introduced. The study also conforms the USD1.00 benchmark as an appropriate cut off point in screening the listed stocks on the exchange.

There are only two notable studies on listed penny stocks that are available for Asian markets. The first study is by Pavabutr et al. (2014) on market microstructural analysis in Asia Pacific equity markets. The second study by Bhattacharyya and Chandra (2016) is a comprehensive analysis of asset pricing and behavioral biases involving penny stocks in the Indian stock market. The only study involving penny stocks outside the US and Asia is by Urbański et al. (2015) on the Warsaw Stock Exchange (Poland) involving an analysis of asset pricing and portfolio testing. A summary on the area of research involving listed penny stocks is shown in Table 2.2.

Table 2.2: Summary of Area of Research on Listed Penny Stocks

No	Area of Research	Academic Study
1	**Market microstructure** (analysis of firm specific characteristics; ownership, short-sale constraints; stock price trading range; idiosyncratic volatility; liquidity and transaction cost)	• Liu et al. (2011, 2013, 2015) (US) • Pavabutr et al. (2014) (US and Asia Pacific) • Rhee and Wu (2012) (US) • Bhattacharyya and Chandra (2016) (India)
2	**Risk and return** (analysis involving asset pricing models; trading strategies; portfolio risk-return analysis; profitability analysis)	• Liu et al. (2011,2013,2015) (US) • Rhee and Wu (2012) (US) • Pavabutr et al. (2014) (US and Asia Pacific) • Urbański et al. (2015) (Poland) • Bhattacharyya and Chandra (2016) (India)

3	**Behavioural finance** (behavioural biases involving analysis of Aplhabetism)	• Bhattacharyya and Chandra (2016) (India)
4	**Regulatory evaluations** (empirical evaluation of exchange listing standards: NASDAQ'S *one-dollar rule*)	• Rhee and Wu (2012) (US)

The study by Ang et al. (2013) is the only study that undertakes to test theories of cross-sectional return premiums between the market conditions of OTC (unlisted stocks) and listed stock markets (refer to Appendix 1C). On comparing the premiums in listed markets, the study finds that the OTC illiquidity premium is several times higher and the momentum premium is three times lower for stocks that are comparable with size, value, and volatility premiums in both markets. The OTC illiquidity, volatility, value, and size premiums are higher among stocks held predominantly by retail investors than those not disclosing financial information. The study also ascertains the theories that are related to differences in investors' opinions together with limits on shorts sales that are able to explain the differences in these premiums.

As a concluding remark, empirical evidence and the range of issues studied on unlisted and listed penny stocks from the US have given conclusive insight to these academically neglected stocks. Though the US based penny stocks' studies have explored loads of information on various aspects of financial characteristics, these findings are confined to US financial markets and cannot be generalized for the Asian markets or other continents. This is mainly because of the inherent differences in the cultural environment and financial situations prevalent in the different stock markets. Studies involving other areas of financial aspects for penny stocks and in other continents besides US are inconclusive especially in the areas of asset pricing implications, market microstructures and penny stock IPO perspectives.

2.7 STOCK RETURNS AND FIRM SPECIFIC FACTORS

Since the beginning of 1980, extensive studies have been conducted in developed and developing countries to identify the underlying factors that influence the cross-section of market returns. The findings of the literature warrant the significant linkage between firm specific factors and stock returns in the countries examined. The common factors included in the studies are size effect, B/M ratio, P/E ratio and turnover. While the significance of these factors differs from one study to another, nonetheless, the most significant factors were the size and B/M ratio.

2.7.1 Studies of Stock Returns and Firm Specific Factors in Developed Markets

Banz (1981) and Reinganum (1981) are noted to be the first researchers to document the size effect when they found a return premium on small stocks quoted on the NYSE between 1936 and 1975 period. Following this, prominent studies of Brown et al. (1983) in the US and Blume and Stambaugh (1983) in Australia confirmed the size effect or the size premium for their respective countries. The other firm specific factor of B/M effect was first documented by Rosenberg et al. (1985) who found return premium on stocks with high B/M ratios in US stock market. The B/M effect or value premium as it is known was confirmed by several studies both in US (Davis et al., 1994; Lakonishok & Shapiro, 1984) and outside the US (Capaul et al., 1993; Chan et al., 1991). These early findings gave strong footing to the significance of size and B/M effects on expected stock returns.

The most notable studies on the multifactor model was from Fama and French (1992). Known for their critical views on CAPM, Fama and French (1992) published the most popular paper on multifactor model of stock as they were the first to include all the aforementioned factors into a longer-term investigation of data in the US. Their long-term data included the beta, size, B/M and P/E ratio of companies in AMEX, NYSE and NASDAQ from 1963 to 1990. They have found that beta is unable to explain variations in returns while B/M ratio and size were pertinent factors in identifying the variations. Moreover, when size and book-to-market ratio were in the model, P/E ratio and leverage power were ineffective and absorbed. Fama and French (1992) had further concluded that the associated risk premium of the size and BM variables were easily measurable with negative and positive significance respectively. These findings were supported by Dennis et al. (1995).

Fama and French (1993) have moved in with another multifactor model called the Fama-French Three Factor (FF3F) model with the following three distinguished factors, namely the market return; SMB factor representing the return on a portfolio of small stocks minus the return of a portfolio of big stocks; and the HML factor for return on a portfolio with high B/M minus the return on a portfolio with low B/M (HML). Though the FF3F model is rejected at traditional significance levels, but it still captures a fair amount of the variation of expected returns. The established relationship of positive effect of B/M ratio and negative effect of size on the stock returns was is confirmed.

Another comprehensive study by Fama and French (1996) involved the short run continuation and long run reversal of returns. In this study, they showed that all the factors for their 3F model such as market beta and size affect stock returns. Evidently, they had discovered that stock returns had have a reversal effect but no continuation effect. Another seminal work by Fama and French (1998) involved the re-examination and comparing the existence of value premium in thirteen developed market and sixteen emerging markets between the financial periods of 1975 and 1995 and 1987 and 1995. Using B/M equity, E/P ratio, cash flow to price ratio and dividend yield to formulate their portfolios, Fama and French (1998) have adopted two asset pricing models namely

CAPM and ICAPM (also known as two-factor Arbitrage Pricing Theory) and have compared the respective results. It was found that the value premium does exist in both markets and empirically concluded that ICAPM was a better model in explaining the stock returns variation.

Another B/M study investigating the relationship between returns and firm specific factors such as firm size, equity and market beta for the developed market is from Elfakhani, Lockwood and Zaher (1998). Using the Canadian stock market data between 1975 and 1992, this study differs from others as firm specific factors are incorporated to test the tax-loss selling hypothesis. Tax-loss selling was a typical process of selling securities at a loss to write-off a capital gains tax liability. It is established that organizations tend to limit the recognition of short-term capital gains as it is taxed higher than the long-term capital gains. The studies also took into account the effect of tax reduction in 1984 in Canada and promptly divided the analysis period into two sub periods. Using 25 portfolios by crossing beta with size for the research, Elfakhani et al. (1998) have discovered that market beta has no significant effect on returns whereas size and B/M factors have reflected significance on the returns. Additionally, the studies have also found January effect in firm size for all the periods. As for the post-1984 period analysis, B/M effect is apparent but the returns have dropped. This finding is contrary to the tax-selling hypothesis where returns are predicted to surge when tax is reduced.

It is commonly claimed in finance literature that higher B/M values will yield higher returns (Shleifer & Vishny, 1997). Adopting this notion, Ali, Hwang and Trombley (2003) have embarked into the question of why professionals do not exploit stocks with higher B/M values to gain higher returns. Using data from 1976 to 1997, their study undertook to investigate whether arbitrage risk, investor sophistication and transaction cost were the stumbling block preventing the exploitation of mispricing to occur. They have found that when there is low investor sophistication coupled with greater arbitrage risk and transaction cost, then there is a greater ability of B/M ratio to predict the future returns.

Another study involving the Canadian stock market is by L'Har, Masmoudi and Suret (2004). This study has tested the 3F model modified with the momentum variable on the stock market of Canada. They examined the effect of the four factors with the inclusion of market environment and the turn of the year effect. It was found that B/M equity, momentum and size were able to significantly affect returns variations.

Liu et al. (2011, 2013, 2015) conducted a series of studies investigating the relation of penny stock returns with firm specific characters. These studies describe the unique characteristics associated with US penny stocks on AMEX, NYSE and NASDAQ. The US based penny stocks were segregated by their characteristics of high beta, small caps, high B/M ratio, poor liquidity, high idiosyncratic volatility and high return. It was also found that the liquidity costs for penny stocks were two times more when compared to that of non-penny stocks which were determined with Gibbs Effective Transaction Costs approach. When risk factors such as liquidity risk and long and short-term reversals were induced into the asset pricing model, it was found that Fama and French (1993)'s 3F model and Carhart (1997)'s 4F model were unable to capture significant abnormal returns. The studies also found that zero-cost portfolios based on firm characteristics rely on these abnormal returns for profitability despite it being insignificant for the penny stocks in the seven-factor model. Trading strategies are sensitive in nature to portfolio weighting schemes and duration of holding periods.

2.7.2 Studies of Stock Returns and Firm Specific Factors in Developing Markets

Claessens et al. (1995) conducted research on the cross-section of stock returns using price-earnings ratio, turnover, dividend yield, B/M equity, size and exchange rate of 19 emerging markets from 1986 to 1993. Adopting the estimator methodology, this study obtained mixed results as dividend yield was significant in five countries, turnover and foreign exchange in nine, B/M equity was significant in six while P/E ratio and size were significant in 10 countries. Contrary to studies involving developed countries, these findings suggested that size and returns were positively related in most of the emerging countries.

Another study involving Pacific-Basin emerging markets of Korea, Hong Kong, Thailand Malaysia and Taiwan by Chui and Wei (1998) on the effect of size, B/M ratio and turn of the year drew adverse effects too. Using monthly data from 1977 to 1993 and adopting the Fama and MacBeth (1973) regression model, the findings showed the relationship between average stock return and market beta to be weak. The B/M equity could explain the cross-sectional variation of expected stock returns in Malaysia, Korea and Hong Kong. It was also found that small firms in Korea and large firms in Hong Kong have experienced higher return in January and that "turn of the year" effect between these countries is attributed to a different composition of investors.

Rouwenhorst (1999) studied the market factors for similarities or distinctness in factors of emerging or developing countries. The study undertook to identify the common factors in the market, characteristics of the local factors, relationship and factors of liquidity in 20 emerging markets. The study utilized data ranging from 1982 to 1997 of 1705 companies incorporating market beta, size, B/M ratio and turnover in Fama and French (1995) factor pricing model. The findings revealed that beta did not affect the returns and global exposure was not prominent in the returns factor. However, beta, B/M ratio, size and momentum were positively related to turnover. It was also found that the returns factors were similar in both emerging and developing markets.

Drew, Naughton and Veeraraghavan (2003) investigated whether the multifactor model of Fama and French (1993) could explain the return variations on the Shanghai stock market better than CAPM. Their findings were twofold. Firstly, the multifactor model identified higher number of variations in the average stock return. Secondly, small and high B/M equity firms (growth firms) produced higher returns than big and value firms. This study also contradicted the earlier findings of Drew and Veeraraghavan (2001) that value shares generated higher returns. The possible reasons suggested for the latter findings were the inadequate processing of market information and the over exploitation amongst the Chinese investors, thus leading to mispricing, heavy investments and lower yield returns of the value shares.

Serra (2003) embarked on a study involving twenty-one emerging markets to identify the determinants of stock returns. Using a set of priori specified factors in the cross section of returns for Latin America and Asian markets, the study undertook to assess whether the important factors consisting of financial, macroeconomic and price attributes were common. The findings indicated that six factors comprising of lagged prices, E/P ratio, B/M ratio, dividend yield and liquidity (size and price per share) were common among the markets. Nonetheless, these factors were not correlated with an important suggestion that the markets were segmented and factors effecting returns were local.

Wong, Tan and Liu (2006) undertook a study to investigate the relations between stock returns and four firm specific variables in the Shanghai stock exchange. Using beta, size, B/M equity and turn of the year (January effect), the findings from this study gave contradicting conclusion as compared to the studies of Drew et al. (2003). This study found that beta and the tradable share of the firms were not significant in the full regressive model. B/M equity and size was positively and negatively related to stock returns respectively. January effect was clearly in existence in the market. Another contracting finding was the higher yield returns from small and value firms as compared to the big and growth companies.

Tudor (2008) conducted a study on firm-specific factors as predictors of future returns for Romanian common stocks for the period of 2002 to 2008. They investigated the explanatory power on future share returns of market beta, financial leverage, B/M equity, size, E/P ratio, ROA and ROE and concluded that size outcaste other factors were the most significant factors in capturing the return variations over the period. It was found that a negative persistent relation existed between size and returns and the size effect was significantly present on Bucharest Stock Exchange. The results also indicated that the beta lacked explanatory power in the analysis and the use of beta as a measure of systematic risk was not supported. It was also found that the year effect was significant on the Romanian market too.

An attempt to investigate the effect of firm-specific factors on the returns for a specific industry was spearheaded by Khan (2011). Khan conducted a study to explicate the effect of dividend announcements on stock prices for the Chemical and Pharmaceutical industry in Pakistan. Taking a sample of 29 companies listed in KSE-100 Index for the period of 2001-2010, the study analysed the relationship between dividends and stock prices after controlling the firm-specific variables like Earnings Per Share (EPS), Return On Equity (ROE), Retention Ratio and Profit After Taxation. The findings revealed that EPS, stock dividend and Profit After Tax had have a significant positive relation to stock prices and were able to explicate the returns variations of stocks of the analysed industry. Inversely, ROE and Retention Ratio proved to be insignificant with a negative relation to stock prices of the same industry. The study has also concluded that Dividend Irrelevance Theory is not applicable in case of Chemical and Pharmaceutical industry of Pakistan.

Another instrumental study involving the main determinants of share prices was conducted by Sharif, Purohit and Pillai (2015). Their study analysed a set of firm-specific variables namely ROE, EPS, book value per share, dividend yield, P/E ratio, debt to assets and controlled by firm size on 41 companies listed in the Bahrain stock exchange for the period of 2006 to 2010. The findings indicated that ROE, book value per share, dividend per share, P/E ratio and firm size were significant determinants of stock prices in the Bahrain market. The results further revealed a high R^2 under fixed and random effects models with a suggestion that investors ~~are~~ were able to optimize their investment returns by taking into consideration of the proposed determinants in Bahrain stock exchange.

2.8 STOCK RETURNS AND MACROECONOMIC - NON-MACROECONOMIC FORCES

From the theoretical perspective, in the last three decades since Chen, Roll and Ross (1986) first attempted to express the equity returns as a function of macroeconomic variables in Macroeconomic Factor Model (MFM), the impact of macroeconomic determinants on stock returns have been the subject of intense theoretical and empirical investigation in the finance literature. The MFM adduced by Chen et al. (1986) by employing specific macroeconomic factors as proxies for undefined variables in the Arbitrage Pricing Theory (APT), has steadfastly argued that the systematic factors or systematic risk (beta) with respect to market portfolio has been hypothesized as the factor explaining the determinants of share price. Two diverse systematic factors that are said to affect stock prices are expected dividends and the discount rate (Nisha, 2015a, 2015b). Theoretically, the discount rate is expected to change with the level of interest rates, term structure and risk while expected dividends changes with inflation rate, real production and consumption (Kandir, 2008). As both of these systematic factors are influenced by economic variables, this implies that a significant relationship can exist between the stock market and the macroeconomic variables of a country and the influence of macroeconomic factors in investment performances cannot be ignored.

As globalization has taken precedence in the last four decades, globalization of the financial sector has become the most rapidly developing and influential aspect of economic globalization (Shangquan, 2000). Today, more countries are becoming economically developed and open, resulting in a more established and efficient stock markets that attract larger groups of prospective investors. This increasing role of stock markets in the economy has encouraged academics to investigate the relationship between the stock markets and the economy. It has been observed that economic factors have a significant impact on the performance of stock markets (Basci, 2013; El-Nader & Alraimony, 2012; Ismail et al., 2016; Venkatraja, 2014). This observation is supported by empirical evidence that macroeconomic variables have explanatory power to explain the variations in stock returns in both developed and developing markets (Chaudhuri & Smiles, 2004). The prevalence of evidence in the finance literature related to stock returns and macroeconomic variables acknowledges that changes in fundamental macroeconomic variables have significant impact on the stock prices (Abdullah & Hayworth, 1993; Alam, 2013; Antonios, 2010; Babayemi et al., 2013; Bilson et al., 2001; Chen et al., 1986; Dhakal et al., 1993; Fama,1981,1990; Flannery & Protopapadakis, 2002; Gan et al., 2006; Geetha et al., 2011; Hooker, 2004; Humpe & Macmillan, 2009; Khan et al., 2015; Lekobane, 2014; Mahmood & Dinniah, 2009; Mukherjee & Naka, 1995; Muradoglu et al., 2000; Naik & Phadi, 2012; Nikkinemi et al., 2008; Nisha, 2015a; Park & Ratti, 2000; Peiró, 2016; Ratanapakorn, 2000). It is plausible to argue that stock markets of all countries are affected by different macroeconomic variables in different intensity, according to the openness, development level, geographical location and political regimes of the respective countries (refer Appendix 2A, 2B, 2C and 2D).

Tables 2.3 and Table 2.4 are summaries of studies (as shown in Appendix 2A, 2B, 2C and 2D) involving stock returns with macroeconomic variables and non-macroeconomic forces respectively. Basically, the areas of research of these studies can be classified into four categories in relation to analysis involving stock returns. The four categories of the summarized research are economic conditions, financial conditions, living conditions and international activities.

Table 2.3: Summary of Studies Involving Macroeconomic Variables

<table>
<tr><th rowspan="2">Areas of Research</th><th rowspan="2">Common Macroeconomic Variables</th><th rowspan="2">Research Methodology</th><th colspan="4">Academic Study</th></tr>
<tr><th>Developed Countries</th><th colspan="2">Developing Countries</th><th>Group Countries</th></tr>
<tr>
<td>i. <u>Economic conditions and returns;</u>
• Macroeconomic factors and stock returns / stock prices / return volatility
• Financial development and stock market development</td>
<td><u>Economic variables;</u>
• Growth rate of GDP or national output or Industrial Production Index (IPI)
• Real GDP per capita
• Employment rate
• Gross Domestic Savings</td>
<td rowspan="2">• Multiple Regression analysis (Time-series and Panel data)
• Pearson's correlation analysis
• VAR models
• Multivariate/ Johansen Cointegration Techniques
• Granger Causality test
• Variance Decomposition Analysis (VDA)
• Impulse Response Functions (IRF)
• ARCH models
• GARCH
• EGARCH model
• GJR-GARCH model
• MGARCH-DCC models;</td>
<td rowspan="2"><u>US:</u>
• Park and Ratti (2000)
• Flannery and Protopapadakis (2003)
• Beltratti and Morana (2006)
• Ratanapakorn and Sharma (2007)
• Chang (2009)
• Guru-Gharan et al. (2009)
• Antonios (2010)
• Sariannidis et al. (2010)
• Sirucek (2012)
• Asgharian et al. (2013)
• Mollick and Assefa (2013)
• Jareño and Negrut (2016)
<u>Australia:</u>
• Chaudhuri and Smiles (2004)
<u>Belgium:</u>
• Nieuwerburgh et al. (2006)</td>
<td rowspan="2"><u>Bangladesh:</u>
• Nisha (2016a)
<u>Brazil:</u>
• Dos Santos et al. (2013)
<u>China:</u>
• Wang (2010)
<u>Cote d'Ivoire:</u>
• Herve et al. (2011)
<u>Ghana:</u>
• Kyereboah-Coleman and Agyire-Tettey (2008)
• Kuwornu (2012)
• Issahaku et al. (2013)
• Ibrahim and Musah (2014)
<u>Iran/Tehran:</u>
• Rad (2011)
• Hasanzadeh and Kianvand (2012)
<u>Jordan:</u>
• Maghayereh (2002)
• Al-Zararee and Ananzeh (2014)</td>
<td rowspan="2"><u>India:</u>
• Vani and Ray (2003)
• Bhattacharya and Mukherjee (2006)
• Padhan (2007)
• Ahmed (2008)
• Sharma and Mahendru (2010)
• Singh (2010)
• Khan et al. (2011)
• Pal and Mittal (2011)
• Srinivasan (2011)
• Naik and Phadi (2012)
• Patel (2012)
• Bhanu (2013)
• Kumar (2013)
• Naik (2013)
• Parmar (2013)
• Maheshwari and Rao (2014)
• Mohanamani and Sivagnanasithi (2014)
• Ray and Sarkar (2014)
• Subburayan and Srinivasan (2014)
• Nisha (2015b)</td>
<td rowspan="2"><u>Developed & developing countries:</u>
• Durham (2003) – 16 countries (15 developed & 1 developing countries)
• Beer and Hebein (2008)

<u>US & Other countries:</u>
• Humpe and Macmillan (2009) - US & Japan
• Li et al. (2010) - US & Canada
• Nikkinemi et al. (2008)- US & Asia Pacific
• Geetha et al. (2011) - US, Malaysia & China</td>
</tr>
<tr>
<td>ii. <u>Financial conditions and returns;</u>
• Effect of monetary policy/term spread on stock returns;
• Long-run and short-run macroeconomic shocks effect on capital market
• Macroeconomic forces and capital market integration</td>
<td><u>Financial variables:</u>
• Interest rates (IR)
• Yields on government securities/bonds
• Discount rate change
• Federal fund rate
• LIBOR or LIBOR futures (proxy of change in IR level)
• Level of money supplies (M1, M2)
• Term spread
• 3-month Tresury bill
• Base Lending Rate</td>
</tr>
</table>

Table 2.3: Summary of Studies Involving Macroeconomic Variables (*Continued from previous table*)

Areas of Research	***Common Macroeconomic Variables***	***Research Methodology***	***Academic Study***			
			Developed Countries	***Developing Countries***		***Group Countries***
iii. ***Living conditions and returns;*** • *Effect of inflation on stock returns;* • *Effect of oil price shock on stock returns;* • *Macroeconomic variables (Inflation) and stock market volatility;* • *Macroeconomic uncertainty and stock market volatility*	***Price effect variables:*** • Consumer Price Index (proxy/ measurement of general price level and inflation); • Oil prices (proxy for cost-push inflation) • Gold prices • Consumption	• GARCH-MIDAS models; • Principal components approach • Applied Artificial Neural Network (ANN); Toda and Yamamoto non-Granger causality technique; • Multi Model Framework (MMF) • Auto Regressive Distributed Lag (ARDL) Bounds Testing Approach • Long-run Structural Modelling • Wavelet Analysis • Bayesian Model Selection perspective • SPSS	*Czech Republic:* • Hsing (2011a) *Greece:* • Hondroyiannis et al. (2005) *Taiwan:* • Chen et al. (2005) • Cheng et al. (2011) • Singh et al. (2011) *UK:* • Asteriou and Price (2000) • Gregoriou et al. (2009) *Italy:* • Panetta (2002) *New Zealand:* • Gan et al. (2006) *Russia*: • Fedorova and Pankratov (2010) *Singapore*: • Mayasmi et al. (2005) • Leong and Hui (2014) *Switzerland* • Hess (2003)	*Kenya*: • Elly and Oriwo (2013) • Mutuku and Ng'eny (2015) *South Africa:* • Chinzara (2010) *Saudi Arabia:* • Kalyanaraman and Al Tuwajri (2014) • Samontaray et al. (2014) *Thailand:* • Ibrahim (2011) *Turkey:* • Erdem et al. (2005) • Erdogan and Ozlale (2005) • Karacaer and Kapusuzoglu (2010) • Basci and Karaca (2013)	*Nigeria*: • Ologunde et al. (2007) • Maku and Atanda (2010) • Adaramola (2011) • Asaolu and Ognumuyiwa (2011) • Izedonmi and Abdullahi (2011) • Oseni and Nwosa (2011) • Anayochukwu (2012) • Osamwonyi and Evbayiro-Osagie, (2012) • Osisanwo and Atanda (2012) • Ibrahim and Agbaje (2013) • Nkechukwu et al. (2013) • Nkoro and Uko (2013) • Ahmad et al. (2015) • Ali et al. (2015)	*European countries:* • Sukruoglu and Nalin, (2014)-selected European countries • Peiró (2016)- 3 European markets *Emerging markets:* • Muradoglu et al. (2000) - 19 emerging markets • Bilson et al. (2001) - 20 emerging markets • Abugri (2008) – 4 emerging markets • Hooker (2004) • Sikalao-Lekobane and Lekobane (2014)
iv. ***International activities and returns;*** • Relations between real economic factors (FER, export) and the stock market movements • Interactions between stock prices and exchange rates	***International relations variables:*** • Exchange rate (ER) (Real/Nominal Effective ER,); • Foreign Direct Investment (FDI) • Foreign Exchange Reserves (FER); • Exports • Market Index of US and Japan					

Table 2.3: Summary of Studies Involving Macroeconomic Variables (*Continued from previous table*)

Areas of Research	***Common Macroeconomic Variables***	***Research Methodology***	***Academic Study***			
			Developed Countries	***Developing Countries***		***Group Countries***
				Pakistan: • Rashid (2008) • Mohammed et al. (2009) • Sohail and Hussain (2009, 2012) • Hussain et al. (2012) • Shah et al. (2012) • Haroon and Jabeen (2013) • Iqbal et al. (2013) • Rafique et al. (2013) • Attari et al. (2013) • Hunjra et al. (2014) • Khan (2014) • Khan et al. (2014) • Kibria et al. (2014) • Nisha (2016a) *Malaysia:* • Ibrahim (1999, 2000, 2002, 2003) • Ibrahim and Wan Yusoff (2001)	*Malaysia (cont...):* • Ibrahim and Aziz (2003) • Yusof and Majid (2007) • Asmy et al. (2009) • Rahman et al. (2009) • Ratneswary and Rasiah (2010) • Bekhet & Mugableh (2012) • Hussin et al. (2012) • Zakaria and Shamsuddin (2012) • Ab Rahman et al. (2013) • Naseri and Masih (2013) • Nasir et al. (2013) • Abdullah et al. (2014) • Yunus et al. (2014) • Chia and Lim (2015)	*Asian/SEA countries:* • Wongbampo and Sharma (2002) - 5 Asian countries • Mahmood and Dinniah (2009) - 6 Asian countries • Hosseini et al. (2011) - China & India • Alam (2013) - 4 South EastAsia markets • Babayemi et al. • (2013) - African markets • Khan et al. (2015) - 4 South Asian countries • Nisha (2015a) - Bangladesh & India

Table 2.4: Summary of Studies Involving Non-Macroeconomic Variables

Areas of Research	***Common Macroeconomic Variables***	***Research Methodology***	***Academic Study***		
			Developed Countries	***Developing Countries***	***Group Countries***
Non-macroeconomic factors (events and news) and returns • Relationship between macroeconomic and non-macroeconomic variables and stock returns • Measuring real sector macroeconomic news and its effect on stock returns. • Impact of US macroeconomic news announcements on the intraday returns	***Non-macroeconomic variables*** • Macroeconomic / Unemplyment news announcements (Boyd et al., 2005; Birz & Lott Jr., 2011; Gurgul & Wójtowicz, 2014) • Expected and unexpected macroeconomic news announcements (Leong & Hui, 2014) • Presidential elections, 921 earth quake, 2003 Iraqi war, SARS outbreak, sports mega-events, AFC, 911 terrorist attack on US (Chen et al., 2005) • 2nd.Presidential elections, SARS, 88 floods, 21st Summer Deaflympics (Cheng et al., 2011)	• Event study and time series econometrics techniques	US: • Boyd et al. (2005) • Birz and Lott Jr (2011) *Taiwan:* • Chen et al. (2005) • Cheng et al. (2011) *Poland:* • Gurgul and Wójtowicz (2014) *Singapore:* • Leong and Hui (2014)		

2.8.1 Economic Conditions and Stock Returns

Macroeconomic variables adopted in the studies involving economic conditions and stock returns are cyclical factors meant to capture the general economic conditions. Growth rate of GDP or Industrial Production Index (IPI) and real GDP per capita are among the commonly used variables in this category. Nevertheless, studies of Singh et al. (2011) have adopted the employment rate while Pal and Mittal (2011) used Gross Domestic Savings as a proxy for economic conditions. Primarily, GDP and other proxy variables of GDP are direct reflections to the change in real economic activities and people's income level. Detailed studies by academics such as Geske and Roll (1983), Chen et al. (1986), Fama (1990), Lee (1992), Mukherjee et al. (1995), Asteriou and Price (2000), Herriott (2001), Hess (2003), Gan et al. (2006), Humpe and Macmillan (2009), Antonios (2010), Birz and Lott Jr (2011), Yasir et al. (2013), Jareño and Negrut (2016) and a host of others have provided the conclusive positive relation between economic activity and stock market. Hess (2003) analysed the impacts of macroeconomic fundamentals and financial variables including the real GDP on various sector indices of the Swiss stock market and found that sector sub-indices of electricity, metallurgy and utilities diverge in their sensitivity to news about fundamental variables. The Variance Decomposition analysis shed important insight of the GDP in explaining stock prices in the sector sub-indexes. Humpe and Macmillan (2009) examined whether a number of macroeconomic variables (Industrial producution (IPI) among them) can influence stock prices in the US and Japan. The Johansen cointegration test which was employed in their study found positive correlation between IPI and stock prices in both the US and Japan stock markets. Studies of Naik and Phadi (2012), Naik (2013), Bhanu (2013) and Maheshwari and Rao (2014) investigating the relationship between macroeconomic variables and Indian stock market found positive significant cointegration as well as long-run equilibrium association between IPI and stock prices. A similar conclusion is documented for studies investigating the relationship between GDP and stock prices for Malaysia. Studies of Ibrahim and Aziz (2003), Yusof and Majid (2007), Rahman et al. (2009), Ratneswary and Rasiah (2010), Bekhet and Mugableh (2012) and Nasir et al. (2013) have a common conclusion about the presence of a long-run relationship and substantial short-run interactions between these two variables. Subscribing to these findings, Yunus et al. (2014) further adds that industrial production (proxy of GDP) contributed the highest percentage in the forecasting of variance error of stock prices while the notable study of Chia and Lim (2015) documents the presence of a long-run positive relationship between economic activity and share prices in Malaysia.

2.8.2 Financial Conditions and Stock Returns

Vast number of research has shown that changes in stock prices systematically react to changes in macroeconomic variables (Chen et al.,1986; Fama & French, 1988; Jensen et al., 1996; Keim & Stambaugh, 1986; Schwert, 1990). Nothwithstanding, Asprem (1989) categorically stated that stock returns have a complex association with macroeconomic variables in addition to portfolios of other assets. A good number of previous research has consistenly found that the identification of predictable patterns in stock prices conforms to an efficient market and theoretically, stock prices will fully reflect all available information in an efficient market (Jensen et al., 1996).

The financial literature has a bundance of research conducted to identify the determinants of stock price movements. According to the study of Chen et al. (1986), three macroeconomic variables, namely inflation, industrial production and interest rates should be systematic predictors of stock market returns. Studies of Wasserfallen (1989) investigating the effects of macroeconomic variables on stock price indices for the

Germany, UK and Switzerland found that stock returns were positively related to real activity. Wasserfallen (1989) further adds that a high economic activity increases the expected profits of firms, thereby boosting stock price movements positively. Measures of economic activity can be proxied by Gross National Product, Industrial Production, Real Consumption, Real Investment, the Unemployment Rate, and Real Wages.

Inversely, inflation was negative effect to stock returns. Measurements for inflation are genarally based on Consumer Price Index and Nominal Wage Index. The inverse effect of interest rates on stock returns was expected. Although Wasserfallen (1989) found significant effects of inflation and interest rates on stock returns, the overall explanatory power of these macroeconomic variables in the model was minimal.

CHAPTER 3

DATA AND METHODOLOGY

3.1 INTRODUCTION

The study is incorporated into three parts, each section of the study will adopt differing statistical tools for analysis appropriate to the defined objectives and research questions. The principle objective of this study is to seek and explain among others the performance; risk premiums; and the significance of macroeconomic and non-macroeconomic determinants on the returns of penny and non-penny stocks in the Malaysian stock market context. Notwithstanding, this study will also seek to create an identification criterion for penny stocks in the context of Malaysia.

3.2 DATA SELECTION

The period of analysis for this study is divided into two periods. The first period of July 2009 to June 2010 (12 months) was set as formation period to compute a justifiable price benchmark to identify penny stocks and to further construct relevant portfolios needed for this study (details of portfolios will be explained in later sections). The second period from July 2010 to June 2015 which comprises a 5-year period (60 months) will be the period of study. The dataset which includes monthly stock prices of all listed securities from Bursa Malaysia was sourced from Thomson DataStream (TDS). A brief description of the period of analysis is shown in Figure 3.1.

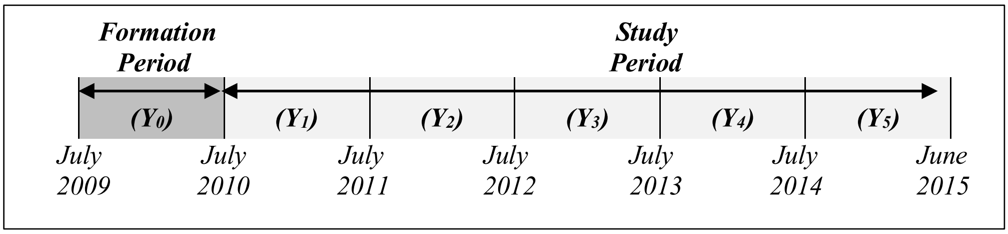


Figure 3.1: Description of Formation and Study Period

The overall study period from July 2009 to June 2015 was selected to depict a time frame in the post-revamp period of Bursa Malaysia. On 6th July 2009, Bursa Malaysia embarked into internationalising its market and introduced an enhancement of global index standards to Kuala Lumpur Composite Index (KLCI) and became known as FTSE Bursa Malaysia KLCI (FBM KLCI). Together with its index partner, FTSE International Limited (FTSE), Bursa Malaysia had incorporated the KLCI with internally implemented index calculation method which render a more investable, tradeble and traceable (transparent) managed index of the constituents. These profound efforts ensured that the index remained representative to measure the pulse of the Malaysian market and maintain links to global standards (Bursa Malaysia Annual Report 2009). Such transformation has empowered Malaysian stock market to provide substantial information of attractive and investable opportunities to both the foreign and local investors (Yeoh, Hooy & Arsad, 2010). The selected time frame of study serves an additional purpose of avoiding dual standards of stock price computations (by Bursa Malaysia) between the pre and post-revamp periods.

3.3 CRITERIA FOR THE SELECTION OF PENNY AND NON-PENNY STOCKS

As there is no official price rule set by Malaysian Securities Commission to identify penny stocks for the Malaysian stock market, few options were deliberated to determine the identification criteria for penny stocks. To enable these deliberations objectively, an equally weighted monthly average closing price deciles were computed in the formation year. The price threshold was an important distinction in identifying penny stocks and were adopted thereon for the construction of penny and non-penny stocks' portfolios for subsequent analysis.

3.3.1 Construction of Decile

A total of 948 constituent companies' stock prices were obtained from TDS for the 72 months' period of analysis (July 2009 - June 2015). The data was cleaned to eliminate stocks which had been suspended, dead and delisted during this tenure and only a total of 757 stocks with continuous operation during this tenure were chosen.

The formation period of 12 months was set from July 2009 to June 2010 for the construction of portfolios and to set a price rule to identify penny stocks in the Malaysian stock market. Firstly, equally weighted monthly closing price over the 12 months' period was computed (Jul 2009 - Jun 2010). The one-year averaging rule applied here was to avoid the over- and under-estimation of portfolio returns as suggested by Liu et al. (2013). The summary of computed average monthly closing prices was then sorted into deciles (10 equal parts) with their corresponding mean and median prices as shown in Table 3.1.

Table 3.1: Summary of Decile (Formation Year)

Decile	*N*	*Mean (RM)*	*Median (RM)*
1	**75**	**6.65**	**4.63**
2	**75**	**2.02**	**2.03**
3	**75**	**1.22**	**1.19**
4	76	0.91	0.91
5	76	0.69	0.68
6	76	0.54	0.54
7	76	0.43	0.44
8	76	0.31	0.31
9	76	0.21	0.20
10	76	0.11	0.18
Aggregate	**757**	**1.30**	**0.61**

As shown in Table 3.1 above, almost 70% of stocks traded at Bursa Malaysia (in the formation year) are below RM1.00 with average mean price of RM1.30 and average median price RM0.61.

3.3.2 Selection of Price Benchmark for Malaysian Penny Stocks

Based on the summary in Table 3.1, the following options were deliberated to ascertain the identification criterion for penny stocks in the context of Malaysia.

First option considered was adopting the U.S Securities and Exchange Commission (US SEC) criteria benchmark pricing of penny stocks at USD5.00 (about RM20.00) and below ("Penny Stock Rules," 2013). Based on Table 3.1, the consequences of adopting this criterion would mean that almost 98.8% of stocks traded at Bursa Malaysia were penny stocks (refer to Figure 1.1). It would be preposterous to adopt this US based benchmark as subjecting 98.8% of the data for penny stocks and the remaining for non-penny did not argue well on the appropriateness nor the adequate sufficiency of data (Fox, 1958) to reveal any significance of non-penny stocks in this study in terms of comparison with penny stocks. Besides, this criterion did not reflect the Asian markets' scenario where more than 90% of listed stocks were below US5.00 (refer to Table 1.1). So, this option was duly rejected.

Second option weighted-in was adopting the unofficial commonly perceived price benchmark of RM1.00 and below as penny stocks (The Forbes, 2011). The resulting effects would mean that almost 70% of the stock traded at Bursa Malaysia fell into the category of penny stocks (as shown in Table 3.1). Having a 70:30 ratios of penny and non-penny stocks, this option is questionable in terms of research biasness and defeats the core definition of penny stocks. As stated in earlier section, penny stocks are stocks denoted by small price denominations and arguably a small portion of the market (Liu et al., 2015). But, by rating 70% of total number of stocks in the Malaysian stock market as penny stocks, a scenario of data bias will prevail (Hwang & Qian, 2010). This option was ruled out too after careful deliberation with due regard to the research topic that is being investigated.

The final and more practical option was to adopt a cut-off price based on the three penny-stock portfolios that this study seeks to create and to examine the effect of price level on stock performances. It is the intention of this study to have three penny stocks portfolios to represent low, medium and upper priced penny stocks. Acceptingly, the last 30% from the computed equally weighted monthly closing price which was sorted into deciles was categorized as penny stocks (refer Table 3.1). Correspondingly, deciles 8, 9 and 10 represented the three-desired category of penny stocks' portfolios respectively. The rest of non-penny stocks were assigned into three different quintiles thereafter (details of portfolios and quintiles will be explained in later sections). As this option was more rationale and it represented the actual market conditions at Bursa Malaysia, the mean price from the 8^{th} decile was adopted as the benchmark price criteria to identify penny stocks in the Malaysian stock market. So, this study will adopt the criteria of stocks with the price of RM0.31 and below to be penny stocks (*Pr* ≤ RM0.31) while the rest are categorized as non-penny stocks (*Pr* > RM0.31). The selection of this price rule for penny stocks will be maintained throughout the study period for total stocks listed in Bursa Malaysia.

3.4 CRITERIA FOR PORTFOLIO CREATION OF PENNY AND NON-PENNY STOCKS

Adopting the criteria of stocks with the price of below RM0.31 to be penny stocks (*Pr* ≤ RM0.31) and the rest as non-penny stocks (*Pr* > RM0.31), the three penny stock portfolios created were PS1 (RM0.22 < *Pr* ≤ RM0.31); PS2 (RM0.12 < *Pr* ≤ RM0.21); and PS3 (*Pr* ≤ RM0.11). The rest of non-penny stocks were assigned in three quintile portfolios based on the ranking of the average monthly closing prices. The highest mean price of non-penny quintile was NPS1 followed by NPS2 (medium priced) and NPS3 (lowest priced non-penny). The creation of these portfolios sought to confirm the robustness and to examine the price level effect on stock performances.

For statistical comparison of penny and non-penny stocks, an aggregate penny stock (AGPS) portfolio and an aggregate non-penny stock (AGNPS) portfolio comprising of all of penny and non-penny stocks respectively were computed too. The construction criteria of penny and non-penny stocks' portfolios is shown in Table 3.2.

Table 3.2: Construction Criteria of Penny and Non-Penny Stocks' Portfolio

Portfolio	Benchmark Price	Description of stocks
PS1	RM0.22 < Pr ≤ RM0.31	High priced penny stocks
PS2	RM0.12 < Pr ≤ RM0.21	Median priced penny stocks
PS3	Pr ≤ RM0.11	Lowest priced penny stocks
NPS1	Quintile portfolio	Highest mean priced non-penny stocks
NPS2	Quintile portfolio	Medium mean priced non-penny stocks
NPS3	Quintile portfolio	Lowest mean priced non-penny stocks
AGPS	Pr ≤ RM0.31	Selection of penny stocks below the benchmark price for penny stocks
AGNPS	Pr > RM0.31	Assignment of all non-penny stocks

3.5 CONSTRUCTION OF PENNY AND NON-PENNY STOCKS' PORTFOLIO

3.5.1 Formation period (July 1, 2009 to June 30, 2010)

From the total of 948 constituent companies' stock prices sourced from TDS for the 72 months' period of analysis (July 2009 - June 2015), only a total of 757 stocks with continuous operation during this tenure (for the whole of 72 months) was sustained after eliminating the suspended, dead and delisted companies. The equally weighted monthly average closing price over the 12 months' period was computed (Jul 2009 - Jun 2010) for these chosen companies. The one-year averaged price was then matched with the construction criteria of penny and non-penny stocks' portfolios and the sorted portfolios for the formation year is shown herein in Table 3.3 below. Its noted that almost a quarter (25%) of the 757 constituent companies' stock prices were categorized as penny stocks with a mean and median price of RM0.19.

Table 3.3: Construction of Penny and Non-Penny Stock Portfolio (Formation and Study Period)

PORTFOLIO	FORMATION			STUDY PERIOD														
	YEAR 0 (Jul 2009-Jun 2010)			YEAR 1 (Jul 2010-Jun 2011)			YEAR 2 (Jul 2011-Jun 2012)			YEAR 3 (Jul 2012-Jun 2013)			YEAR 4 (Jul 2013-Jun 2014)			YEAR 5 (Jul 2014-Jun 2015)		
	N	**Mean *(RM)***	**Median *(RM)***	**N**	**Mean *(RM)***	**Median *(RM)***	**N**	**Mean *(RM)***	**Median *(RM)***	**N**	**Mean *(RM)***	**Median *(RM)***	**N**	**Mean *(RM)***	**Median *(RM)***	**N**	**Mean *(RM)***	**Median *(RM)***
NP1	187	3.74	2.34	191	4.45	2.68	189	4.74	2.59	186	5.48	2.86	199	5.90	3.29	201	5.81	3.23
NP2	188	0.87	0.84	191	0.97	0.92	189	0.93	0.86	186	1.00	0.97	199	1.15	1.11	201	1.21	1.18
NP3	188	0.46	0.47	191	0.48	0.47	189	0.45	0.44	186	0.46	0.43	199	0.52	0.50	201	0.55	0.55
AGNP	**563**	**1.68**	**0.84**	**573**	**1.97**	**0.92**	567	**2.04**	**0.86**	558	**2.32**	**0.97**	597	**2.53**	**1.11**	603	**2.53**	**1.18**
PS1 (RM0.22 < p ≤ RM0.31)	75	0.27	0.27	42	0.17	0.18	77	0.27	0.27	74	0.27	0.27	57	0.28	0.28	57	0.28	0.28
PS2 (RM0.12 < p ≤ RM0.21)	72	0.17	0.17	78	0.27	0.27	76	0.17	0.16	79	0.17	0.17	60	0.17	0.22	50	0.18	0.18
PS3 (p ≤ RM0.11)	47	0.08	0.09	64	0.09	0.09	37	0.09	0.09	46	0.09	0.09	43	0.09	0.09	47	0.08	0.09
AGPS	**194**	**0.19**	**0.19**	**184**	**0.19**	**0.19**	**190**	**0.19**	**0.20**	**199**	**0.19**	**0.19**	**160**	**0.19**	**0.19**	**154**	**0.18**	**0.19**
TOTAL	**757**	**1.30**	**0.61**	**757**	**1.53**	**0.67**	**757**	**1.58**	**0.62**	**757**	**1.76**	**0.64**	**757**	**2.03**	**0.80**	**757**	**2.10**	**0.89**

Source: Author's computation

3.5.2 Study Period (July 1, 2010 to June 30, 2015)

For subsequent period after the formation (study period), the 757 constituent companies that were identified with continuous operation (during the formation year) was maintained but due consideration was adopted to address the price movements of their stocks. Stocks that were identified as penny in the formation period might had moved above the price rule of RM0.31 set forth for penny stocks. Likewise, stocks that were identified as non-penny might had seen a decline in its price performance. To address the price movement of stocks and to reconstruct the portfolios in accordance to the benchmark criteria for penny stocks ($p \leq$ RM0.31), two decision rules were adopted, namely One-year Averaging Rule and One-year Grace Period Rule.

Decision Rule 1: One-year Averaging Rule

An equally weighted monthly average closing price for 12 months was computed for each constituent companies' stock prices at the end of each year during the study period. If the average price (at the end of each year) was below RM0.31, the stock was considered as penny stocks. Inversely, if the average price was above RM0.31, the stock was discarded as non-penny. The exclusion of stock from the penny stocks portfolio may over- and under-estimate the portfolio's returns, thus the second decision rule was introduced.

Decision Rule 2: One-year Grace Period Rule

Once a stock is categorized as penny stock, a one-year grace period is accorded to this stock before it is discarded as non-penny. The three penny stock portfolios are rebalanced each year based on the examined prices per share of the component stocks in each portfolio. The construction of annual portfolios during the formation and study period is shown in Table 3.3.

3.6 RESEARCH METHODOLOGY

3.6.1 First Part: To Investigate the Performance of Penny and Non-Penny Stocks in The Malaysian Stock Market in Terms of Return and Risk Premiums

The first part of the study concurs to examine the performance of penny and non-penny stocks in Malaysian stock market during the period of analysis, namely between July 2010 to Jun 2015. A comprehensive assessment of penny stocks' financial performance was to include excess returns (risk-adjusted returns) and risk premiums as highlighted in the asset pricing theories such as beta (risk); size premium; value premium; momentum premium; profitability factor; and investment factor. The analyses were drawn without controlling these variables for various risk factors. Primarily, this section investigates the returns and risk premiums that can explain the degree of differences and strength between the penny and non-penny stocks' portfolios in the Malaysian stock market context.

3.6.1.1 Research Hypothesis

Two main research questions and the corresponding hypothesis addressed in this research are as follows:

Research Question 1:

Is there a significant difference in returns between penny and non-penny stocks in the Malaysian stock market?

Hypothesis 1:

H_1 : There is no significant difference in returns between penny and non-penny stocks in the Malaysian stock market.

Research Question 2:

Is there a significant difference in risk premiums between penny and non-penny stocks in the Malaysian stock market?

Hypothesis 2:

H_{2a} : There is no significant difference in beta between penny and non-penny stocks in the Malaysian stock market.

H_{2b} : There is no significant difference in size premiums between penny and non-penny stocks in the Malaysian stock market.

H_{2c} : There is no significant difference in value premiums between penny and non-penny stocks in the Malaysian stock market.

H_{2d}: There is no significant difference in momentum premiums between penny and non-penny stocks in the Malaysian stock market.

H_{2e}: There is no significant difference in profitability factor between penny and non-penny stocks in the Malaysian stock market.

H_{2f}: There is no significant difference in investment factor between penny and non-penny stocks in the Malaysian stock market.

3.6.1.2 Construction of The Explanatory Return Based Factors for Penny and Non-Penny Stocks

Besides the excess returns (*Ri - Rf*), other explanatory return based factors of beta (risk), size (*SMB*), value (*HML*), momentum (*WML*), profitability (*RMW*) and investment (*CMA*) premiums of each portfolio (consisting of three penny stocks, three non-penny stocks and an aggregate portfolio for penny and non-penny stocks respectively) were constructed.

i. Market Portfolio Excess Return (R_i - R_f)

Excess return or Risk Adjusted Return is the difference between equally-weighted valid returns on the sorted portfolio of penny or non-penny stocks (R_{it}) and Risk Free Return (R_{ft}) for the month *t*. It can be expressed as (R_{it} - R_{ft}).

The computed values of excess return are indicative as to whether an investment returns from stocks or portfolio exceeds the risk free or riskless rate. Excess returns can be either positive ($R_{it} > R_{ft}$) or negative ($R_{it} < R_{ft}$). Basically, positive or negative excess returns demonstrate as to whether an investment from the stocks or portfolio outperformed or underperforms in comparison to the riskless rate.

ii. Risk Premium (Beta)

Beta or risk as it is known in finance is a measure of volatility of a stock as compared to the market as a whole or simply the sensitivity of a stock investment to the market. The riskiness of penny stocks is evaluated on the basis of systematic risk. The beta is calculated by comparing the historical returns of the portfolio and market returns using statistical techniques to calculate the beta. The beta is computed as below:

$$Beta = \frac{Cov\ (r_s - r_m)}{Var\ (r_m)}$$

where: r_s *and* r_m *are stock and market returns respectively*

The interpretation of the beta values can be categorized into two, namely whether the beta is positive or negative. If the stocks have a positive beta, then the undertone to this index is that the stocks or most of the stocks move in the same direction as the general market. Additionally, if the beta is greater than 1, then the stock moves more than the market does in the same direction and construed as riskier than the general market but potentially more profitable. Inversely, a positive beta of less than 1 is generally less risky than the general market and gains will also probably be less than market gains. Notwithstanding, stocks with a negative beta can be construed to move in the opposite direction to the general market and have a negative correlation to the general market

iii. **Size Premium (*SMB*)**

Small Minus Big (*SMB*) premium is the difference between the return on a portfolio of small-cap stocks and the return on a portfolio of large-cap stocks. Fama and French (1993) breakpoint ranking method is not adopted for this calculation as the portfolios of penny and non-penny is constructed based on special benchmark prices and is deemed as a special situation.

Hence, *SMB* a factor computed as the equally-weighted average of the returns of the small-cap stocks (smallest 30% of stocks according to market cap) minus the returns on the equally-weighted average returns of large-cap stocks (highest 30% of stocks according to market cap) within each portfolio in each month as shown below:

$$SMB = \begin{bmatrix} \textit{Average returns of} \\ \textit{small-cap stocks} \\ \textit{(bottom 30\% ranked} \\ \textit{by market cap)} \end{bmatrix} - \begin{bmatrix} \textit{Average returns of} \\ \textit{large-cap stocks} \\ \textit{(top 30\% ranked by} \\ \textit{market cap)} \end{bmatrix}$$

The computed values of *SMB* accounts for firm size, namely small and large-sized firms was based on the firm's market capitalization. As such, zero *SMB* values signify large cap while values greater than 0.5 encapsulate small cap firms.

iv. Value Premium (*HML*)

High Minus Low (*HML*) premium is the difference between the return on a portfolio comprised of high book-to-market (B/M) stocks and the return on a portfolio that comprisess of low B/M stocks. The B/M data is obtained for each month t from July of year y to June of year y+5. Adopting the similar approach of *SMB*, the Fama and French (1993) breakpoint ranking method is not adopted for this calculation as the portfolios of penny and non-penny is constructed based on special benchmark prices and is deemed as a special situation. The B/M values are ranked for each stocks within its portfolios and divided into two equal groups, namely top 50% (highest B/M ratio) and bottom 50% (lowest B/M ratio). Similarly, *HML* is the difference between the equally-weighted average of the returns for the 50% of stocks with the highest B/M ratio with the equally-weighted average returns of the bottom 50% of stocks identified with lowest B/M ratio each month within each portfolio as shown below:

$$HML = \left[\begin{array}{c} \textit{Average returns of} \\ \textit{high B/M stocks} \\ \textit{(top 50\% ranked} \\ \textit{by B/M ratio)} \end{array} \right] - \left[\begin{array}{c} \textit{Average returns of} \\ \textit{low B/M stocks} \\ \textit{(bottom 50\% ranked} \\ \textit{by B/M ratio)} \end{array} \right]$$

The calculated values of *HML* signifies whether the stocks are categorized as growth stocks or value stocks. If the *HML* values are less than 0 (negative), the stocks are placed as growth stocks while positive *HML* values of more than 0.3 are categorically called value stocks.

v. Momentum premium (*WML*)

Winner Minus Loser (*WML*) premium is the difference between the return on a portfolio comprised of stocks with high returns and the return on a portfolio comprised of stocks with low returns from *t - 12* to *t - 2*. A similar ranking process as the size and B/M factor computation is used. First, for each month *t* from July of year *y* to June of year *y+5*, stocks are ranked in each price sorted portfolios based on their monthly returns. Then the calculation of stock performance between month *t-12* and *t-2* was performed. The month *t-1* is excluded to avoid the continuation effect or any spurious association between the prior month return and the current month return caused by bid-ask spread effects or thin trading (Jegadeesh & Titman, 2001; Rouwenhorst, 1999). Stocks above the top 40% performance breakpoint for prior returns are designated winner (W); the middle 30% are classified as neutral (N); and the bottom 30% being loser (L) stocks for each portfolio. *WML* is the equally-weighted average of the returns on the winner stock minus the returns on the loser stock within each portfolio for each month. The computation is shown below:

$$WML = \left[\begin{array}{c} \textit{Average returns of} \\ \textit{winner stocks} \\ \textit{(top 40\% performance} \\ \textit{breakpoint for prior} \\ \textit{returns)} \end{array} \right] - \left[\begin{array}{c} \textit{Average returns of} \\ \textit{loser stocks} \\ \textit{(bottom 30\%} \\ \textit{performance breakpoint} \\ \textit{for prior returns)} \end{array} \right]$$

vi. Profitability Premium (*RMW*)

RMW (Robust Minus Weak) is the factor related to firm's profitability and computed based on the equally-weighted average returns on stocks of high profitability (robust) with equally-weighted average returns of low profitability (weak) stocks. This study adopted Return on Assets (ROA) as proxy for profitability. ROA which is computed by dividing firm's earnings by total assets as on July end of year *t* and is a widely accepted indicator of profitable firms and serves to capture the systematic risk commonly embedded in profitability investment strategies (Kalra & Celis, 2016).

Adopting the similar approach of *SMB* and *HML*, the ROA values are ranked for each stocks within its portfolios and divided into two equal groups, that are top 50% (robust profitability) and bottom 50% (weak profitability). *RMW* is then computed as follows:

$$RMW = \left[\begin{array}{c} \textit{Average returns of} \\ \textit{robust stocks} \\ \textit{(top 50\% high} \\ \textit{profitability stocks)} \end{array} \right] - \left[\begin{array}{c} \textit{Average returns of} \\ \textit{weak stocks} \\ \textit{(bottom 50\% low} \\ \textit{profitability stocks)} \end{array} \right]$$

vii. Investment Premium (*CMA*)

CMA (Conservative Minus Aggressive) relates to investments undertaken by the firm and is measured by the difference between the equally-weighted average returns on stocks of low (conservative) investment with equally-weighted average returns of stocks with high (aggressive) investment. Firm's investment is measured by the change in total assets from July end of year *t-1* to July end of the month *t* and divided by total assets at the July end of year *t-1* as suggested by Fama and French (2015). The computed investment figures are ranked into two equal groups, that is bottom 50% as conservative investment and top 50% as aggressive investment within each portfolio for each month. The computation of *CMA* are as follows:

$$CMA = \left[\begin{array}{c}\textit{Average returns of}\\ \textit{conservative stocks}\\ \textit{(bottom 50\% low}\\ \textit{investment stocks)}\end{array}\right] - \left[\begin{array}{c}\textit{Average returns of}\\ \textit{aggressive stocks}\\ \textit{(top 50\% high}\\ \textit{investment stocks)}\end{array}\right]$$

3.6.1.3 Statistical Description of the Risk-Return Factors of Penny and Non-Penny Stocks

Measures of central tendency namely the mean and measures of variability including the standard deviation (or variance), kurtosis and skewness will be among statistical descriptive used for comparison of return and risk factors of the price sorted penny and non-penny portfolios. When performing empirical and analytical analysis, descriptive statistics provide a useful summary of the characteristics of the series which provides a historical account of return behavior.

- Mean is a statistical indicator that will be gauged to analyze the performance of each of the explanatory return based factors listed in this analysis. While the mean is a good indicator to evaluate the performance of a portfolio, this study will adopt other statistical and fundamental tools to give a broader statistical property of the price sorted portfolios of penny and non-penny stocks.

- Skewness is an indicator that is extremely important to finance and investing. Most of the stock prices and asset returns data set have either positive or negative skew rather than follow the balanced normal distribution (skewness of zero). A skewed or a non-symmetrical distribution when applied to investment returns are generally described as being negatively skewed (interpreted as frequent small gains and few large losses) or positively skewed (interpreted as frequent small losses and a few large gains) (Chen, 2017). Statistically, skewness ($\gamma 1$) is defined as:

$$\gamma_1 = \frac{\mu_3}{\sigma^3} = \frac{E[(X - \mu)^3]}{E[(X - \mu)^2]^{3/2}}$$

- Kurtosis is the measurement of the peakness or flatness of the series distribution. The distribution is peaked (leptokurtic) relative to the normal distribution if the kurtosis is more than 3. Inversely, the distribution is flat (platykurtic) if the kurtosis is less than 3. In finance, high kurtosis of the return distribution implies that investors are likely to experience an occasional extreme return of either negative or positive from their investment (Kenton, 2017). Statistically, kurtosis (γ_2) is defined as:

$$\gamma_2 = \frac{\mu_4}{\sigma^4} = \frac{E[(X - \mu)^4]}{E[(X - \mu)^2]^2}$$

- Standard deviation is a measure of dispersion or spread in the series and refers to the historical volatility of a security. In finance, standard deviation is used to gauge for the amount of expected volatility. A volatile stock will have a high standard deviation while lower deviation is indicative of a stable blue chip stock (Banton, 2017; Nickolas, 2018).

- Jarque-Bera test will be conducted to further verify if the series is normally distributed and to determine its implication on the market's volatility. The Jarque-Bera test is a goodness-of-fit measure of departure from normality based on the sample skewness (γ_1) and kurtosis (γ_2) and defined as:

$$JB = \frac{n}{6}\left[(\gamma_1)^2 + \frac{(\gamma_2 - 3)^2}{4} \right] \quad \textit{where: n is number of observations}$$

The statistic J-B has an asymptotic chi-square (χ^2) distribution with 2 degrees of freedom and is used to test the null hypothesis that the data is from a normal distribution (Jarque & Bera, 1980). The null hypothesis is a joint hypothesis of which both the skewness and kurtosis are 0.

3.6.1.4 Hypothesis Test

To test the strength and differences between the risk-return factors with penny and non-penny portfolios, two statistical evaluations are conduceted, namely correlation test and *t*-test.

i. Correlation test is conducted to evaluate the inter-correlations between the relevant variables of both penny and non-penny stock. The correlation matrix and coefficients for the portfolio returns and risk premiums is obtained to determine the degree of correlation between the selected portfolios. Correlations describe how two variable co-vary but not necessarily indicate evidence to show a causal relationship. Nevertheless, the conclusion than can be made about the strength of the relationship between two variables (strong, moderate or weak) as measured by a correlation coefficient is influenced by the context of the variables/factors of this study. Cohen (1988) has suggested a rule of thumb on the strength of correlation values to represent strong relationship ($r = \pm 0.5$); moderate relationship ($r = \pm 0.3$) and weak relationship ($r = \pm 0.1$).

ii. The two-sample t-test for equal means is adopted to investigate the statistical significance in the difference of means for market excess returns (*Ri* - *Rf*), beta (risk), size (*SMB*), value (*HML*), momentum (*WML*), profitability (*RMW*) and investment (*CMA*) between penny and non-penny stocks.

The two-sample t-test adopted is a measure to determine if two populations means are equal in relation to the analyzed factors (Snedecor & Cochran, 1989). As the samples are unpaired, the two-sample t-test for unpaired data is defined as:

$$H_0 : \mu_1 = \mu_2$$
$$H_1 : \mu_1 \neq \mu_2$$

The test statistics are as follows:

$$T = \frac{\bar{Y}_1 - \bar{Y}_2}{\sqrt{s_1^2/N_1 + s_2^2/N_2}}$$

where: N_1 *and* N_2 *are the sample sizes*

$\bar{Y}_1$ *and* $\bar{Y}_2$ *are the sample means, and*

s_1^2 *and* s_2^2 *are the sample variances*

With significance level of α, the critical region to reject the null hypothesis that the two means are equal is:

$$|T| > t_{1-\alpha/2,v}$$

where: $t_{1-\alpha/2,v}$ *is the critical value of the t distribution with v degrees of freedom*

3.6.2 Second Part: To Analyse the Return and Risk Premiums Between Penny and Non-Penny Stocks in Malaysian Market

The second part of the thesis is a further extension from the first research and undertakes to verify the return variations of risk premiums in each price sorted portfolios' rate of return with multifactor asset pricing models.

3.6.2.1 Research Hypothesis

Two main research questions and the corresponding hypothesis addressed in the second research are as follows:

Research Question 3:

Which risk premium is able to explain the return variations for penny and non-penny stocks in the Malaysian stock market?

Hypothesis 3:

H_{3a} : Size premium is not able to explain the return variations for penny and non-penny stocks in the Malaysian stock market.

H_{3b} : Value premium is not able to explain the return variations for penny and non-penny stocks in the Malaysian stock market.

H_{3c} : Momentum premium is not able to explain the return variations for penny and non-penny stocks in the Malaysian stock market.

H_{3d} : Profitability premium is not able to explain the return variations for penny and non-penny stocks in the Malaysian stock market.

H_{3e} : Investment premium is not able to explain the return variations for penny and non-penny stocks in the Malaysian stock market.

Research Question 4:

Which asset pricing model is able to capture the return variations for penny and non-penny stocks in the Malaysian stock market?

Hypothesis 4:

H_{4a} : The single-factor model is not the best fit model to capture the return variations for penny and non-penny stocks in the Malaysian stock market.

H_{4b} : The three-factor model is not the best fit model to capture the return variations for penny and non-penny stocks in the Malaysian stock market.

H_{4c} : The four-factor model is not the best fit model to capture the return variations for penny and non-penny stocks in the Malaysian stock market.

H_{4d} : The five-factor model is not the best fit model to capture the return variations for penny and non-penny stocks in the Malaysian stock market.

3.6.2.2 Multifactor Asset Pricing Models

Return series from various portfolios will be analysed with time-series regressions of Capital Asset Pricing Model's single-factor model (CAPM) (Lintner, 1965; Sharpe, 1964), Fama-French (1993)'s three-factors model, Carhart (1997)'s four-factors model and the five-factor model of Fama-French (2015). Comparatively, a final time-series regression incorporating the excess returns and all five risk premiums (herein called the extended six-factor model) will be done to analyse the variation of the combined risk premiums in each portfolios' rate of return.

In line with the research objective, each factor or the risk premium will be gradually introduced through the single-factor model to the six-factor model (extended) to illustrate the change in the magnitude of the estimated Jensen's alpha and the corresponding change in the adjusted *R*-square (R^2) values. Then, appropriate hypotheses test will be analysed to identify the risk premium and best fit model in the asset pricing framework that can explain the return variations between penny and non-penny stocks.

i. Single-factor model (CAPM)

Treynor (1962), Sharpe (1964), Lintner (1965) and Mossin (1966) adopted the seminal work of Markowitz's theory of portfolio selection (mean-variance preferences and portfolio diversification) and proposed in their separate studies a conventional model to explain the cross sectional variation in stock market behaviour called the Capital Asset Pricing Model (CAPM).

In finance, the CAPM is a model adopted to determine the theoretically appropriate required rate of return of a market securities (shares) or an investment and to make well informed financial decisions about adding to a well-diversified portfolio. The linear relationship between the required rate of return on an investment and its systematic risk are mathematically expressed in the CAPM as below:

$$R_{it} - R_{Ft} = a_i + b_i(R_{Mt} - R_{Ft}) + e_{it} \quad \text{.......} \quad 3.1$$

where:

Rit - RFt is the excess return on penny or non-penny stocks' portfolio i for period t

RMt - RFt is the market excess return for period t

ai is the intercept and zero for all portfolios i

eit is a zero-mean residual.

ii. Three-factor model (3F)

The three-factor model (3F), is an empirical asset pricing model developed by Fama and French (1993) as an extension from their earlier seminal studies. The standard asset pricing models is said to work forward, that is from assumptions about investors' taste and portfolio selections to predictions about the measurement of risk and the said relation between expected return and risk. But a different take is noted in the 3F model developed by Fama and French (1993). Based on the theoretical foundation of Dividend Discount Model, the unique feature of the 3F model developed by Fama and French (1993) is an empirical model that works backwards as it takes the pattern of average returns and proposed their model to capture them. As CAPM uses a single factor, beta, to compare a portfolio with the market as a whole, the 3F model is designed to capture the relation between average return-size and average return-B/M anomalies. Basically, the 3F model expands on the CAPM by adding two additional risk factors, namely size risk and value risk to the market risk factor that already existed in CAPM. To represent the market capital (size factor) and B/M ratio (value factor) returns, Fama and French (1993) presented the linear relationship as below:

$$R_{it} - R_{Ft} = a_i + b_i(R_{Mt} - R_{Ft}) + s_i SMBt + h_i HMLt + e_{it} \quad \text{.................................... 3.2}$$

where:

SMBt is the difference between the returns on a portfolio of small-cap stocks and the return on a portfolio of large-cap stocks (the size premium),

HMLt is the difference between the returns on a portfolio comprised of high book-to-market stocks and the returns on a portfolio comprised of low book-to-market stocks (the value premium)

s_i and h_i are respective factor sensitivities. If the sensitivities are able capture all variation in expected returns, then the intercept a_i is zero for all portfolios i.

iii. Four-factor model (4F)

Chan et al. (1996) and Jegadeesh and Titman (2001) pointed out that the 3F model has a shortfall in explaining the momentum returns as documented by Jegadeesh and Titman (1993). Taking into account the failure of 3F model, namely to explain the short-term momentum effects, Carhart (1997) made further improvements on the model and introduced a fourth factor called the momentum to capture the momentum anomaly. The momentum anomaly basically refers to a temporal pattern of prior stock returns having explanatory power in the cross section of stock returns. Simply, the momentum effect states that a strong uptrend in the past returns will possibly continue to move up in the near future. Additionally, stocks with an impressive performance between 3 and 12 months tend to perform continuously well in the near future (Carhart, 1997).

The redefined four-factor model (4F) is expressed as below:

$$R_{it} - R_{Ft} = a_i + b_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + w_i WML_t + e_{it} \quad \text{.................} \ 3.3$$

where:

WML_t *is the difference between the returns on a portfolio comprised of stocks with high returns from t-12 to t-2 and the return on a portfolio comprised of stocks with low returns from t-12 to t-2 (the momentum premium).*

w_i *represents factor sensitivities. If the sensitivities are able capture all variation in expected returns, then the intercept* a_i *is zero for all portfolios i.*

iv. Five-factor model (5F)

Fama and French (2015) further revamped their well-known 3F asset pricing model in explaining stock returns. Two additional factors of profitability and investment were added to the original 3F model which became known as five-factor model (5F). The inclusion of these two factors stems from empirical evidence, suggestions and opinion from other researchers that the original 3F model was deficient as it did not account for profitability and investment in regard to the variation in average returns. Embracing these inputs, Fama and French (2005) revisited the 3F Model and infused two new factors to develop the five-factor asset pricing model, that is the profitability and investment factors. The profitability factor is a proxy representing stocks of companies with a high operating profitability that perform better. Additionally, the investment factor denotes stocks of companies with high total asset growth that have below average returns. Both the new factors are concrete examples of what are popularly known as quality factors. The mathematical equation for the 5F model is represented below:

$$R_{it} - R_{Ft} = a_i + b_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + e_{it} \quad .... 3.4$$

where:

RMWt is the difference between the returns on diversified portfolios of stocks with robust and weak profitability (profitability premium),

CMAt is the difference between the returns on a diversified portfolios of low and high investment stocks, that is conservative and aggressive investment (investment premium)

r_i and c_i are respective factor sensitivities. If the sensitivities are able capture all variation in expected returns, then the intercept a_i is zero for all portfolios i.

vi. Six-factor model (6F)

Encapsulating all the risk factors of beta, size (SMB), value (HML), momentum (WML), profitability (RMW) and investment (CMA), this research proposes an extended asset pricing model of six-factors to capture the patterns in average returns associated with penny and non-penny stocks. The unrestricted model is expressed as below:

$$R_{it} - R_{Ft} = a_i + b_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + w_i WML_t + r_i RMW_t + c_i CMA_t + e_{it} \quad .... 3.5$$

3.6.2.3 Hypotheses Test

To address the two research questions and the corresponding hypothesis in this part, two different statistical tests will be adopted. Details of these test are explained henceforth.

i. Comparing the risk premiums that is able to explain the return variations between AGPS and AGNP in the Malaysian stock market.

   The test for significance of the difference between two slopes or coefficients will be used to achieve the above research objective. The *t*-test will ascertain whether the slopes for two independent populations are equal, hence we test the following null and alternative hypotheses:

   $$H_0 : \beta_1 = \beta_2 \text{ or } \beta_1 - \beta_2 = 0$$

   $$H_1 : \beta_1 \neq \beta_2 \text{ or } \beta_1 - \beta_2 \neq 0$$

   The test statistics or *t*-value for the difference between two slopes are as follows:

   $$t = \frac{b_1 - b_2}{\sqrt{s_{b1}^2 + s_{b2}^2}} \quad \square \; df = n_1 + n_2 - 4$$

   where: b_1 *and* b_2 *are the slopes of lines 1 and 2*

   n_1 *and* n_2 *are the sample sizes for lines 1 and 2*

   s_{b1} *and* s_{b2} *are the standard errors for lines 1 and 2*

   To determine whether the slopes of two lines are significantly different from each other, a probability value of less than 0.05 indicates that the two slopes are significantly different from each other.

ii. Determining the best fit asset pricing model to capture return variations between AGPS and AGNP in the Malaysian stock market.

The test of multiple linear restriction of F-test will be conducted to achieve the above research objective. If the *t*-test is a conventional statistical tool focused to test whether or not an independent variable is individually significant, then the *F*-test is employed to test whether or not a group of variables are jointly significant. Notwithstanding, the *F*-test adopted for this section of research is to determine whether or not the group of risk premiums employed in the respective asset pricing models are jointly significant to capture the return variations of penny and non-penny stocks.

Using the extended six-factor model as the unrestricted model (full model) in this analysis, the *F*-test will capture the joint significance of the risk premiums in the restricted asset pricing models of single-factor, three-factors, four-factors and five-factors. Basically, *F*-test will compare the return variations between the unrestricted model with that of the restricted model as a test of joint significance of the restricted model. Hence, the time-series regression of the unrestricted model will be:

$$R_{it} - R_{Ft} = \beta_0 + \beta_1(R_{Mt} - R_{Ft}) + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 WML_t + \beta_5 RMW_t + \beta_6 CMA_t + u$$

Correspondingly, the null and alternative hypotheses will differ between each of the restricted asset pricing models.

For the single-factor model:	H_0 : $\beta_1 = 0$
(Restricted model)	H_1 : $\beta_1 \neq 0$
For the three-factor model:	H_0 : $\beta_1 = 0, \beta_2 = 0, \beta_3 = 0$
(Restricted model)	H_1 : *at least one is different from 0*

For the <u>four-factor</u> model: H$_0$: $\beta_1 = 0, \beta_2 = 0, \beta_3 = 0, \beta_4 = 0$

(Restricted model) H$_1$: *at least one is different from 0*

For the <u>five-factor</u> model: H$_0$: $\beta_1 = 0, \beta_2 = 0, \beta_3 = 0, \beta_5 = 0, \beta_6 = 0$

(Restricted model) H$_1$: *at least one is different from 0*

The test statistics or F-test for the joint significance test are as follows:

$$\boldsymbol{F^0} = \frac{(SSR_R - SSR_{UR})/ q}{SSR_{UR} / (n\text{-}k\text{-}1)} \;\square\; F_{q,\, n\text{-}k\text{-}1}$$

where SSR_R : *Sum of Squares of Residual of Restricted Model)*

SSR_{UR} : *Sum of Squares of Residual of Unrestricted Model*

q : *number of restriction (the number of risk premiums dropped)*

k : *number of risk premiums (independent variables)*

$n\text{-}k\text{-}1$: *denominator degrees of freedom*

To determine the best fit asset pricing model to capture the return variations between AGPS and AGNP, the computed F-value is compared the Critical F-value (from F table). If the F-value > Critical F-value, the we reject the null hypotheses at the designated level of significance.

3.6.3 Third Part: To Investigate the Impact of Macroeconomic and Non-Macroeconomic Variables on Penny and Non-Penny Stocks in The Malaysian Stock Market

The third part of this thesis undertakes to identify macroeconomic and non-macroeconomic variables that significantly affected penny and non-penny stocks' returns in the Malaysian context. To analyse the impact of macroeconomic determinants and non-macroeconomic forces, a set of macroeconomic determinants were selected by benchmarking to similar widely quoted academic literatures that have significant effects on the stock returns in the Malaysian context. In addition to the macroeconomic variables, some of the significant non-macroeconomic events that occurred in the sample period were selected. These events were divided into macroeconomic and non-macroeconomic news and categorized into local and global events.

3.6.3.1 Selection of Explanatory Variables

The overwhelming academic literature involving macroeconomic factors supports the notion that any movement in the macroeconomic factors have adverse impact on the movement of stock market and vice versa. Though the relationship between the real economy determinants and stock market evolution is evident, nonetheless the direction of the causality relationship remains controversial (Jareño & Negrut, 2016). This study will explore the empirical influence of domestic and foreign factors on penny and non-penny stocks' returns in Malaysia. Correspondingly, this research seeks to hypothesize the model with nine macroeconomic determinants and ten non-macroeconomic forces. The selection of these variables is based on basic financial theories and empirical literature and their theoretical importance are justified henceforth.

Macroeconomic Variables

i. Gross Domestic Product (GDP) and Stock Returns

Studies involving the relation between GDP and the stock market are extensive. Detailed studies by academics such as Geske and Roll (1983), Chen et al. (1986), Fama (1990), Lee (1992), Mukherjee et al. (1995), Asteriou and Price (2000), Herriott (2001), Hess (2003), Gan et al. (2006), Humpe and Macmillan (2009), Antonios (2010), Birz and Lott Jr (2011), Yasir et al. (2013), Jareño and Negrut (2016) and a host of others have provided the conclusive positive relation between economic activity and stock market. The common notion here is that stock prices are a function of the present value of expected cash flows in the stock valuation model. Hence, the expected cash flow depends on the company's performance and subsequently is dependent on the performance of the economy. As GDP is an indicator of economic activity, hence a better performing economy affects a company through an increase in the expected cash flow and their prices. Therefore, higher GDP will affect the company performance positively with improved profits and better dividend pay-outs. Briefly, it is hypothesized that the real GDP and stock prices are positively related. The calculation of growth rate of industrial production (GDP) is as follows:

$$\Delta GDP_t = ln\ (IP_t / IP_{t-1})\ x\ 100$$

ii. Inflation (INF) and Stock Returns

Extensive studies involving the impact of inflation on stock returns has revealed a negative relation (to quote some studies: Chen et al. (1986), Barrows and Naka (1994), Jareño and Negrut (2016), Handroyiannis et al. (2001), Maysami et al. (2000), Mukherjee et al. (1995), Singh et al. (2011)). Theoretically, there is an opposing view to this relation.

As Asprem (1989) puts it, inflation should be positively related to stock return if stocks are used as a hedge against inflation. Asprem (1989)'s view is based on the Fisher's effect which condenses that the nominal interest rate anticipates the expected inflation rate and therefore, inflation has no significance on real interest rate as well as the stock prices. As the interest rate or the rate of return is reflective upon the expected inflation in the market, investors tend to revalue their assets in an effort to hedge against this expected inflation. However, other empirical studies namely by Chen et al. (1986), Barrows and Naka (1994), Chen et al. (2005) conclude that stock market is negatively affected by inflation. This finding supports the view of Fama (1981) that due to the positive and significant correlation between real activity (GDP) and stock prices, the occurrence of inflation causes a slowdown in real activity thus, decreasing the stock prices. As for the Malaysian market context, the concern for price stability has always been one the macroeconomic policy objectives of the Malaysian government. Thus, a rise in the rate of expected inflation will lead the monetary authorities to apply restrictive monetary policies which eventually culminates a negative effect upon stock prices (Albaity, 2011; Aisyah et al., 2009). As such, the relationship between inflation and stock price in this study is hypothesized as negative. The estimation of the expected inflation is conduct based on the moving averages as in Chen et al. (1986) and Chen (1991).

iii. Money Supply (M2) and Stock Returns

A number of studies in the financial economics literature has steadfastly classified money supply as one of the macroeconomic indicators that effect stock returns, but its relationship remained controversial and inconclusive amongst the academics. There are two side to this controversial view namely the first group places the stock market efficiency to defuse any correlation between the stock prices and money supply. The reasoning is that in an efficient market, once the anticipated changes in supply of money is included, then the underlying link between money supply and stock prices could not be established. This group contends that a change in money supply will only influence the velocity of money and will have no effect on stock prices. Studies to this effect had been established in the US stock market by Kraft and Kraft (1977) and Sirucek (2012) who found no causal relationship between stock returns and US money supply. Likewise, Maghayereh (2003), Chancharat et al. (2007) and Ozbay (2009) also found statistically insignificant relationship between these variables in Jordan, Thailand and Turkey respectively. Congruently, Pearce and Roley (1983) and Serletis (1993) found no cointegration between monetary variables and stock returns while studying the relationship between stock returns and money growth. On a same note, Habibullah and Baharumshah (1996) studied the predictive power of money supply and output to forecast stock market prices in Malaysia using a trivariate co-integration approach and also found no cointegration among this variable.

The second group argued that there was a relation between stock prices and money market. This notion was supported by the findings that any variations in money supply causes wealth effect and resultantly changes the current equilibrium of investors' portfolios. Hence, when investors moved to readjust their portfolio in their effort to achieve the desired new equilibrium, this had affected and changed the price level of various assets. Notwithstanding, an increase in money supply will lead to an increase in liquidity and thus result an ascendant movement of stock prices (Kevin, 2000). The renowned supporting studies to this effect were found in the study of Rudolph (1972) for the US market where he detected a graphical association between money supply and stock returns. Studies of Park and Ratti (2000), Beltratti and Morana (2006), Ratanapakorn and Sharma (2007), Chang (2009), Guru-Gharan et al. (2009), Asgharian et al. (2013) and other studies involving the US market hd shown positive correlation between money supply and returns.

As for Malaysia's stock prices, Habibullah (1998) and Ibrahim (1999, 2000, 2002, 2003) found evidences of a cointegration between stock returns with money supply and also notes that Malaysia's stock market is informationally inefficient with respect to macroeconomic variables particularly money supply. These findings support the view of the first group that significant correlation existed in inefficient markets. Based on these arguments, it is hypothesized that the variable of money supply (broad money supply is a proxy for M2) has a predictable positive impact on stock returns in the Malaysian market context. The growth rate of money supply (ΔM2) was calculated in terms of the difference in natural log using M2 as follows:

$$\Delta M2_t = \ln (M2_t / M2_{t-1}) \times 100$$

iv. Price Index of Malaysia (PI-MSIA)

The selection of stock exchange price index of Malaysia namely FTSE Bursa Malaysia KLCI is to effectively reflect the performance of the companies listed on the stock exchange. The performance of listed companies in the Bursa Malaysia are generally sensitive to the indicative of any government policy change impacts, investors' expectations and responsive to the underlying structural changes in different sectors of the economy (Murthy, Anthony & Vighnesvaran, 2016). In this context, it is hypothesized that there is a predictable positive impact on the stock returns. The change in the stock price index of Malaysia is calculated in terms of the difference in natural log as follows:

$$\Delta PI\text{-}MSIA_t = \ln (PI\text{-}MSIA_t / PI\text{-}MSIA_{t-1}) \times 100$$

v. Price Index of US (PI-US)

The inclusion of price indices of US is an effort to check the growing linkages between macroeconomic variables and the movement of stock prices in the Malaysian market from the developed market. These linkages in the form of cointegration, co-movement and contagion for the Malaysian market have well been documented in the literature over the last decade (such as Rahman, Sidek and Tafri (2009), Kan and Lim (2015), Murthy, Anthony and Vighnesvaran (2016)).

In this regard, it is hypothesized that there is a predictable positive impact from the price indices of US. Similar to the calculation of PI-MSIA, the change in the stock price indices of US will be calculated in terms of the difference in natural log using PI-US as follows:

$$\Delta PI\text{-}US_t = \ln (PI\text{-}US_t / PI\text{-}US_{t-1}) \times 100$$

Non Macroeconomic Variables

Some of the recent non-macroeconomic forces were selected in addition to the macroeconomic variables. These non-macroeconomic forces included political events, natural disasters, sports mega events, regional and global financial crisis (events will be on country specific or international). These events are divided into macroeconomic and non-macroeconomic news and categorized into local and global events.

i. Economic News and Events

Local and global events were chosen to represent economic news and events. On the local front, (1) the Goods and Services Tax (GST) implementation at 6% in April 2015 was chosen. As for the global economic news, an important global economic event pertaining to world oil price plunge to an historic low in November 2014 was also selected. Relationship between economic event and news cast important implication on the expectations and perception of investors. Investors who perceive economic events that will have positive economic impact on their consumption and purchasing power will react positively and vice versa (Boyd et al., 2005, Leong & Hui, 2014). As such, the implementation of GST and oil price plunge had negative impact on the purchasing power of investors, thus this event is hypothesized negatively.

ii. Non-economic News and Events

Non-economic news and events will cover different areas of news and events that are deemed to affect the investors either directly or indirectly. Two events were chosen on the local and global front, namely (1) political event of the 13th Malaysian General Elections (GE13) in May, 2013 and (2) the second term re-election of President Obama as the US President in November, 2012.

Consentingly, researchers have empirically pointed out that political events such as general elections and the re-election of US Presidents had significant correlation between elections and stock returns (Bialkowski et al., 2008). Primarily, political events and news affects investors' expectation and their subsequent investment strategy (Jorg & Christian, 2006). If the outcome of the political event were not in harmony with the investors' expectation, then investors would seek to liquidate their market shares and the market would head for a bullish trend (Wong & Michael, 2009). As for the political scenario of GE13 in Malaysia and the re-election of President Obama, it is deemed that both the events were in harmony with the investors' optimism, thus it is hypothesized that there is a positive outcome from this event towards the market returns.

3.6.3.2 Research Hypothesis

Two main research questions and the corresponding hypothesis addressed in the second research are as follows:

<u>Research Question 5:</u>

What is the cointegration relationship between the selected macroeconomic and non-macroeconomic variables with the returns of the penny and non-penny stocks in the Malaysian stock market?

<u>Hypothesis 5:</u>

H_{5a} : There is no long-run relationship between the selected macroeconomic and non-macroeconomic variables with the returns of penny stocks in the Malaysian stock market.

H_{5b} : There is no long-run relationship between the selected macroeconomic and non-macroeconomic variables with the returns of non-penny stocks in the Malaysian stock market.

H_{5c} : There is no short-run relationship between the selected macroeconomic and non-macroeconomic variables with the returns of penny stocks in the Malaysian stock market.

H_{5d} : There is no short-run relationship between the selected macroeconomic and non-macroeconomic variables with the returns of non-penny stocks in the Malaysian stock market.

<u>Research Question 6:</u>

Is there a short-run causality between the selected macroeconomic and non-macroeconomic variables with the returns of the penny and non-penny stocks in the Malaysian stock market?

<u>Hypothesis 6:</u>

H_{6a} : There is no short-run causality between the selected macroeconomic and non-macroeconomic variables with the returns of penny stocks in the Malaysian stock market.

H_{6b} : There is no short-run causality between the selected macroeconomic and non-macroeconomic variables with the returns of non-penny stocks in the Malaysian stock market.

3.6.3.3 Hypothesis Testing for Research Question 5

i. Correlation Test

A review of correlations among exploratory variables of the selected macroeconomic variables will be done to determine the strength of their correlations.

ii. Unit Root Test

A unit root tests will be carried out to examine the stationarity of all variables as it is common that the time series data are assumed to be non-stationary. As such, this would eliminate spurious regressions problems. In order to determine the presence of unit roots, the standard Augmented Dickey-Fuller (ADF) and Philips-Perron (PP) tests with an intercept; trend and intercept; and without any trend (none) will be employed for both the dependent and independent variables (macroeconomic and non-macroeconomic).

In view of the mixed level of integration found among the dependent and independent variables and the small sample data sets (60 observations), the ARDL bounds testing approach to cointegration is used to test the long-run relations between the variables which was developed by Pesaran et al. (2001). The unrestricted error correction method (UECM) of the ARDL version is used to calculate the *F*-statistic and the empirical equations are as follows:

Empirical equations for Penny stocks:

$$\boldsymbol{PS1_t} = \alpha_0 + \alpha_1 ln(GDP_t) + \alpha_2(INF_t) + \alpha_3 ln(M2_t) + \alpha_4 ln(BCI_t) + \alpha_5 ln(CSI_t) + \alpha_6 ln(PI\text{-}MSIA_t) + \alpha_7 ln(PI\text{-}CHI_t) + \alpha_8 ln(PI\text{-}JPN_t) + \alpha_9 ln(PI\text{-}US_t) + \sum_{w=1}^{2} \lambda_w LEC_{wt} + \sum_{x=1}^{2} \lambda_x GEC_{xt} + \sum_{y=1}^{4} \lambda_y LNE_{yt} + \sum_{z=1}^{2} \lambda_z GNE_{zt} + \mu_i \quad \text{........ } \mathbf{4.1\ (a)}$$

$$\boldsymbol{PS2_t} = \alpha_0 + \alpha_1 ln(GDP_t) + \alpha_2(INF_t) + \alpha_3 ln(M2_t) + \alpha_4 ln(BCI_t) + \alpha_5 ln(CSI_t) + \alpha_6 ln(PI\text{-}MSIA_t) + \alpha_7 ln(PI\text{-}CHI_t) + \alpha_8 ln(PI\text{-}JPN_t) + \alpha_9 ln(PI\text{-}US_t) + \sum_{w=1}^{2} \lambda_w LEC_{wt} + \sum_{x=1}^{2} \lambda_x GEC_{xt} + \sum_{y=1}^{4} \lambda_y LNE_{yt} + \sum_{z=1}^{2} \lambda_z GNE_{zt} + \mu_i \quad \text{........ } \mathbf{4.1\ (b)}$$

$$\boldsymbol{PS3_t} = \alpha_0 + \alpha_1 ln(GDP_t) + \alpha_2(INF_t) + \alpha_3 ln(M2_t) + \alpha_4 ln(BCI_t) + \alpha_5 ln(CSI_t) + \alpha_6 ln(PI\text{-}MSIA_t) + \alpha_7 ln(PI\text{-}CHI_t) + \alpha_8 ln(PI\text{-}JPN_t) + \alpha_9 ln(PI\text{-}US_t) + \sum_{w=1}^{2} \lambda_w LEC_{wt} + \sum_{x=1}^{2} \lambda_x GEC_{xt} + \sum_{y=1}^{4} \lambda_y LNE_{yt} + \sum_{z=1}^{2} \lambda_z GNE_{zt} + \mu_i \quad \text{........ } \mathbf{4.1\ (c)}$$

$$AGPS_t = \alpha_0 + \alpha_1 ln(GDP_t) + \alpha_2 (INF_t) + \alpha_3 ln(M2_t) + \alpha_4 ln(BCI_t) + \alpha_5 ln(CSI_t) + \alpha_6 ln(PI\text{-}MSIA_t) + \alpha_7 ln(PI\text{-}CHI_t) + \alpha_8 ln(PI\text{-}JPN_t) + \alpha_9 ln(PI\text{-}US_t) + \sum_{w=1}^{2} \lambda_w LEC_{wt} + \sum_{x=1}^{2} \lambda_x GEC_{xt} + \sum_{y=1}^{4} \lambda_y LNE_{yt} + \sum_{z=1}^{2} \lambda_z GNE_{zt} + \mu_i \quad \text{........ 4.1 (d)}$$

Equations for Non-Penny Stocks:

$$NPS1_t = \alpha_0 + \alpha_1 ln(GDP_t) + \alpha_2 (INF_t) + \alpha_3 ln(M2_t) + \alpha_4 ln(BCI_t) + \alpha_5 ln(CSI_t) + \alpha_6 ln(PI\text{-}MSIA_t) + \alpha_7 ln(PI\text{-}CHI_t) + \alpha_8 ln(PI\text{-}JPN_t) + \alpha_9 ln(PI\text{-}US_t) + \sum_{w=1}^{2} \lambda_w LEC_{wt} + \sum_{x=1}^{2} \lambda_x GEC_{xt} + \sum_{y=1}^{4} \lambda_y LNE_{yt} + \sum_{z=1}^{2} \lambda_z GNE_{zt} + \mu_i \quad \text{..... 4.2 (a)}$$

$$NPS2_t = \alpha_0 + \alpha_1 ln(GDP_t) + \alpha_2 (INF_t) + \alpha_3 ln(M2_t) + \alpha_4 ln(BCI_t) + \alpha_5 ln(CSI_t) + \alpha_6 ln(PI\text{-}MSIA_t) + \alpha_7 ln(PI\text{-}CHI_t) + \alpha_8 ln(PI\text{-}JPN_t) + \alpha_9 ln(PI\text{-}US_t) + \sum_{w=1}^{2} \lambda_w LEC_{wt} + \sum_{x=1}^{2} \lambda_x GEC_{xt} + \sum_{y=1}^{4} \lambda_y LNE_{yt} + \sum_{z=1}^{2} \lambda_z GNE_{zt} + \mu_i \quad \text{..... 4.2 (b)}$$

$$NPS3_t = \alpha_0 + \alpha_1 ln(GDP_t) + \alpha_2 (INF_t) + \alpha_3 ln(M2_t) + \alpha_4 ln(BCI_t) + \alpha_5 ln(CSI_t) + \alpha_6 ln(PI\text{-}MSIA_t) + \alpha_7 ln(PI\text{-}CHI_t) + \alpha_8 ln(PI\text{-}JPN_t) + \alpha_9 ln(PI\text{-}US_t) + \sum_{w=1}^{2} \lambda_w LEC_{wt} + \sum_{x=1}^{2} \lambda_x GEC_{xt} + \sum_{y=1}^{4} \lambda_y LNE_{yt} + \sum_{z=1}^{2} \lambda_z GNE_{zt} + \mu_i \quad \text{..... 4.2 (c)}$$

$$AGNPS_t = \alpha_0 + \alpha_1 ln(GDP_t) + \alpha_2 (INF_t) + \alpha_3 ln(M2_t) + \alpha_4 ln(BCI_t) + \alpha_5 ln(CSI_t) + \alpha_6 ln(PI\text{-}MSIA_t) + \alpha_7 ln(PI\text{-}CHI_t) + \alpha_8 ln(PI\text{-}JPN_t) + \alpha_9 ln(PI\text{-}US_t) + \sum_{w=1}^{2} \lambda_w LEC_{wt} + \sum_{x=1}^{2} \lambda_x GEC_{xt} + \sum_{y=1}^{4} \lambda_y LNE_{yt} + \sum_{z=1}^{2} \lambda_z GNE_{zt} + \mu_i \quad \text{..... 4.2 (d)}$$

iii. Bounds Testing to Cointegration

Correspondingly, the calculated *F*-statistics of the equation is compared with the critical bounds tabulated by Pesaran et al. (2001) to test the existence of cointegration between the variables. On this note, hypothesis of no cointegration is $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8 = \beta_9 = \beta_{10} = 0$ in equations 5.1(a-d) and 5.2 (a-d) against the hypothesis of cointegration of $\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq \beta_7 \neq \beta_8 \neq \beta_9 \neq \beta_{10} \neq 0$. Cointegration is ascertained if the calculated F-statistics is more than upper critical bound. Inversely, the decision in favour of no cointegration is ruled out if the lower critical bound is more than the computed F-statistics. Notwithstanding, an inconclusive decision on the cointegration is suggested if the calculated F-statistics lies between upper and lower critical bounds.

iv. Long-Run Coefficients of Variables

The existence of long-run relationship between the dependent and independent variables (macroeconomic determinants and non-macroeconomic forces) is further explored to interpret the marginal effects of independent variables on the returns of penny and non-penny stocks.

v. Short-Run Elasticities of Variables

If the Bounds Testing validated the existence of long-run association between the variables, the ARDL model will be reparametrized into error correction model (ECM). The bounds testing approach uses linear specification for dynamic ECM without losing information about the long-run relationship (Banerrjee & Newman, 1993). The short-run dynamics and long-run relationship of the underlying independent variables on the returns of penny and non-penny stocks' portfolios will be further analysed and reported.

vi. Stability Test

The stability of the long- and short-run coefficients will be tested using cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMsq) techniques presented by Brown et al. (1975). If the plots of CUSUM and CUSUMsq statistics for both penny and non-penny stocks are well within the straight lines representing the critical bounds at 5% significance level, it can be concluded that all coefficients in the error-correction model (ECM) are relatively stable and the null hypothesis cannot be rejected. Additionally, following Bahmani-Oskooee and Nasir (2004), it can be concluded that the empirical equations of penny and non-penny stocks in the ARDL estimates are correctly specified too.

3.6.3.4 Hypothesis Testing for Research Question 6

i. VECM Granger Causality Analysis

The Granger causality test will be performed to ascertain the existence of cointegration among the dependent and independent variables. The existence of a cointegrating relationship among the variables will be analysed to ascertain the short- and long-run Granger causality between the variables. Taking into account the lag order of equation 5.1(a-d) and 5.2(a-d), the significance of the differenced variables can be measured directly through the corresponding *t*-statistics.

ii. Granger Causality formation:

Granger Causality equation for penny stocks:

PS1:

$$(1-B)\begin{pmatrix} \boldsymbol{\Delta ln\ PS1_t} \\ \Delta ln\ GDP_t \\ \Delta INF_t \\ \Delta ln\ M2_t \\ \Delta ln\ PI\text{-}MS_t \\ \Delta ln\ PI\text{-}US_t \\ LEC1_t \\ GEC1_t \\ LNE1_t \\ GNE1_t \end{pmatrix} = \begin{bmatrix} b_1 \\ b_2 \\ b_3 \\ b_4 \\ b_5 \\ b_6 \\ b_7 \\ b_8 \\ b_9 \\ b_{10} \end{bmatrix} + \sum_{i=1}^{q}(1-B)\begin{pmatrix} C_{11,i}\ C_{12,i} \ldots C_{120,i} \\ C_{21,i}\ C_{12,i} \ldots C_{220,i} \\ C_{31,i}\ C_{12,i} \ldots C_{320,i} \\ C_{41,i}\ C_{12,i} \ldots C_{420,i} \\ C_{51,i}\ C_{12,i} \ldots C_{520,i} \\ C_{61,i}\ C_{12,i} \ldots C_{620,i} \\ C_{71,i}\ C_{12,i} \ldots C_{720,i} \\ C_{81,i}\ C_{12,i} \ldots C_{820,i} \\ C_{91,i}\ C_{12,i} \ldots C_{920,i} \\ C_{101,i}\ C_{12,i} \ldots C_{1020,i} \end{pmatrix}\begin{pmatrix} \boldsymbol{\Delta ln\ PS1_{t-1}} \\ \Delta ln\ GDP_{t-1} \\ \Delta INF_{t-1} \\ \Delta ln\ M2_{t-1} \\ \Delta ln\ PI\text{-}MS_{t-1} \\ \Delta ln\ PI\text{-}US_{t-1} \\ LEC1_t \\ GEC1_t \\ LNE1_t \\ GNE1_t \end{pmatrix} + \begin{bmatrix} \delta_1 \\ \delta_2 \\ \delta_3 \\ \delta_4 \\ \delta_5 \\ \delta_6 \\ \delta_7 \\ \delta_8 \\ \delta_9 \\ \delta_{10} \end{bmatrix}[ECT_{t-1}] + \begin{bmatrix} \mu_{1t} \\ \mu_{2t} \\ \mu_{3t} \\ \mu_{4t} \\ \mu_{5t} \\ \mu_{6t} \\ \mu_{7t} \\ \mu_{8t} \\ \mu_{9t} \\ \mu_{10t} \end{bmatrix} \quad \ldots\textbf{5.1(a)}$$

PS2:

$$(1-B)\begin{pmatrix} \boldsymbol{\Delta ln\ PS2_t} \\ \Delta ln\ GDP_t \\ \Delta INF_t \\ \Delta ln\ M2_t \\ \Delta ln\ PI\text{-}MS_t \\ \Delta ln\ PI\text{-}US_t \\ LEC1_t \\ GEC1_t \\ LNE1_t \\ GNE1_t \end{pmatrix} = \begin{bmatrix} b_1 \\ b_2 \\ b_3 \\ b_4 \\ b_5 \\ b_6 \\ b_7 \\ b_8 \\ b_9 \\ b_{10} \end{bmatrix} + \sum_{i=1}^{q}(1-B)\begin{pmatrix} C_{11,i}\ C_{12,i} \ldots C_{120,i} \\ C_{21,i}\ C_{12,i} \ldots C_{220,i} \\ C_{31,i}\ C_{12,i} \ldots C_{320,i} \\ C_{41,i}\ C_{12,i} \ldots C_{420,i} \\ C_{51,i}\ C_{12,i} \ldots C_{520,i} \\ C_{61,i}\ C_{12,i} \ldots C_{620,i} \\ C_{71,i}\ C_{12,i} \ldots C_{720,i} \\ C_{81,i}\ C_{12,i} \ldots C_{820,i} \\ C_{91,i}\ C_{12,i} \ldots C_{920,i} \\ C_{101,i}\ C_{12,i} \ldots C_{1020,i} \end{pmatrix}\begin{pmatrix} \boldsymbol{\Delta ln\ PS2_{t-1}} \\ \Delta ln\ GDP_{t-1} \\ \Delta INF_{t-1} \\ \Delta ln\ M2_{t-1} \\ \Delta ln\ PI\text{-}MS_{t-1} \\ \Delta ln\ PI\text{-}US_{t-1} \\ LEC1_t \\ GEC1_t \\ LNE1_t \\ GNE1_t \end{pmatrix} + \begin{bmatrix} \delta_1 \\ \delta_2 \\ \delta_3 \\ \delta_4 \\ \delta_5 \\ \delta_6 \\ \delta_7 \\ \delta_8 \\ \delta_9 \\ \delta_{10} \end{bmatrix}[ECT_{t-1}] + \begin{bmatrix} \mu_{1t} \\ \mu_{2t} \\ \mu_{3t} \\ \mu_{4t} \\ \mu_{5t} \\ \mu_{6t} \\ \mu_{7t} \\ \mu_{8t} \\ \mu_{9t} \\ \mu_{10t} \end{bmatrix} \quad \ldots\textbf{5.1(b)}$$

PS3:

$$(1-B)\begin{pmatrix} \boldsymbol{\Delta ln\ PS3_t} \\ \Delta ln\ GDP_t \\ \Delta INF_t \\ \Delta ln\ M2_t \\ \Delta ln\ PI\text{-}MS_t \\ \Delta ln\ PI\text{-}US_t \\ LEC1_t \\ GEC1_t \\ LNE1_t \\ GNE1_t \end{pmatrix} = \begin{bmatrix} b_1 \\ b_2 \\ b_3 \\ b_4 \\ b_5 \\ b_6 \\ b_7 \\ b_8 \\ b_9 \\ b_{10} \end{bmatrix} + \sum_{i=1}^{q}(1-B)\begin{pmatrix} C_{11,i}\ C_{12,i} \ldots C_{120,i} \\ C_{21,i}\ C_{12,i} \ldots C_{220,i} \\ C_{31,i}\ C_{12,i} \ldots C_{320,i} \\ C_{41,i}\ C_{12,i} \ldots C_{420,i} \\ C_{51,i}\ C_{12,i} \ldots C_{520,i} \\ C_{61,i}\ C_{12,i} \ldots C_{620,i} \\ C_{71,i}\ C_{12,i} \ldots C_{720,i} \\ C_{81,i}\ C_{12,i} \ldots C_{820,i} \\ C_{91,i}\ C_{12,i} \ldots C_{920,i} \\ C_{101,i}\ C_{12,i} \ldots C_{1020,i} \end{pmatrix}\begin{pmatrix} \boldsymbol{\Delta ln\ PS3_{t-1}} \\ \Delta ln\ GDP_{t-1} \\ \Delta INF_{t-1} \\ \Delta ln\ M2_{t-1} \\ \Delta ln\ PI\text{-}MS_{t-1} \\ \Delta ln\ PI\text{-}US_{t-1} \\ LEC1_t \\ GEC1_t \\ LNE1_t \\ GNE1_t \end{pmatrix} + \begin{bmatrix} \delta_1 \\ \delta_2 \\ \delta_3 \\ \delta_4 \\ \delta_5 \\ \delta_6 \\ \delta_7 \\ \delta_8 \\ \delta_9 \\ \delta_{10} \end{bmatrix}[ECT_{t-1}] + \begin{bmatrix} \mu_{1t} \\ \mu_{2t} \\ \mu_{3t} \\ \mu_{4t} \\ \mu_{5t} \\ \mu_{6t} \\ \mu_{7t} \\ \mu_{8t} \\ \mu_{9t} \\ \mu_{10t} \end{bmatrix} \quad \ldots\textbf{5.1(c)}$$

AGPS:

$$(1-B)\begin{pmatrix} \boldsymbol{\Delta ln\ AGPS_t} \\ \Delta ln\ GDP_t \\ \Delta INF_t \\ \Delta ln\ M2_t \\ \Delta ln\ PI\text{-}MS_t \\ \Delta ln\ PI\text{-}US_t \\ LEC1_t \\ GEC1_t \\ LNE1_t \\ GNE1_t \end{pmatrix} = \begin{bmatrix} b_1 \\ b_2 \\ b_3 \\ b_4 \\ b_5 \\ b_6 \\ b_7 \\ b_8 \\ b_9 \\ b_{10} \end{bmatrix} + \sum_{i=1}^{q}(1-B)\begin{pmatrix} C_{11,i}\ C_{12,i} \ldots C_{120,i} \\ C_{21,i}\ C_{12,i} \ldots C_{220,i} \\ C_{31,i}\ C_{12,i} \ldots C_{320,i} \\ C_{41,i}\ C_{12,i} \ldots C_{420,i} \\ C_{51,i}\ C_{12,i} \ldots C_{520,i} \\ C_{61,i}\ C_{12,i} \ldots C_{620,i} \\ C_{71,i}\ C_{12,i} \ldots C_{720,i} \\ C_{81,i}\ C_{12,i} \ldots C_{820,i} \\ C_{91,i}\ C_{12,i} \ldots C_{920,i} \\ C_{101,i}\ C_{12,i} \ldots C_{1020,i} \end{pmatrix}\begin{pmatrix} \boldsymbol{\Delta ln\ AGPS_{t-1}} \\ \Delta ln\ GDP_{t-1} \\ \Delta INF_{t-1} \\ \Delta ln\ M2_{t-1} \\ \Delta ln\ PI\text{-}MS_{t-1} \\ \Delta ln\ PI\text{-}US_{t-1} \\ LEC1_t \\ GEC1_t \\ LNE1_t \\ GNE1_t \end{pmatrix} + \begin{bmatrix} \delta_1 \\ \delta_2 \\ \delta_3 \\ \delta_4 \\ \delta_5 \\ \delta_6 \\ \delta_7 \\ \delta_8 \\ \delta_9 \\ \delta_{10} \end{bmatrix}[ECT_{t-1}] + \begin{bmatrix} \mu_{1t} \\ \mu_{2t} \\ \mu_{3t} \\ \mu_{4t} \\ \mu_{5t} \\ \mu_{6t} \\ \mu_{7t} \\ \mu_{8t} \\ \mu_{9t} \\ \mu_{10t} \end{bmatrix} \quad \ldots\textbf{5.1(d)}$$

Granger Causality equation for non-penny stocks:

NP1:

$$(1-B)\begin{pmatrix} \boldsymbol{\Delta ln\ NP1_t} \\ \Delta ln\ GDP_t \\ \Delta INF_t \\ \Delta ln\ M2_t \\ \Delta ln\ PI\text{-}MS_t \\ \Delta ln\ PI\text{-}US_t \\ LEC1_t \\ GEC1_t \\ LNE1_t \\ GNE1_t \end{pmatrix} = \begin{bmatrix} b_1 \\ b_2 \\ b_3 \\ b_4 \\ b_5 \\ b_6 \\ b_7 \\ b_8 \\ b_9 \\ b_{10} \end{bmatrix} + \sum_{i=1}^{q}(1-B)\begin{pmatrix} C_{11,i}\ C_{12,i} \ldots\ldots C_{120,i} \\ C_{21,i}\ C_{12,i} \ldots\ldots C_{220,i} \\ C_{31,i}\ C_{12,i} \ldots\ldots C_{320,i} \\ C_{41,i}\ C_{12,i} \ldots\ldots C_{420,i} \\ C_{51,i}\ C_{12,i} \ldots\ldots C_{520,i} \\ C_{61,i}\ C_{12,i} \ldots\ldots C_{620,i} \\ C_{71,i}\ C_{12,i} \ldots\ldots C_{720,i} \\ C_{81,i}\ C_{12,i} \ldots\ldots C_{820,i} \\ C_{91,i}\ C_{12,i} \ldots\ldots C_{920,i} \\ C_{101,i}\ C_{12,i} \ldots C_{1020,i} \end{pmatrix}\begin{pmatrix} \boldsymbol{\Delta ln\ NP1_{t-1}} \\ \Delta ln\ GDP_{t-1} \\ \Delta INF_{t-1} \\ \Delta ln\ M2_{t-1} \\ \Delta ln\ PI\text{-}MS_{t-1} \\ \Delta ln\ PI\text{-}US_{t-1} \\ LEC1_t \\ GEC1_t \\ LNE1_t \\ GNE1_t \end{pmatrix} + \begin{bmatrix} \delta_1 \\ \delta_2 \\ \delta_3 \\ \delta_4 \\ \delta_5 \\ \delta_6 \\ \delta_7 \\ \delta_8 \\ \delta_9 \\ \delta_{10} \end{bmatrix}[ECT_{t-1}] + \begin{bmatrix} \mu_{1t} \\ \mu_{2t} \\ \mu_{3t} \\ \mu_{4t} \\ \mu_{5t} \\ \mu_{6t} \\ \mu_{7t} \\ \mu_{8t} \\ \mu_{9t} \\ \mu_{10t} \end{bmatrix} \quad \ldots\mathbf{5.2(a)}$$

NP2:

$$(1-B)\begin{pmatrix} \boldsymbol{\Delta ln\ NP2_t} \\ \Delta ln\ GDP_t \\ \Delta INF_t \\ \Delta ln\ M2_t \\ \Delta ln\ PI\text{-}MS_t \\ \Delta ln\ PI\text{-}US_t \\ LEC1_t \\ GEC1_t \\ LNE1_t \\ GNE1_t \end{pmatrix} = \begin{bmatrix} b_1 \\ b_2 \\ b_3 \\ b_4 \\ b_5 \\ b_6 \\ b_7 \\ b_8 \\ b_9 \\ b_{10} \end{bmatrix} + \sum_{i=1}^{q}(1-B)\begin{pmatrix} C_{11,i}\ C_{12,i} \ldots\ldots C_{120,i} \\ C_{21,i}\ C_{12,i} \ldots\ldots C_{220,i} \\ C_{31,i}\ C_{12,i} \ldots\ldots C_{320,i} \\ C_{41,i}\ C_{12,i} \ldots\ldots C_{420,i} \\ C_{51,i}\ C_{12,i} \ldots\ldots C_{520,i} \\ C_{61,i}\ C_{12,i} \ldots\ldots C_{620,i} \\ C_{71,i}\ C_{12,i} \ldots\ldots C_{720,i} \\ C_{81,i}\ C_{12,i} \ldots\ldots C_{820,i} \\ C_{91,i}\ C_{12,i} \ldots\ldots C_{920,i} \\ C_{101,i}\ C_{12,i} \ldots C_{1020,i} \end{pmatrix}\begin{pmatrix} \boldsymbol{\Delta ln\ NP2_{t-1}} \\ \Delta ln\ GDP_{t-1} \\ \Delta INF_{t-1} \\ \Delta ln\ M2_{t-1} \\ \Delta ln\ PI\text{-}MS_{t-1} \\ \Delta ln\ PI\text{-}US_{t-1} \\ LEC1_t \\ GEC1_t \\ LNE1_t \\ GNE1_t \end{pmatrix} + \begin{bmatrix} \delta_1 \\ \delta_2 \\ \delta_3 \\ \delta_4 \\ \delta_5 \\ \delta_6 \\ \delta_7 \\ \delta_8 \\ \delta_9 \\ \delta_{10} \end{bmatrix}[ECT_{t-1}] + \begin{bmatrix} \mu_{1t} \\ \mu_{2t} \\ \mu_{3t} \\ \mu_{4t} \\ \mu_{5t} \\ \mu_{6t} \\ \mu_{7t} \\ \mu_{8t} \\ \mu_{9t} \\ \mu_{10t} \end{bmatrix} \quad \ldots\mathbf{5.2(b)}$$

NP3:

$$(1-B)\begin{pmatrix} \boldsymbol{\Delta ln\ NP3_t} \\ \Delta ln\ GDP_t \\ \Delta INF_t \\ \Delta ln\ M2_t \\ \Delta ln\ PI\text{-}MS_t \\ \Delta ln\ PI\text{-}US_t \\ LEC1_t \\ GEC1_t \\ LNE1_t \\ GNE1_t \end{pmatrix} = \begin{bmatrix} b_1 \\ b_2 \\ b_3 \\ b_4 \\ b_5 \\ b_6 \\ b_7 \\ b_8 \\ b_9 \\ b_{10} \end{bmatrix} + \sum_{i=1}^{q}(1-B)\begin{pmatrix} C_{11,i}\ C_{12,i} \ldots\ldots C_{120,i} \\ C_{21,i}\ C_{12,i} \ldots\ldots C_{220,i} \\ C_{31,i}\ C_{12,i} \ldots\ldots C_{320,i} \\ C_{41,i}\ C_{12,i} \ldots\ldots C_{420,i} \\ C_{51,i}\ C_{12,i} \ldots\ldots C_{520,i} \\ C_{61,i}\ C_{12,i} \ldots\ldots C_{620,i} \\ C_{71,i}\ C_{12,i} \ldots\ldots C_{720,i} \\ C_{81,i}\ C_{12,i} \ldots\ldots C_{820,i} \\ C_{91,i}\ C_{12,i} \ldots\ldots C_{920,i} \\ C_{101,i}\ C_{12,i} \ldots C_{1020,i} \end{pmatrix}\begin{pmatrix} \boldsymbol{\Delta ln\ NP3_{t-1}} \\ \Delta ln\ GDP_{t-1} \\ \Delta INF_{t-1} \\ \Delta ln\ M2_{t-1} \\ \Delta ln\ PI\text{-}MS_{t-1} \\ \Delta ln\ PI\text{-}US_{t-1} \\ LEC1_t \\ GEC1_t \\ LNE1_t \\ GNE1_t \end{pmatrix} + \begin{bmatrix} \delta_1 \\ \delta_2 \\ \delta_3 \\ \delta_4 \\ \delta_5 \\ \delta_6 \\ \delta_7 \\ \delta_8 \\ \delta_9 \\ \delta_{10} \end{bmatrix}[ECT_{t-1}] + \begin{bmatrix} \mu_{1t} \\ \mu_{2t} \\ \mu_{3t} \\ \mu_{4t} \\ \mu_{5t} \\ \mu_{6t} \\ \mu_{7t} \\ \mu_{8t} \\ \mu_{9t} \\ \mu_{10t} \end{bmatrix} \quad \ldots\mathbf{5.2(c)}$$

AGNP:

$$(1-B)\begin{pmatrix} \boldsymbol{\Delta ln\ AGNP_t} \\ \Delta ln\ GDP_t \\ \Delta INF_t \\ \Delta ln\ M2_t \\ \Delta ln\ PI\text{-}MS_t \\ \Delta ln\ PI\text{-}US_t \\ LEC1_t \\ GEC1_t \\ LNE1_t \\ GNE1_t \end{pmatrix} = \begin{bmatrix} b_1 \\ b_2 \\ b_3 \\ b_4 \\ b_5 \\ b_6 \\ b_7 \\ b_8 \\ b_9 \\ b_{10} \end{bmatrix} + \sum_{i=1}^{q}(1-B)\begin{pmatrix} C_{11,i}\ C_{12,i} \ldots\ldots C_{120,i} \\ C_{21,i}\ C_{12,i} \ldots\ldots C_{220,i} \\ C_{31,i}\ C_{12,i} \ldots\ldots C_{320,i} \\ C_{41,i}\ C_{12,i} \ldots\ldots C_{420,i} \\ C_{51,i}\ C_{12,i} \ldots\ldots C_{520,i} \\ C_{61,i}\ C_{12,i} \ldots\ldots C_{620,i} \\ C_{71,i}\ C_{12,i} \ldots\ldots C_{720,i} \\ C_{81,i}\ C_{12,i} \ldots\ldots C_{820,i} \\ C_{91,i}\ C_{12,i} \ldots\ldots C_{920,i} \\ C_{101,i}\ C_{12,i} \ldots C_{1020,i} \end{pmatrix}\begin{pmatrix} \boldsymbol{\Delta ln\ AGNP_{t-1}} \\ \Delta ln\ GDP_{t-1} \\ \Delta INF_{t-1} \\ \Delta ln\ M2_{t-1} \\ \Delta ln\ PI\text{-}MS_{t-1} \\ \Delta ln\ PI\text{-}US_{t-1} \\ LEC1_t \\ GEC1_t \\ LNE1_t \\ GNE1_t \end{pmatrix} + \begin{bmatrix} \delta_1 \\ \delta_2 \\ \delta_3 \\ \delta_4 \\ \delta_5 \\ \delta_6 \\ \delta_7 \\ \delta_8 \\ \delta_9 \\ \delta_{10} \end{bmatrix}[ECT_{t-1}] + \begin{bmatrix} \mu_{1t} \\ \mu_{2t} \\ \mu_{3t} \\ \mu_{4t} \\ \mu_{5t} \\ \mu_{6t} \\ \mu_{7t} \\ \mu_{8t} \\ \mu_{9t} \\ \mu_{10t} \end{bmatrix} \quad \ldots\mathbf{5.2(d)}$$

CHAPTER 4

PERFORMANCE OF PENNY STOCKS IN MALAYSIAN STOCK MARKET (PART 1)

4.1 INTRODUCTION

This chapter deals with a comprehensive analysis of the financial characteristics and the performance of penny and non-penny stocks in theMalaysian stock market during the analysis period, that is between July 2010 and June 2015 (60 months). The description of the data and period of analysis is explained in Chapter 3. Primarily, this section investigates the returns and risk premiums that can explain the degree of differences and strength between the penny and non-penny stocks' portfolios in the Malaysian stock market context.

4.2 DESCRIPTION OF VARIABLES

4.2.1 Dependent Variables

Adopting the price identification criterion for penny stocks created in the previous sections of this thesis, stocks with the price of RM0.31 and below ($Pr \leq$ RM0.31) are categorized as penny stocks while the rest are categorized as non-penny stocks ($Pr >$ RM0.31). The selection of this price rule is maintained and adopted in the creation of penny and non-penny stocks' portfolio. The summary of the penny and non-penny stocks' portfolio is shown in Table 4.1.

Table 4.1: Summary of Dependent Variables

Portfolio		Price Range	Description of stocks
Penny Stocks	**PS1**	RM0.22 < *Pr* ≤ RM0.31	High priced penny stocks
	PS2	RM0.12 < *Pr* ≤ RM0.21	Median priced penny stocks
	PS3	*Pr* ≤ RM0.11	Lowest priced penny stocks
	AGPS	*Pr* ≤ RM0.31	Selection of penny stocks below the benchmark price for penny stocks
Non-Penny Stocks	**NPS1**	Quintile portfolio	Highest mean priced non-penny stocks
	NPS2	Quintile portfolio	Medium mean priced non-penny stocks
	NPS3	Quintile portfolio	Lowest mean priced non-penny stocks
	AGNPS	*Pr* > RM0.31	Assignment of all non-penny stocks

4.2.2 Independent Variables

As this section deals with a comprehensive analysis of the performance of penny and non-penny stocks in the Malaysian stock market, the summary of the financial characteristics addressed are listed in Table 4.2 below.

Table 4.2: Summary of Independent Variables

Financial Variables	Description
Excess returns	Excess return or Risk Adjusted Return is the difference between Asset Return (R_i) and Risk Free Return (R_f) or (R_i-R_f)
Beta	Beta or risk is a measure of volatility of a stock in comparison to the market as a whole or an investment's sensitivity to the market
Size premium	Small Minus Big (SMB) is the equally-weighted average of the returns of the small-cap stocks minus the returns on the big-cap stocks within each portfolio.
Value premium	High Minus Low (HML) is the equally-weighted average of the returns on the high B/M ratio minus the returns on the low B/M ratio within each portfolio
Momentum premium	Winner Minus Loser (WML) is the equally-weighted average of the returns on the winner stock minus the returns on the loser stock with each portfolio
Profitability premium	Robust Minus Weak (RMW) is the factor related to firm's profitability which is the difference between the returns on portfolios of robust (high) profitability and weak (low) profitability firms
Investment premium	Conservative Minus Aggressive (CMA) is the factor related to investment, which is the difference between the returns of conservative (low) investment portfolios and aggressive (high) investment portfolios.

4.3 RESEARCH QUESTIONS AND HYPOTHSES

The research questions and its corresponding hypotheses for this part of the study are shown in Table 4.3 below.

Table 4.3: Summary of Research Questions and Hypotheses of First Part of The Study

Research Question	Hypotheses
RQ1 : Is there a significant difference in returns between penny and non-penny stocks in the Malaysian stock market?	H_1 : There is no significant difference in returns between penny and non-penny stocks in the Malaysian stock market.
RQ2 : Is there a significant difference in risk premiums between penny and non-penny stocks in the Malaysian stock market?	H_{2a} : There is no significant difference in beta between penny and non-penny stocks in the Malaysian stock market. H_{2b} : There is no significant difference in size premiums between penny and non-penny stocks in the Malaysian stock market. H_{2c} : There is no significant difference in value premiums between penny and non-penny stocks in the Malaysian stock market. H_{2d} : There is no significant difference in momentum premiums between penny and non-penny stocks in the Malaysian stock market. H_{2e} : There is no significant difference in profitability premiums between penny and non-penny stocks in the Malaysian stock market. H_{2f} : There is no significant difference in investment premiums between penny and non-penny stocks in the Malaysian stock market.

4.4 RETURN OF PENNY AND NON-PENNY STOCKS

The results of descriptive analysis of mean, skewness, kurtosis and Jarque-Bera (J-B) statistics for excess return or risk-adjusted returns ($R_i - R_f$) of all price sorted portfolios are shown in Table 4.4.

Table 4.4: Descriptive Statistic for Mean Value of Excess Returns for PS and NPS

	$(R_i\text{-}R_f)_{NPS1}$	$(R_i\text{-}R_f)_{NPS2}$	$(R_i\text{-}R_f)_{NPS3}$	$(R_i\text{-}R_f)_{AGNPS}$	$(R_i\text{-}R_f)_{PS1}$	$(R_i\text{-}R_f)_{PS2}$	$(R_i\text{-}R_f)_{PS3}$	$(R_i\text{-}R_f)_{AGPS}$
Mean	**-0.0228**	**-0.0229**	**-0.0240**	**-0.0232**	**-0.0268**	**-0.0287**	**-0.0332**	**-0.0296**
Median	-0.0233	-0.0266	-0.0257	-0.0255	-0.0263	-0.0313	-0.0414	-0.0254
Maximum	0.0597	0.1050	0.1167	0.0938	0.1402	0.1315	0.1452	0.1377
Minimum	-0.1089	-0.1299	-0.1363	-0.1231	-0.1410	-0.1390	-0.1637	-0.1488
Std. Dev.	0.0318	0.0388	0.0443	0.0374	0.0490	0.0543	0.0615	0.0514
Skewness	-0.1745	0.1337	0.1233	0.0147	0.3406	0.1715	0.5261	0.3189
Kurtosis	3.9343	4.5708	3.9867	4.2172	4.1439	2.9495	3.7415	3.7151
Jarque-Bera	2.4872	6.3468**	2.5859	3.7063	4.431***	0.3006	4.1429	2.2952
Observations	60	60	60	60	60	60	60	60

*** and *** denotes significance at 5% and 10% levels respectively*

Both penny and non-penny stocks have exhibited negative value means ranging from -0.0228 to -0.0332 with PS3 having the lowest mean value (M = -0.0332, SD = 0.0615) and NP1 with the highest mean (M = -0.0228, SD = 0.0318). It is also notable that the mean value of excess returns for aggregate non-penny stocks (AGNPS) (M = -0.0232, SD = 0.0374) are higher than that of all aggregate penny stocks (AGPS) (M = -0.0296, SD = 0.0514). Briefly, it can be sum up that the mean values of excess returns declines with the decrease in stock prices. Therefore, penny stocks do not differ in terms of returns with non-penny stocks in the context of the Malaysian stock market. Nonetheless, it is also found that all penny stocks (PS1, PS2, PS3, AGPS) in the analysis have higher standard deviations compared to non-penny stocks (NPS1, NPS2, NPS3, AGNPS), thus enhancing the widely noted characteristics of penny stocks to be more volatile in terms of price as compared to non-penny stocks (Liu et al., 2011, 2013, 2015; Rhee & Wu, 2012).

As shown in Table 4.4, the skewness, normality test and kurtosis suggest that only NPS2 and PS1 are not normally distributed. This finding is enhanced with J-B normality test for NPS2 and PS1 which are significant at 5% or 10% level respectively, thus suggesting the rejection of the null hypothesis of normality of the data and implying that the series are not normally distributed. The skewness of all stocks except NPS1 shows a positive value indicating a right skew while the negative value observed for NPS1 indicates a left skew. Both penny and non-penny stocks have high positive kurtosis values (with the exception of PS2) indicating the distribution has heavier tails and more likely to be leptokurtic distribution.

Figure 4.1 below shows the mean values of monthly excess returns of penny and non-penny stocks. It is noted that both penny and non-penny stocks move together but the peakness of penny stocks are more apparent over the analysis period.

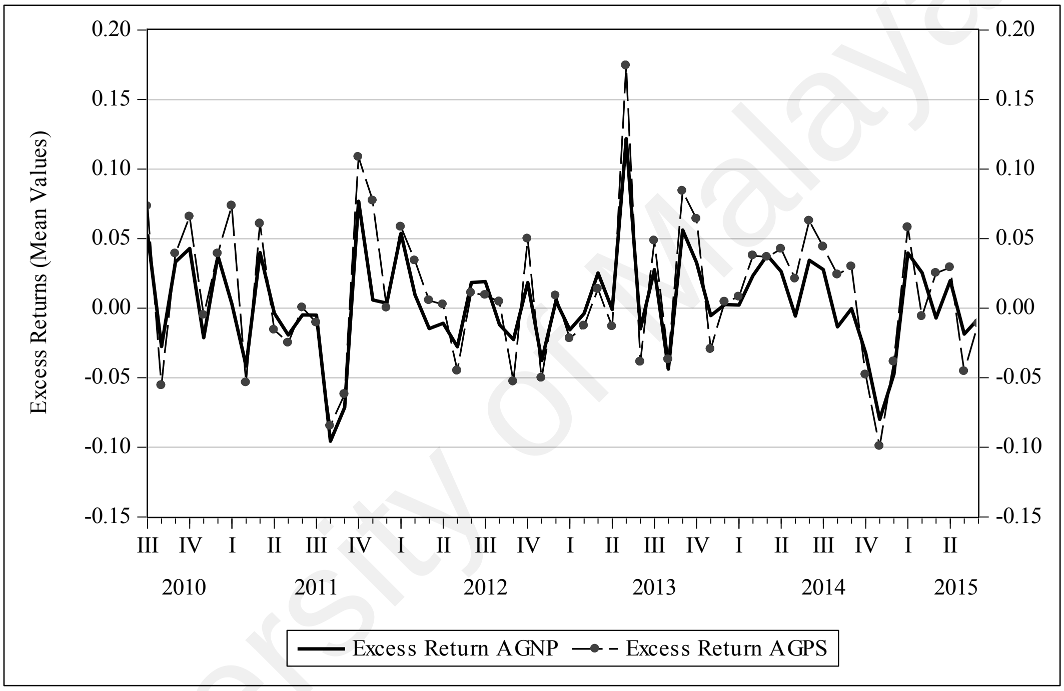


Figure 4.1: Mean Value of Excess Returns for Aggregate Penny and Non-Penny Stocks

Table 4.5 below shows the correlation test results of mean excess returns for the components of penny and non-penny stocks' portfolios. As depicted in the table below, all components between the penny and non-penny stocks' portfolios are strongly correlated at 1% significance level. AGPS and AGNPS have a very strong correlation at 0.8828% and are significant at 1% level. The correlation between the components is further enhanced by the difference in the mean test which is shown in Table 4.6 below.

Table 4.5: Correlation for Mean Value of Excess Returns Between Components of Penny and Non-Penny Portfolio

	$(R_i-R_f)_{NPS1}$	$(R_i-R_f)_{NPS2}$	$(R_i-R_f)_{NPS3}$	$(R_i-R_f)_{AGNPS}$	$(R_i-R_f)_{PS1}$	$(R_i-R_f)_{PS2}$	$(R_i-R_f)_{PS3}$	$(R_i-R_f)_{AGPS}$
$(R_i-R_f)_{NPS1}$	1.0000							
$(R_i-R_f)_{NPS2}$	**0.9392***	1.0000						
$(R_i-R_f)_{NPS3}$	**0.9020***	**0.9515***	1.0000					
$(R_i-R_f)_{AGNPS}$	**0.9636***	**0.9869***	**0.9787***	1.0000				
$(R_i-R_f)_{PS1}$	**0.8004***	**0.8685***	**0.8959***	**0.8802***	1.0000			
$(R_i-R_f)_{PS2}$	**0.7881***	**0.8485***	**0.8682***	**0.8589***	**0.8742***	1.0000		
$(R_i-R_f)_{PS3}$	**0.7320***	**0.7559***	**0.7400***	**0.7604***	**0.7916***	**0.8614***	1.0000	
$(R_i-R_f)_{AGPS}$	**0.8168***	**0.8729***	**0.8868***	**0.8828***	**0.9414***	**0.9695***	**0.9246***	1.0000

Table 4.6: Mean Differences for Mean Value of Excess Returns Between Penny and Non-Penny Portfolio

$(R_i-R_f)_{AGPSS}$	$(R_i-R_f)_{AGNPS}$	**Mean Difference**	***t*-value**	***p*-value**
-0.0296	-0.0232	0.0064	-0.7799	0.4370

The computed *t*-value of -0.7799 (*p*-value = 0.4370) in the above table is not significant, thus indicating that there is no difference between the means. Hence, we accept the null hypothesis that there is no significant difference in returns between penny and non-penny stocks. The results support the earlier analysis (descriptive statistics) of a decline in monthly mean excess returns with the decline in stock prices. The results also signify the common findings of Liu et al. (2011,2013,2015) and Rhee and Wu (2012) that listed penny stocks in the US which are able to sustain abnormal returns (as compared to non-penny stocks) cannot be generalized for Malaysian stock market.

4.5 BETA OF PENNY AND NON-PENNY STOCKS

The beta descriptive values of penny and non-penny stocks are shown in Table 4.7 while Figure 4.2 displays the plotted mean values of beta for both stocks. All price sorted portfolios have positive mean beta values within the range of 0.9155 (NPS3) to 1.0114 (PS2). The mean beta values decline with the increase in stock prices for penny stocks and PS2 has the highest mean beta of 1.0114 (*SD* = 0.053). The mean beta value for PS2 and PS3 is greater than 1, thus, these stock moves more than the market in the same direction and construed as riskier than the general market but potentially more profitable (Campbell & Vuolteenaho, 2004; Scholes & Williams, 1977). With regard to non-penny stocks, the mean beta values increased with the increase in prices for non-penny stocks and NPS1 (*M* = 0.9504, *SD* = 0.0435) have the highest beta value within the non-penny stocks' quintile portfolios. As the beta of NPS1, NPS2 and NPS3 are less than 1, these stocks are less risky than the general market and gains will probably be less than market gains (Scholes & Williams, 1977). The beta of AGPS (*M* = 0.9950, *SD* = 0.1208) are explicitly higher than the beta of AGNPS (*M* = 0.9384, *SD* = 0.0405), thus conforming the notion that penny stocks are high risk and more volatile compared to non-penny stocks (Liu et al., 2011, 2013, 2015).

Positive skewness (right skew) is found for PS2, PS3, NPS3, AGNPS and AGPS. For values of Kurtosis, all price sorted portfolios have positive values, thus indicating a heavier tail in its distribution as evident in Figure 4.2. The J-B test of normality is significant for NPS3, AGNPS, PS1 and PS2, thus implying that these stocks are not normally distributed.

With reference to Figure 4.2, it is evident that the mean values of beta for penny stocks shows a more volatile movement with extremely high and low values as compared to mean values of beta for non-penny.

Table 4.7: Descriptive Statistics for Mean Value of Beta for PS and NPS

	$Beta_{NPS1}$	$Beta_{NPS2}$	$Beta_{NPS3}$	$Beta_{AGNPS}$	$Beta_{PS1}$	$Beta_{PS2}$	$Beta_{PS3}$	$Beta_{AGPS}$
Mean	**0.9504**	**0.9492**	**0.9155**	**0.9384**	**0.9850**	**1.0114**	**1.0052**	**0.9950**
Median	0.9476	0.9567	0.9190	0.9507	0.9982	0.9325	1.0035	1.0004
Maximum	1.0646	1.0519	0.9926	1.0012	1.1704	1.4053	1.1363	1.2172
Minimum	0.8837	0.8071	0.7241	0.8442	0.7605	0.7488	0.8473	0.7899
Std. Dev.	0.0435	0.0655	0.0484	0.0405	0.1134	0.1998	0.0727	0.1208
Skewness	0.5827	-0.5360	-1.1357	-0.9901	-0.5345	0.4069	0.0817	-0.0790
Kurtosis	2.7425	2.7625	5.4416	3.0489	2.1990	1.8348	1.9976	2.0312
Jarque-Bera	3.5616	3.0135	27.8025*	9.8083*	4.4614***	5.0498***	2.5785	2.4089
Observations	60	60	60	60	60	60	60	60

** and *** denotes significance at 1% and 10% levels respectively*

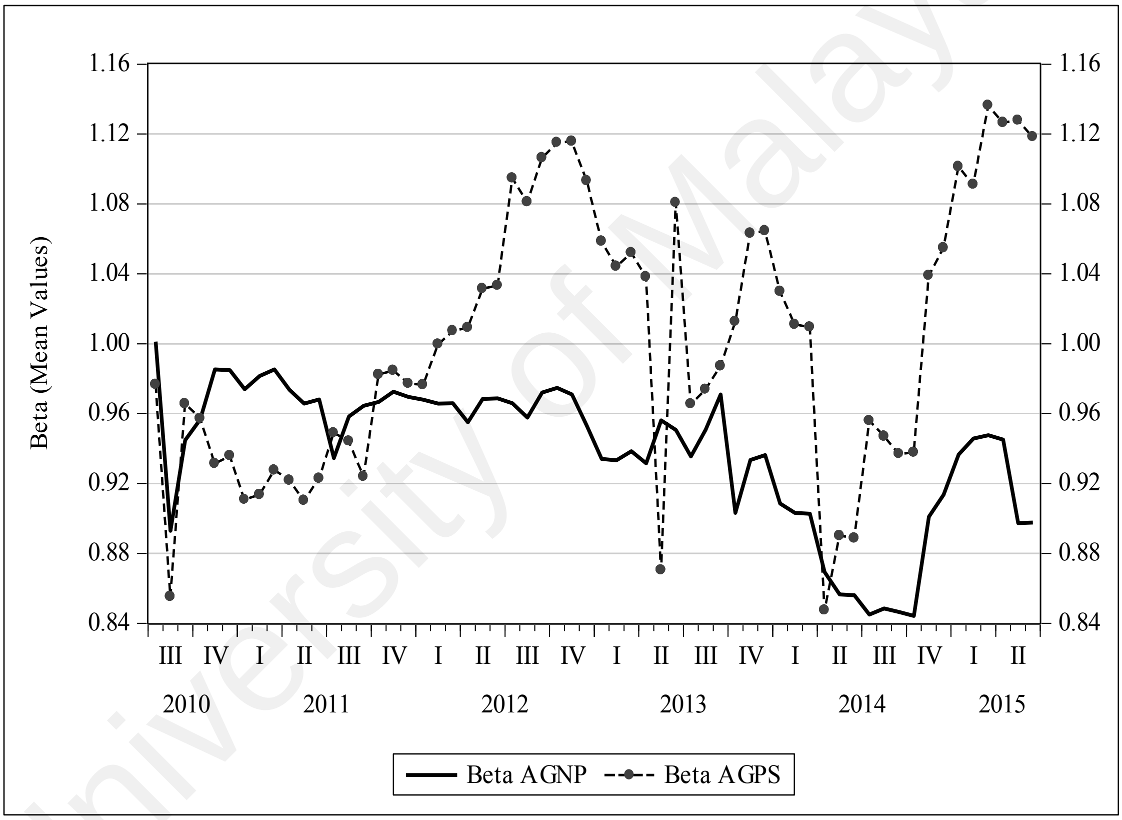


Figure 4.2: Mean Value of Beta for Aggregate Penny and Non-Penny Stocks

The correlation between the components of penny and non-penny stocks' portfolio for mean value of beta is shown in Table 4.8. It is found the NPS1 is correlated to all components of penny and non-penny stocks' portfolio either at 1% or 5% level of significance with a positive correlation within the non-penny stocks but is negatively correlated to penny stocks. On a same note, all penny stocks are correlated within its group from moderate to strong. The correlation between AGPS and AGNPS is found to be moderate at -0.4302% and significant at 1% level.

Table 4.8: Correlation for Mean Value of Beta Between Components of PS and NPS

	$Beta_{NPS1}$	$Beta_{NPS2}$	$Beta_{NPS3}$	$Beta_{AGNPS}$	$Beta_{PS1}$	$Beta_{PS2}$	$Beta_{PS3}$	$Beta_{AGPS}$
$Beta_{NPS1}$	1.0000							
$Beta_{NPS2}$	**0.4816***	1.0000						
$Beta_{NPS3}$	**0.3351***	**0.3259***	1.0000					
$Beta_{AGNPS}$	**0.7517***	**0.8417***	**0.6944***	1.0000				
$Beta_{PS1}$	**-0.6625***	**-0.1945**	0.1435	**-0.2852****	1.0000			
$Beta_{PS2}$	**-0.6946***	**-0.5926***	-0.0482	**-0.5878***	**0.7684***	1.0000		
$Beta_{PS3}$	**-0.2725****	0.1062	**0.4911***	0.1551	**0.6737***	**0.4372***	1.0000	
$Beta_{AGPS}$	**-0.7000***	**-0.4039***	0.0966	**-0.4302***	**0.9277***	**0.9420***	**0.6554***	1.0000

** and ** denotes correlation is significant at the 1% and 5% level respectively*

The test results for the mean difference for beta between aggregate penny and non-penny stocks are shown in Table 4.9 below. The computed *t*-value is 3.411 with a *p*-value of 0.0008. By conventional criteria, this difference is considered to be extremely significant statistically. Hence, the null hypothesis is rejected and it is concluded that there is significant difference between the mean value of beta for these two group of stocks. Thus, it is perceived that the penny stocks are riskier and more volatile than non-penny stocks.

Table 4.9: Mean Difference for Mean Value of Beta Between PS and NPS

$Beta_{AGPS}$	$Beta_{AGNPS}$	Mean Difference	*t*-value	*p*-value
0.9950	0.9385	0.0567	3.4411	**0.0008***

** Significant at the 1% level (2-tailed).*

4.6 SIZE PREMIUM OF PENNY AND NON-PENNY STOCKS

The size premium represented by *SMB* statistics of penny and non-penny stocks. *SMB* accounts for the spread in returns between small and large sized firms (small minus big) based on the company's market capitalization. As shown in Table 4.10, both penny and non-penny stocks were observed to have negative mean values. PS3 shows the lowest mean value (M = -0.0293, SD = 0.0783) while NPS1 has the highest mean value

(*M* = -0.0007, *SD* = 0.0233). It is also noted that mean values of *SMB* have a positive relation with stock prices as the mean values of *SMB* increases with an increase in stock prices, thus indicating that higher priced stocks namely non-penny stocks have higher market capitalization as compared to low priced stocks (penny stocks). This fills the conventional view that penny stocks are owned by small cap companies (Vogel, 2017b). Comparing this finding with the earlier findings for excess returns (that there is no difference between the means), it is concluded that low priced stocks in the Malaysian stock market (namely penny stocks) outperforms larger ones (non-penny stocks) in terms of returns and risk.

Table 4.10: Descriptive Statistics of Mean Value of SMB for PS and NPS

	SMB_{NPS1}	SMB_{NPS2}	SMB_{NPS3}	SMB_{AGNPS}	SMB_{PS1}	SMB_{PS2}	SMB_{PS3}	SMB_{AGPS}
Mean	**-0.0007**	**-0.0034**	**-0.0128**	**-0.0042**	**-0.0254**	**-0.0305**	**-0.0454**	**-0.0258**
Median	-0.0011	0.0030	-0.0146	-0.0038	-0.0280	-0.0360	-0.0354	-0.0288
Maximum	0.0507	0.0608	0.0532	0.0368	0.1106	0.1150	0.1753	0.1100
Minimum	-0.0626	-0.0844	-0.0889	-0.0394	-0.2249	-0.1119	-0.2007	-0.1372
Std. Dev.	0.0233	0.0291	0.0306	0.0180	0.0517	0.0411	0.0701	0.0430
Skewness	-0.1029	-0.6384	-0.3818	0.0920	-0.4436	1.0330	-0.3678	0.1316
Kurtosis	2.7754	3.3424	2.8765	2.4868	6.2365	5.4691	2.4204	4.2098
Jarque-Bera	0.2321	4.3692	1.4958	0.7429	28.1553*	25.9098*	2.1926	3.8319
Observations	60	60	60	60	60	60	60	60

As shown in Table 4.10, all stocks except PS2 are negatively skewed. All stocks have a positive kurtosis values indicating leptokurtic distribution in its series. As for test of normality, J-B test of normality finds all stocks being normally distributed for *SMB* except for PS1.

Figure 4.3 shows the mean values of *SMB* of penny and non-penny stocks. It is noted that a more volatile movement is projected for penny stocks as compared to non-penny stocks over the analysis period.

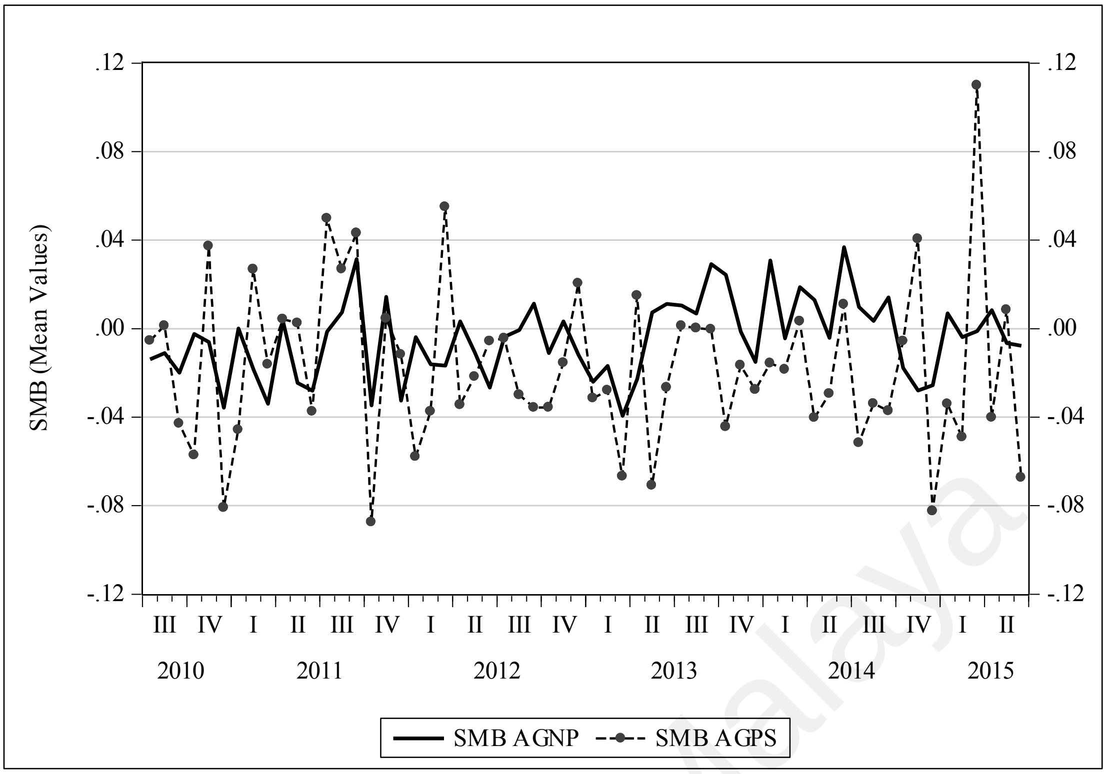


Figure 4.3: Mean Value of *SMB* for Aggregate Penny and Non-Penny Stocks

A further analysis of correlation between the components of penny and non-penny stocks' portfolio is shown in Table 4.11. The results of correlation are mixed with weak to strong coefficients recorded between the components. PS1 seem to have a positive but weak correlation with NPS2, NPS3 and AGNPS while AGPS is strongly correlated to PS2 but is moderate in its relation to PS1 and PS2. A very weak, positive and non-significant correlation is detected between AGPS and AGNPS at 0.1682%.

Table 4.11: Correlation for Mean Value of *SMB* Between Components of Penny and Non-Penny Portfolios

	SMB_{NPS1}	SMB_{NPS2}	SMB_{NPS3}	SMB_{AGNPS}	SMB_{PS1}	SMB_{PS2}	SMB_{PS3}	SMB_{AGPS}
SMB_{NPS1}	1.0000							
SMB_{NPS2}	-0.0202	1.0000						
SMB_{NPS3}	-0.0902	**0.4201***	1.0000					
SMB_{AGNPS}	**0.6114***	**0.4166***	**0.3245***	1.0000				
SMB_{PS1}	-0.0200	**0.2388*****	0.1880	0.1042	1.0000			
SMB_{PS2}	0.1345	0.0946	0.1070	0.0834	0.1066	1.0000		
SMB_{PS3}	**-0.2186*****	0.0894	0.2015	-0.1845	-0.0224	-0.1555	1.0000	
SMB_{AGPS}	0.0620	**0.2423****	**0.2348*****	**0.2264*****	**0.3545***	**0.3088***	0.1836	1.0000

** , ** and *** denotes correlation is significant at 1%, 5% and 10% levels respectively*

The result of the test for the mean difference between penny and non-penny stocks for SMB is shown in Table 4.12 below. The *t*-test results with a *t*-value of 2.3344 is significant at 5% level. The null hypothesis is rejected and it is concluded that there are statistically significant mean differences for *SMB* between penny and non-penny stocks. These result substantiates the earlier findings (descriptive statistics) that penny stocks consist of small capital companies and are able to outperform non-penny stocks in terms of returns and risk in the Malaysian stock market.

Table 4.12: Mean Differences for Mean Value of SMB Between PS and NPS

SMB_{AGPS}	SMB_{AGNPS}	**Mean Difference**	***t*-value**	***p*-value**
-0.0258	-0.0042	0.0217	3.6034	**0.0005***

*** Significant at the 5% level (2-tailed).*

4.7 VALUE PREMIUM OF PENNY AND NON-PENNY STOCKS

The value premium is represented by *HML* statistics of penny and non-penny stocks. *HML* premium is the difference between the return on a portfolio comprises of high B/M stocks and the return on a portfolio comprises of low B/M stocks. A similar pattern of negative mean values is noted for *HML* as it was found for *SMB*.

As shown in Table 4.13, both penny and non-penny stocks have negative mean values ranging from -0.0007 to -0.0264. NPS1 has the highest mean value of -0.0007 (*SD* = 0. 0231) while PS3 has the lowest mean value of -0.0264 (*SD* = 0. 0754). There is a positive relation between the mean values of *HML* and stock pricing as lower priced stocks (penny stocks) have lower *HML* compared to higher priced stock (non-penny) with higher *HML* value. *HML* accounts for the spread in returns between value and growth stocks. Companies with high B/M ratios have lower mean values of *HML* and are known as growth stocks. Inversely, high *HML* mean values refer to lower B/M ratios and known as value stocks. In this context, both AGPS and AGNPS are not conclusively separated between the low and high *HML* mean values. Nevertheless, penny stocks are mostly growth stocks while non-penny stocks have a mixture of value stocks (NPS1) and growth stocks (NPS2 and NPS3) in the Malaysian market.

Skewness for all priced stocks are observed to be negative except for PS2. The Kurtosis value seem to be greater than zero, thus suggesting the distribution of *HML* series have heavier tails and are peaked. Normality is ruled for NPS2, PS1 and AGPS based on with J-B normality test with a significant result between 1% to 10% level of significance.

Table 4.13: Descriptive Statistics of Mean Value of *HML* for PS and NPS

	HML_{NPS1}	HML_{NPS2}	HML_{NPS3}	HML_{AGNPS}	HML_{PS1}	HML_{PS2}	HML_{PS3}	HML_{AGPS}
Mean	**-0.0007**	**-0.0035**	**-0.0117**	**-0.0045**	**-0.0090**	**-0.0135**	**-0.0264**	**-0.0159**
Median	-0.0012	0.0039	-0.0124	-0.0044	-0.0056	-0.0175	-0.0085	-0.0173
Maximum	0.0511	0.0569	0.0524	0.0361	0.0947	0.1046	0.1808	0.1014
Minimum	-0.0648	-0.0854	-0.0823	-0.0467	-0.1996	-0.1030	-0.1820	-0.0905
Std. Dev.	0.0231	0.0287	0.0286	0.0180	0.0534	0.0450	0.0754	0.0347
Skewness	-0.1537	-0.6592	-0.3127	-0.2286	-0.7965	0.6498	-0.0717	0.5581
Kurtosis	2.9867	3.3328	2.9791	2.8838	4.5317	3.0933	2.9176	4.0597
Jarque-Bera	0.2366	4.622^{***}	0.9791	0.5564	12.209^{*}	4.2440	0.0684	5.9224^{**}
Observations	60	60	60	60	60	60	60	60

, ** and * denotes significance at 1%; 5% and 10% levels respectively*

The graphical presentation of the mean value of *HML* is shown in Figure 4.4. The mean values of *HML* for penny stocks shows a more volatile movement with extreme high and low values as compared to the mean values of beta for non-penny.

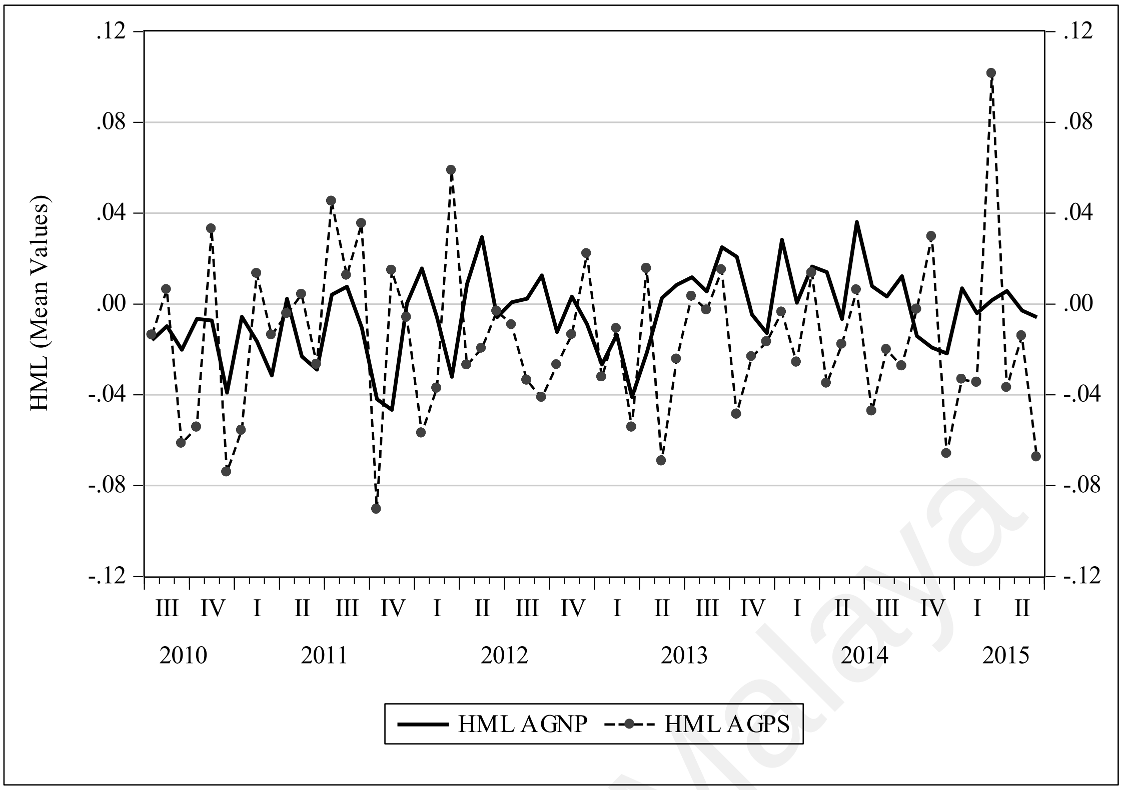


Figure 4.4: Mean Value of *HML* for Aggregate Penny and Non-Penny Stocks

The correlation results for mean values of *HML* between the components of penny and non-penny stocks' portfolio is shown in Table 4.14. The value premium (*HML*) for NPS2 and NPS3 has a weak but positive significant correlation with penny stocks. The AGPS is also positively correlated within the penny stocks components and the correlation is between moderate and strong.

Table 4.14: Correlation for Mean Value of *HML* Between Components of Penny and Non-Penny Portfolios

	HML_{NPS1}	HML_{NPS2}	HML_{NPS3}	HML_{AGNPS}	HML_{PS1}	HML_{PS2}	HML_{PS3}	HML_{AGPS}
HML_{NPS1}	1.0000							
HML_{NPS2}	-0.0795	1.0000						
HML_{NPS3}	-0.0911	**0.4129***	1.0000					
HML_{AGNPS}	**0.4836***	**0.3787***	**0.2442*****	1.0000				
HML_{PS1}	-0.0440	**0.3469***	**0.3311***	0.1155	1.0000			
HML_{PS2}	-0.0570	**0.2936****	**0.2761****	0.0116	0.1993	1.0000		
HML_{PS3}	-0.1699	**0.2369*****	**0.3440***	-0.1029	-0.0739	**0.3524***	1.0000	
HML_{AGPS}	-0.1281	**0.4676***	**0.5135***	0.0834	**0.5349***	**0.7718***	**0.6051***	1.0000

** , ** and *** denotes correlation is significant at 1%, 5% and 10% levels respectively*

A further t-test was computed to test the null hypothesis and there was no mean difference in the mean value of *HML* between the AGNP and AGPS. As indicated in Table 4.15, the mean difference for mean value of *HML* between these stocks are significant, thus the null hypothesis is rejected and it is concluded that there is significant difference in the mean value of *HML*. This supports the notion of different categories of stocks between the penny and non-penny. Penny stocks (AGPS) with low *HML* are growth stocks while non-penny stocks with moderate to high *HML* values have a mixture of both growth and value stocks in the Malaysian market context

Table 4.15: Mean Differences for Mean Value of *HML* Between PS and NPS

HML_{AGPS}	HML_{AGNP}	Mean Difference	*t*-value	*p*-value
-0.0159	-0.0045	-0.0114	2.2589	**0.0257****

*** Significant at the 5% level (2-tailed)*

4.8 MOMENTUM PREMIUM OF PENNY STOCK AND NON-PENNY STOCK

The descriptive statistics of momentum premium is represented by *WML* of penny and non-penny stocks. *WML* premium is the difference between the return on a portfolio comprises of stocks with high returns and the return on a portfolio comprises of stocks with low returns from *t-12* to *t-2*.

As shown in Table 4.16, the observed mean values for *WML* are between 0.0580 and 0.1135 and decrease monotonically with the increase in price level. PS3 has the highest mean value of 0.1135 (*SD* = 0.0210) whereas NPS1 records the lowest with 0.0580 (*SD* = 0.0072). The WML value recorded for AGNP (*M* = 0.0694, *SD* = 0.0104) is lower than that of AGPS (*M* = 0.0943, *SD* = 0.0163). The values of *WML* clearly signify the existence of momentum effect in the Malaysian stock market for both categories of stocks but it's more prominent with low priced stocks. PS1, PS3, NPS1 and NPS2 are skewed to the right as observed with a positive value. The value of Kurtosis for all stocks are more than 1.9 which shows the existence of leptokurtic distribution for *WML*. Normal distribution is observed for AGNPS, AGPS and NPS2 category of stocks (J-B test of normality) in the Malaysian stock market.

Table 4.16: Descriptive Statistics for Mean Value of *WML* for PS and NPS

	WML_{NPS1}	WML_{NPS2}	WML_{NPS3}	WML_{AGNPS}	WML_{PS1}	WML_{PS2}	WML_{PS3}	WML_{AGPS}
Mean	**0.0580**	**0.0708**	**0.0799**	**0.0694**	**0.0844**	**0.0906**	**0.1135**	**0.0943**
Median	0.0571	0.0712	0.0819	0.0701	0.0849	0.0917	0.1157	0.0969
Maximum	0.0727	0.0866	0.1013	0.0855	0.1214	0.1192	0.1661	0.1203
Minimum	0.0436	0.0553	0.0559	0.0107	0.0564	0.0588	0.0685	0.0020
Std. Dev.	0.0072	0.0082	0.0103	0.0104	0.0135	0.0109	0.0210	0.0163
Skewness	0.2350	0.0314	-0.3509	-2.9871	0.1350	-0.1722	0.0394	-3.0598
Kurtosis	2.5832	1.9506	2.7381	17.9944	2.8248	3.7881	2.7732	18.1877
Jarque-Bera	0.9866	2.7631	1.4028	65.304*	0.2591	1.8494	0.1441	67.290*
Observations	60	60	60	60	60	60	60	60

** Significant at 1% level*

The mean values of *WML* are presented graphically in Figure 4.5. Both penny and non-penny stocks have some identical fluctuations with regards to market movements but the momentum effect seem more pertinent for penny stocks. It's evident that penny stocks in the Malaysian stock market have higher momentum effect as compared to non-penny stocks.

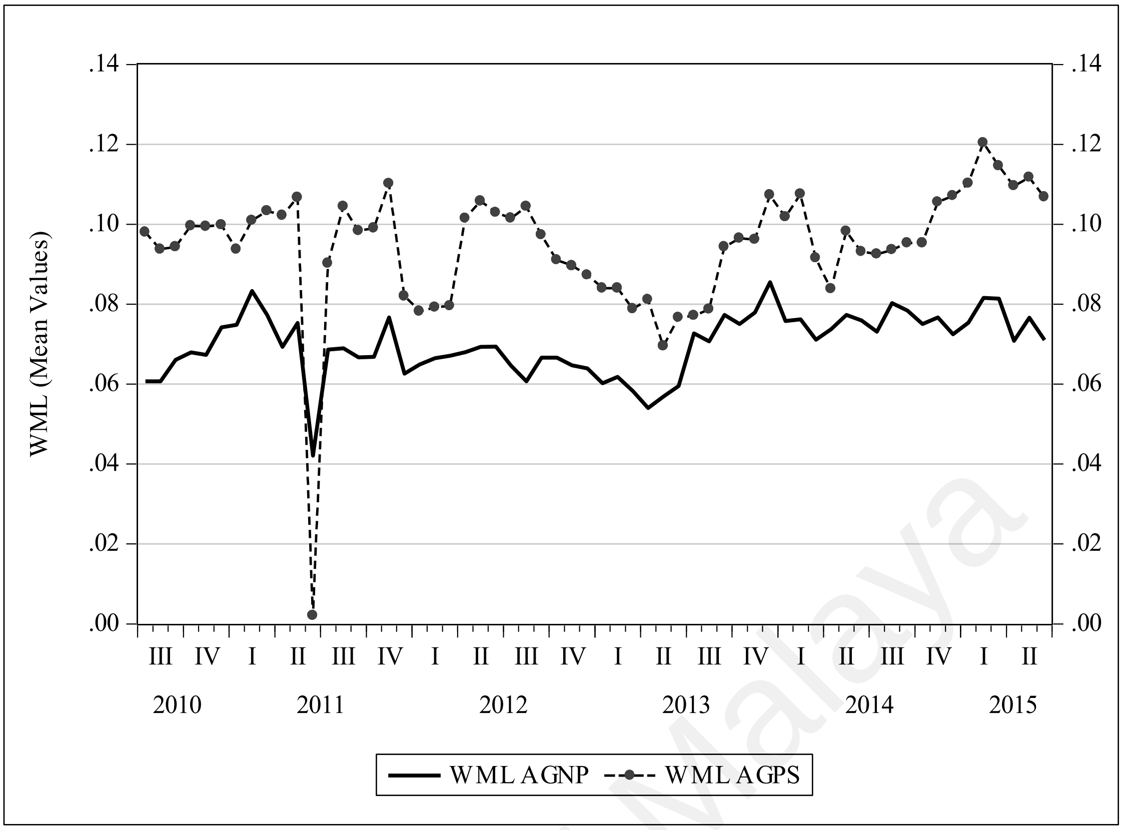


Figure 4.5: Mean Value of *WML* for Aggregate Penny and Non-Penny Stocks

The continuation of the correlation analysis is presented in Table 4.17 below. Both AGPS and AGNPS have a positive and significant correlation (between weak to moderate) with all components of stocks. This is evident from the near corresponding movements of the mean value of *WML* as depicted in Figure 4.5.

Table 4.17: Correlation for Mean Value of *WML* Between Components of Penny and Non-Penny Portfolios

	WML_{NPS1}	WML_{NPS2}	WML_{NPS3}	WML_{AGNPS}	WML_{PS1}	WML_{PS2}	WML_{PS3}	WML_{AGPS}
WML_{NPS1}	1.0000							
WML_{NPS2}	**0.7231***	1.0000						
WML_{NPS3}	**0.4534***	**0.5559***	1.0000					
WML_{AGNPS}	**0.3665***	**0.5213***	**0.6233***	1.0000				
WML_{PS1}	**0.3861***	**0.2746****	**0.3754***	**0.4450***	1.0000			
WML_{PS2}	-0.0979	0.0099	0.1403	**0.2750****	**0.2359*****	1.0000		
WML_{PS3}	**0.2691****	0.1970	**0.5107***	**0.3160***	**0.3521***	0.0473	1.0000	
WML_{AGPS}	**0.2589****	**0.2584*****	**0.3815***	**0.3401***	**0.5200***	**0.2820***	**0.4973***	1.0000

** , ** and *** denotes correlation is significant at 1%, 5% and 10% levels respectively*

The test for mean difference for *WML* between penny and non-penny stocks returned an impressive statistical significance at 1% level of confidence (refer Table 4.18). Correspondingly, the null hypothesis is rejected and it is concluded that there is significant difference in the mean value of *WML* between penny and non-penny stocks in the Malaysian market context. The earlier conclusion of prominent momentum effect for all priced sorted stocks is adopted.

Table 4.18: Mean Differences for Mean Value of *WML* Between PS and NPS

WML_{AGPS}	WML_{AGNPS}	**Mean Difference**	***t*-value**	***p*-value**
0.0943	0.0694	0.0249	9.9753	**0.0001***

* *Significant at the 1% level (2-tailed)*

4.9 PROFITABILITY PREMIUM OF PENNY AND NON-PENNY STOCKS

The descriptive statistics of profitability premium is represented by *RMW* of penny and non-penny stocks. *RMW* is the difference between the return on diversified portfolios of stocks with robust and weak profitability. As shown in Table 4.19, The mean values of *RMW* ranges between -0.0015 (PS3) and 0.0057 (PS1). The mean values of *RMW* does not move monotonically with stock price levels. All priced sorted portfolios of penny and non-penny stocks recorded a positive *RMW* except for the lowest penny stock PS3 with a mean value of -0.0015 (*SD* = 0.0695). Both PS1 and PS2 have the highest mean values of RMW of 0.0057 (*SD* = 0.0401) and 0.0039 (*SD* = 0.0438) respectively. Nevertheless, RMW of AGNPS (*M* = 0.0031, *SD* = 0.0110) is higher from AGPS (*M* = 0.0022, *SD* = 0.0289). Basically, the profitability premium (mean value of *RMW*) remains mixed for both penny and non-penny stocks in the Malaysian stock market context. A right skew is observed for all price sorted portfolios as the values of skewness are positive. As the kurtosis values are positive and above zero, the distribution has heavier tails. NPS2 and PS3 are significant for J-B test of normality, thus this portfolio of stocks are not normally distributed. All other portfolio stocks have normal distribution.

Table 4.19: Descriptive Statistics for Mean Value of *RMW* for PS and NPS

	RMW_{NPS1}	RMW_{NPS2}	RMW_{NPS3}	RMW_{AGNPS}	RMW_{PS1}	RMW_{PS2}	RMW_{PS3}	RMW_{AGPS}
Mean	**0.0007**	**0.0037**	**0.0029**	**0.0031**	**0.0057**	**0.0039**	**-0.0015**	**0.0022**
Median	0.0012	0.0060	0.0061	0.0047	0.0049	0.0066	-0.0094	0.0032
Maximum	0.0302	0.0344	0.0377	0.0234	0.1064	0.0969	0.2638	0.0638
Minimum	-0.0217	-0.0535	-0.0491	-0.0244	-0.0840	-0.1067	-0.1609	-0.0581
Std. Dev.	0.0129	0.0171	0.0209	0.0110	0.0401	0.0438	0.0695	0.0289
Skewness	0.0300	-0.8527	-0.5859	-0.4019	0.2074	-0.1435	0.8084	0.0950
Kurtosis	1.9356	4.1120	2.7642	2.6120	2.7980	2.7509	5.4238	2.6291
Jarque-Bera	2.8413	10.363*	3.57	1.99	0.53	0.36	21.223*	0.43
Observations	60	60	60	60	60	60	60	60

* *Significant at 1% level*

The graphical mean value of *RMW* is shown in Figure 4.6. Though both penny and non-penny are clustered together but a clear volatile movement is observed for penny stocks as compared to non-penny stocks.

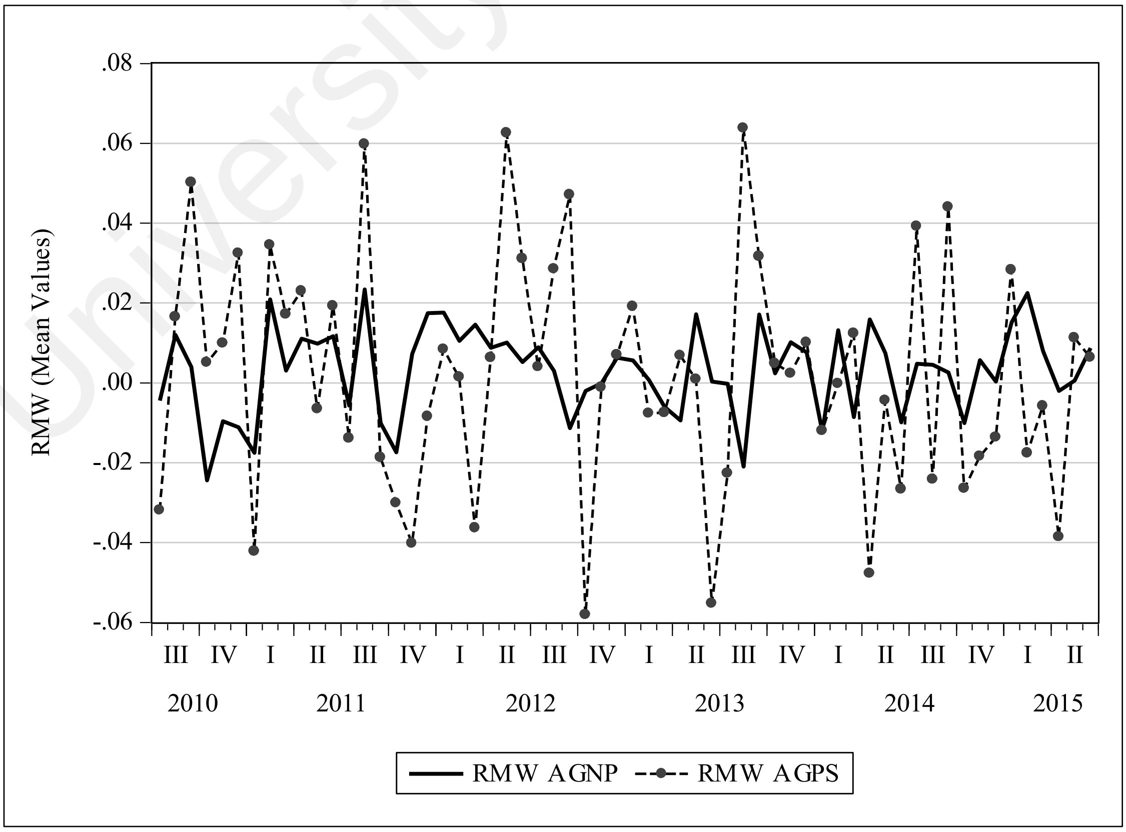


Figure 4.6: Mean Value of *RMW* for Aggregate Penny and Non-Penny Stocks

The results of correlations for mean value of *RMW* between the components of penny and non-penny stocks (refer Table 4.20) clearly shows that all non-penny stocks (NPS1, NPS2, NPS3) are correlated positively between weak, moderate and strong with AGNPS. On the same note, all penny stocks of PS1, PS2 and PS3 are positively correlated to AGPS ranging from moderate to strongly. All other components of penny and non-penny stocks do not show any correlation.

Table 4.20: Correlation for Mean Value of *RMW* Between Components of Penny and Non-Penny Portfolios

	RMW_{NPS1}	RMW_{NPS2}	RMW_{NPS3}	RMW_{AGNPS}	RMW_{PS1}	RMW_{PS2}	RMW_{PS3}	RMW_{AGPS}
RMW_{NPS1}	1.0000							
RMW_{NPS2}	-0.1148	1.0000						
RMW_{NPS3}	0.0553	0.1327	1.0000					
RMW_{AGNPS}	**0.3016***	**0.5252***	**0.7570***	1.0000				
RMW_{PS1}	-0.0474	0.1674	0.0837	0.1216	1.0000			
RMW_{PS2}	-0.0582	0.0057	0.1927	0.0858	-0.0073	1.0000		
RMW_{PS3}	-0.1280	0.1605	-0.0193	0.0060	-0.0048	0.1357	1.0000	
RMW_{AGPS}	-0.1077	0.1343	0.2082	0.1522	**0.4366***	**0.6375***	**0.6230***	1.0000

* *Correlation is significant at the 1% level*

The *t*-test results for the mean difference between the mean values of *RMW* for AGNPS and AGPS returned are not significant (refer Table 4.21), thus we rule out any significant difference between these mean values. This supports the earlier findings (refer Table 4.19) that the profitability premium (mean value of *RMW*) remains mixed for both penny and non-penny stocks in the Malaysian stock market context.

Table 4.21: Mean Differences for Mean Value of *RMW* Between PS and NPS

RMW_{AGPS}	RMW_{AGNPS}	**Mean Difference**	***t*-value**	***p*-value**
0.0022	0.0031	-0.0009	0.2254	0.8220

4.10 INVESTMENT PREMIUM OF PENNY AND NON-PENNY STOCK

The final asset pricing model's investment premium descriptive statistics of *CMA* is shown in Table 4.22. *CMA* is the difference between the returns on diversified portfolios of low and high investment stocks, which is called conservative and aggressive.

Table 4.22: Descriptive Statistics for Mean Value of *CMA* for PS and NPS

	CMA_{NPS1}	CMA_{NPS2}	CMA_{NPS3}	CMA_{AGNPS}	CMA_{PS1}	CMA_{PS2}	CMA_{PS3}	CMA_{AGPS}
Mean	**-0.0157**	**-0.0156**	**-0.0150**	**-0.0157**	**-0.0140**	**-0.0146**	**-0.0134**	**-0.0118**
Median	-0.0104	-0.0034	-0.0058	-0.0078	0.0006	0.0071	-0.0122	0.0085
Maximum	0.0789	0.1069	0.1016	0.1026	0.1407	0.1648	0.2309	0.1540
Minimum	-0.1613	-0.1950	-0.2515	-0.1933	-0.3479	-0.3358	-0.2871	-0.3319
Std. Dev.	0.0415	0.0538	0.0641	0.0528	0.0937	0.0937	0.1078	0.0866
Skewness	-1.8808	-1.8309	-2.1678	-2.0918	-1.9583	-1.5545	-0.6431	-1.8664
Kurtosis	7.5194	7.1831	8.0271	8.0094	7.3530	6.0153	3.9978	7.1854
Jarque-Bera	86.436*	77.266*	110.176*	106.490*	85.718*	46.894*	6.6255	78.630*
Observations	60	60	60	60	60	60	60	60

** Significant at 1% level*

The mean values of *CMA* for all price sorted portfolios are negative and between a close knit range of -0.0118 and -0.0157. PS3 with mean value of -0.0134 (*SD* = 0.1078) tops the list and NP1 being the lowest (*M* = -0.016, *SD* = 0.041). Likewise, AGPS records a higher mean value of CMA (*M* = -0.0118, *SD* = 0.0866) as compared to AGNPS (*M* = -0.0157, *SD* = 0.0528). The corresponding results in the *CMA* is closely related to the category of stocks enlisted in the earlier section of *HML*. It is found that the AGPS consists of growth stocks with low *HML* mean value while AGNPS with its moderate to high *HML* mean value has a mixed composition of value and growth stocks. Basically, growth stocks are issued by small capital companies that have substantial potential for growth in the foreseeable future. Growth companies may currently be growing at a faster pace than the overall market and often devote most of their current revenue toward further expansion (Cussen, 2018). Except for PS3, all priced sorted portfolio do not have normal distribution (based on J-B test of normality) with a left skew (skewness are negative for all stocks) and heavy tails (values recorded for Kurtosis).

Figure 4.7 presents the graphical movements of the mean value of *CMA* for AGNP and AGPS. Both clusters of stocks seem to have identical fluctuations but the investment effect is more volatile for penny stocks.

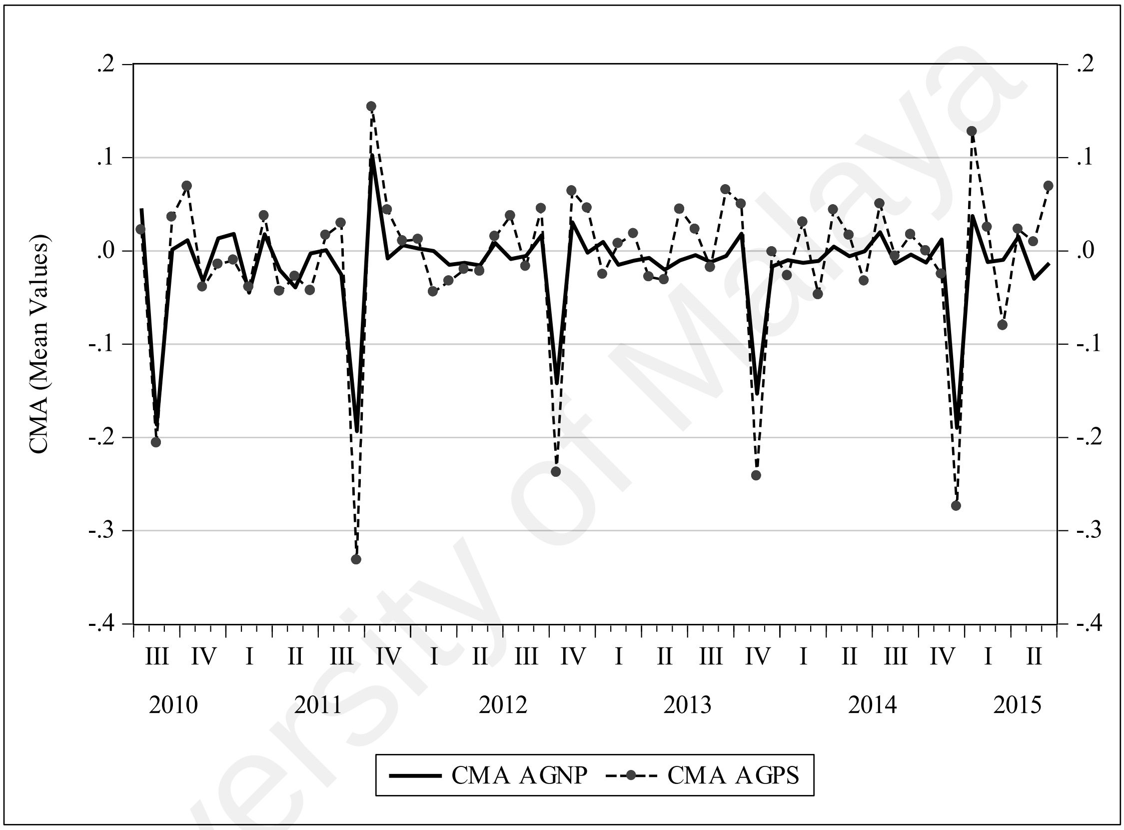


Figure 4.7: Mean Value of CMA for Aggregate Penny and Non-Penny Stocks

The correlation between the components of penny and non-penny stocks' portfolio is shown in Table 4.23. All components returned positive significant correlation from strong to very strong. The close correlation for mean value of *CMA* between all components of penny and non-penny stocks' portfolio signifies that companies trading in the Malaysia stock market are devoting most of their current revenue toward further expansion regardless of whether it is a growth or value stocks.

Table 4.23: Correlation for Mean Value of *CMA* Between Components of Penny and Non-Penny Portfolios

	CMA_{NPS1}	CMA_{NPS2}	CMA_{NPS3}	CMA_{AGNPS}	CMA_{PS1}	CMA_{PS2}	CMA_{PS3}	CMA_{AGPS}
CMA_{NPS1}	1.0000							
CMA_{NPS2}	**0.9345***	1.0000						
CMA_{NPS3}	**0.8978***	**0.9114***	1.0000					
CMA_{AGNPS}	**0.9560***	**0.9751***	**0.9698***	1.0000				
CMA_{PS1}	**0.8842***	**0.8388***	**0.8617***	**0.8757***	1.0000			
CMA_{PS2}	**0.7805***	**0.8372***	**0.8395***	**0.8515***	**0.7762***	1.0000		
CMA_{PS3}	**0.7627***	**0.7431***	**0.7605***	**0.7892***	**0.7024***	**0.7301***	1.0000	
CMA_{AGPS}	**0.8987***	**0.8816***	**0.8807***	**0.9118***	**0.9133***	**0.9017***	**0.8607***	1.0000

* *Correlation is significant at the 1% level*

The *t*-value to test the mean difference for mean value of *CMA* between AGPS and AGNPS is presented in Table 4.24 below. Corresponding to the high correlation between the components of penny and non-penny stocks' portfolio, the *t*-value is found to be significant at 1% level of confidence. Hence, it is concluded that there is a significant difference between the mean value of *CMA b*etween penny and non-penny stocks in the Malaysian stock market.

Table 4.24: Mean Differences for Mean Value of CMA Between PS and NPS

CMA_{AGPS}	CMA_{AGNP}	Mean Difference	*t*-value	*p*-value
-0.1180	-0.0157	-0.1023	7.8127	**0.0001***

* *Significant at the 1% level (2-tailed).*

The summary findings from the first part of the research is presented in Table 4.25 below.

Table 4.25: Summary of Findings for Performance of PS in Malaysian Stock Market

Research Question	**Hypothesis**	**Mean Differences** #	**Test Results** ***Accept/Reject Null Hypothesis***	**Remarks**
RQ1 : Is there a significant difference in the returns between penny and non-penny stocks in the Malaysian stock market?	**H_1 :** There is no significant difference in returns between penny and non-penny stocks in the Malaysian stock market.	0.0064 (-0.7799)	**Accept**	▪ Mean values of **excess returns declines with the decrease in stock prices**, ▪ Penny stocks do not differ in terms of returns with non-penny stocks
RQ2 : Is there a significant difference in risk premiums between penny and non-penny stocks in the Malaysian stock market?	**H_{2a} :** There is no significant difference in beta between penny and non-penny stocks in the Malaysian stock market.	**0.0567*** (3.4411)	**Reject**	▪ Penny stocks are **riskier and more volatile** than non-penny stocks
	H_{2b} : There is no significant difference in size premiums between penny and non-penny stocks in the Malaysian stock market.	**0.0217*** (3.6034)	**Reject**	▪ **Higher priced stocks has higher market capitalization** as compared to low priced stocks
	H_{2c} : There is no significant difference in value premiums between penny and non-penny stocks in the Malaysian stock market.	**-0.0114**** (2.2589)	**Reject**	▪ **Penny stocks are mostly growth stocks** while non-penny stocks have a mixture of value stocks and growth stocks
	H_{2d} : There is no significant difference in momentum premiums between penny and non-penny stocks in the Malaysian stock market.	**0.0249*** (9.9753)	**Reject**	▪ **Prominent momentum effect found for low priced stocks**
	H_{2e} : There is no significant difference in profitability premiums between penny and non-penny stocks in the Malaysian stock market.	-0.0009 (0.2254)	**Accept**	▪ **Profitability premium remains mixed** for both penny and non-penny stocks
	H_{2f} : There is no significant difference in investment premiums between penny and non-penny stocks in the Malaysian stock market.	**-0.1023*** (7.8127)	**Reject**	▪ **Investment premium is higher for penny stocks** as its mainly growth stocks

t-values are presented in parenthesis
** and ** denotes t-values are significant at 1% and 5% levels (2-tailed) respectively.*

4.11 CONCLUSION

Primarily, the objectives of this part are to investigate the returns and risk premiums that can explain the degree of strength and differences between the penny and non-penny stocks in the Malaysian market context. On a brief note, penny stocks in the Malaysian stock market context do not differ in terms of returns and profitability premium when compared to non-penny stocks. Nevertheless, the findings also show that Malaysian penny stocks are mostly growth stocks which are riskier (higher beta), more volatile (higher volatility), has low market capitalization, prominent to momentum effects and has a higher investment premium as compared to non-penny stocks.

CHAPTER 5

RISK-RETURN ANALYSIS BETWEEN PENNY AND NON-PENNY STOCKS IN MALAYSIAN STOCK MARKET (PART 2)

5.1 INTRODUCTION

The second part of the research is a continuation of the first part and undertakes to verify the variation of risk premiums in each price sorted portfolios' rate of return with multifactor asset pricing models. The brief description of the variables adopted in this analysis is explained in Section 4.2 of Chapter 4. Nonetheless, the existence of risk premiums for penny and non-penny stocks in the Malaysian market are analysed in line with the research objectives.

5.2 MULTIFACTOR MODELS

The time-series regressions is run against the Capital Asset Pricing Model's single factor model (CAPM) (Lintner, 1965; Sharpe, 1964), Fama-French's (1993) three-factors model of size and value premiums, Carhart's (1997) four-factors model which includes momentum premium; and the five-factor model of Fama-French (2015) incorporating the additional factor of profitability and investment. Comparatively, a final time-series regression incorporating the excess returns and all five risk premiums (herein called the extended six-factor model), is done to analyse the variation of the combined risk premiums in each portfolios' rate of return. Each factor or the risk premium is gradually introduced through the single factor model to the six factor model (extended) to illustrate the change in the magnitude of estimated alphas (Jensen's alpha) and the corresponding change in the adjusted R-square (R^2) values as the additional factors are captured. Equation 5.1 to 5.5 below represents the gradual progression of the risk premiums analysis with the respective asset pricing models:

Single factor model (CAPM)	:	$R_{it} - R_{Ft} = a_i + b_i(R_{Mt} - R_{Ft}) + e_{it}$	5.1
Three-factor model (Fama & French, 1993)	:	$R_{it} - R_{Ft} = a_i + b_i(R_{Mt} - R_{Ft}) + s_i SMBt + h_i HMLt + e_{it}$	5.2
Four-factor model (Carhart, 1997)	:	$R_{it} - R_{Ft} = a_i + b_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + w_i WML_t + e_{it}$	5.3
Five-factor model (Fama & French, 2015)	:	$R_{it} - R_{Ft} = a_i + b_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + e_{it}$	5.4
Six-factor model (Extended model)	:	$R_{it} - R_{Ft} = a_i + b_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + w_i WML_t + r_i RMW_t + c_i CMA_t + e_{it}$	5.5

In the regressions above:

- R_{it} - R_{Ft} is the excess return on penny or non-penny stocks' portfolio i for period t
- R_{Mt} - R_{Ft} is the market excess return for period t
- SMB_t is the difference between the returns on a portfolio of small-cap stocks and the return on a portfolio of large-cap stocks (the size premium)
- HML_t is the difference between the returns on a portfolio comprised of high book-to-market stocks and the returns on a portfolio comprised of low book-to-market stocks (the value premium)
  - WML_t is the difference between the returns on a portfolio comprised of stocks with high returns from *t-12* to *t-2* and the return on a portfolio comprised of stocks with low returns from *t-12* to *t-2* (the momentum premium).
  - RMW_t is the difference between the returns on diversified portfolios of stocks with robust and weak profitability (profitability premium),

- CMA_t is the difference between the returns on diversified portfolios of low and high investment stocks, namely conservative and aggressive investments (investment premium).
- b_i, s_i, h_i, w_i r_i, and c_i are respective factor sensitivities. If the sensitivities are able capture all variation in expected returns, then the intercept a_i is zero for all portfolios i.
- e_{it} is a zero-mean residual.

5.3 SUMMARY OF RESEARCH QUESTIONS AND HYPOTHESES

The research questions and their corresponding hypotheses to this part of the study are as follows:

Table 5.1: Summary of The Research Questions and Hypotheses of Second Part of Study

Research Questions:	Hypotheses
RQ3 : Which risk premium is able to explain the return variations for penny and non-penny stocks in the Malaysian stock market?	$\mathbf{H_{3a}}$: Size premium is not able to explain the return variations for penny and non-penny stocks in the Malaysian stock market. $\mathbf{H_{3b}}$: Value premium is not able to explain the return variations for penny and non-penny stocks in the Malaysian stock market. $\mathbf{H_{3c}}$: Momentum premium is not able to explain the return variations for penny and non-penny stocks in the Malaysian stock market. $\mathbf{H_{3d}}$: Profitability premium is not able to explain the return variations for penny and non-penny stocks in the Malaysian stock market. $\mathbf{H_{3e}}$: Investment premium is not able to explain the return variations for penny and non-penny stocks in the Malaysian stock market.
RQ4 : Which asset pricing model is able to capture the return variations for penny and non-penny stocks in the Malaysian stock market?	$\mathbf{H_{4a}}$: The single-factor model is not the best fit model to capture the return variations for penny and non-penny stocks in the Malaysian stock market. $\mathbf{H_{4b}}$: The three-factor model is not the best fit model to capture the return variations for penny and non-penny stocks in the Malaysian stock market. $\mathbf{H_{4c}}$: The four-factor model is not the best fit model to capture the return variations for penny and non-penny stocks in the Malaysian stock market. $\mathbf{H_{4d}}$: The five-factor model is not the best fit model to capture the return variations for penny and non-penny stocks in the Malaysian stock market.

5.4 RESULTS OF TIME-SERIES REGRESSION USING MULTIFACTOR MODELS

The results of the time-series regressions using multifactor models on the equally weighted (EW) monthly excess returns of penny and non-penny stocks' portfolios are reported in Tables 5.2 and Table 5.3. The results are reported in the one-, three-, four-, five- and the extended six-factor models and the Newey-West robust t-statistics (Newey et al., 1987) are reported in parentheses.

5.4.1 Time-Series Regression for Penny Stocks

5.4.1.1 Regression Analysis of Aggregate Penny Stocks' Portfolio (AGPS)

With reference to the time-series regression analysis involving AGPS as shown in Table 5.2, the intercept terms (Jensen's alpha) estimated on the single-factor CAPM model is 0.000% with a *t*-statistics of 0.044. When the risk factors of size premium (*SMB*) and value premium (*HML*) are loaded-in, the intercept of the three-factor model declines to -0.001% (with t-stat of -0.205). While *SMB* shows a positive and significant loading at 10% level, *HML* is insignificant and has a negative loading for the monthly excess returns of AGPS with a coefficient of -0.211%. The *HML* coefficient of below zero indicates that the composition of AGPS are growth stocks. About 74% of the return variations of AGPS are explained with the inclusion of *SMB* and *HML* as indicated by the increase in the value of adjusted R^2 as compared to the single-factor model.

However, further inclusion of the momentum factor (*WML*) in the four-factor model substantially affects the intercept term and the return variations. The intercept term improves to 0.001% (*t*-stat of 0.262) and adjusted R^2 moves up to 74.8%. The risk factors of *SMB* and *WML* are significant at 10% level respectively and both *HML* and *WML* load negatively as compared to positive loading of *SML* on AGPS's excess returns. The negative loading of *WML* further indicates that the composition of stocks in AGPS as loser stocks.

The time-series regression is further probed with a five-factor model incorporating the profitability (*RMW*) and investment factors (*CMA*). The intercept terms declines to -0.043% (t-stat of -1.728) with no substantial effect on the adjusted R^2 which have decreased marginally by 0.04% to 74.4%. While *SMB* remains positive and significant at 10% level, the *CMA* is seen to load heavily and significant at 10% level on the AGPS returns as compared to the negative loading of the *RMW* factor. The heavy loading of *CMA* in the five-factor model leaves the value premium (*HML*) redundant and negative.

Finally, the extended six-factor model capturing all the risk premium shows a marginal increase in the Jensen's alpha (intercept term) to -0.027% (with *t*-stat of -1.359) and the return variation marginally moves up to 74.8%. The loadings of these risk factors indicate that the AGPS portfolio behaves like growth ($HML < 0$) and loser stocks (*WML* is negative). Contrary to the common notion that penny stocks are small cap stocks (Liu et. al, 2015), the composition of penny stocks in the Malaysian market consist of large cap stocks as the coefficient of *SMB* is consistently significant, positive and below 0.5% for all multifactor models. The investment factor (*CMA*) has a positive loading on the returns while the profitability factor (*CMA*) remains negative but both are insignificant statistically.

Primarily, it is found that the loadings of risk factors that are seen significant are size (*SMB*), momentum (*WML*) and investment (*CMA*) premiums. We can note that when the *WML* is regressed into the four-factor model, the minimal increase in the portfolio alpha (0.001%) as compared to the same alpha in the three-factor model (-0.001%) indicates the explanatory role of *WML* for AGPS. The *HML* coefficient of below zero in all the multifactor models indicates that the composition of AGPS are growth stocks. Convincingly, the four-factor model with an intercept term of 0.001% is able to capture almost 75% the returns variation of AGPS.

5.4.1.2 Regression Analysis of Price Sorted Penny Stocks' Portfolio (PS1, PS2 & PS3)

The three sub-group penny stock portfolios' time series regressions (PS1, PS2 and PS3) are also shown in Table 5.2. The risk premiums are gradually loaded into the respective asset pricing models and the results are as follows:

- All the three examined penny stock portfolios demonstrate marginal fluctuations in their alphas or intercept values. The estimated alphas for these three portfolios are close to zero between the range of -0.055% and 0.052 and is insignificant except for the five- and six-factor models in PS1; and the four-factor model in PS2. As the estimated alphas of these regressions are economically small and close to zero, the loading of the risk factors are not sufficient to explain the respective portfolio's observed monthly excess returns.

- It is observed that *SMB* has a positive and significant (at 10% level) loading for all the observed penny stock portfolios. The estimated coefficients of *SMB* signifies a mixed composition of stocks within the three penny stocks portfolios. Stocks composed in PS1 and PS2 have an *SMB* coefficient of less than 0.5, thus categorized as large cap stocks while stocks in the PS3 portfolio are small cap stocks since the *SMB* coefficient is more than 0.5.

- Loading of *HML* risk factor has a negative relation to the returns of all penny stock portfolios. As the *HML* coefficients are less than zero, we can summarize that the composition of penny stocks in the Malaysian market context are growth stocks. Additionally, the *HML* loadings are only significant for PS3 at 1% level.

- The momentum factor (*WML*) is also seen to have negative loadings in all price sorted penny stocks portfolios. Except for PS3, *WML* is seen to be statistically significant for PS1 and PS2. The negative loading of *WML* against the monthly excess returns of each penny stocks' portfolios signifies that penny stocks in all portfolios are loser stocks.

- The remaining risk premiums of *CMA* is positively and significantly related to the returns of PS1 and PS2 but are insignificant to the returns of PS3. The remaining risk premium of RMW displays a reversal pattern for PS1, PS2 and PS3 as compared to the loading of *CMA*. The loading of *RMW* has a negative relation to the returns of PS1, PS2 and PS3. All *RMW* coefficients are not significant. This justifies the notion that since the composition of stocks in the PS1 and PS2 portfolios are growth stocks and held by large cap firms. These firms devote most of their current revenue toward further expansion, thus returning a positive loading of the investment factor (*CMA*) on monthly excess returns of PS1 and PS2.

- Lastly, the observed adjusted R^2 for all price sorted penny stock portfolios does not display a drastic change when risk factors are loaded in the respective asset pricing models. The magnitude of change in the adjusted R^2 for all these portfolios are below 5%. The four-factor model can be deemed a better fit model as it is able to capture almost 82% of returns variations in PS1; 79% in PS2 and 62% in PS3. The prominent feature in all these price sorted penny stocks portfolios are the illustrative role of *SMB*, *HML*, *WML* and *CMA* in explaining the return variations.

Table 5.2: Time-Series Regression Results with Multifactor Models for Penny Stocks

Portfolio	***Model (Factors)***	***Constant (Intercept)***	***R_M-R_F***	***SMB***	***HML***	***WML***	***RMW***	***CMA***	***Adj R^2***
AGPS *(Pr ≤ RM0.31)*	***1- (Single)***	0.000	**1.246***						0.733
		(0.044)	(12.770)						
	3-	-0.001	**1.139***	**0.444*****	-0.211				0.739
		(-0.205)	(8.813)	(1.838)	(-1.140)				
	4-	0.001	**1.102***	**0.473*****	-0.233	**-0.138*****			0.748
		(0.262)	(8.540)	(1.984)	(-1.276)	(-1.681)			
	5-	-0.043	**1.128***	**0.443*****	-0.245		-0.014	**0.602*****	0.744
		(-1.728)	(8.000)	(1.832)	(-1.302)		(-0.297)	(1.730)	
	6-	-0.027	**1.095***	**0.469*****	-0.261	**-0.113*****	-0.007	0.508	0.748
		(-1.359)	(7.699)	(1.949)	(-1.393)	(-1.339)	(-0.163)	(1.441)	
PS 1 *(RM0.22 < Pr ≤ RM0.31)*	***1- (Single)***	-0.001	**1.213***						0.775
		(-0.398)	(14.311)						
	3-	0.000	**1.199***	**0.170*****	-0.183				0.782
		(0.064)	(11.295)	(1.643)	(-1.344)				
	4-	0.001	**1.185***	**0.196****	-0.200	**-0.189****			0.815
		(0.310)	(11.642)	(1.972)	(-1.537)	(-2.504)			
	5-	**-0.052****	**1.250***	**0.152*****	-0.194		-0.023	**0.662****	0.792
		(-2.091)	(11.085)	(1.496)	(-1.434)		(-2.091)	(2.144)	
	6-	**-0.050****	**1.230***	**0.181*****	**-0.217*****	**-0.199***	-0.018	**0.713****	0.814
		(-2.338)	(11.514)	(1.866)	(-1.698)	(-2.730)	(-0.485)	(2.440)	
PS 2 *(RM0.12 < Pr ≤ RM0.21)*	***1- (Single)***	0.000	**1.151***						0.771
		(-0.017)	(14.122)						
	3-	0.000	**1.126***	**0.296*****	-0.036				0.774
		(0.110)	(13.029)	(1.693)	(-0.573)				
	4-	**0.031*****	**1.111***	**0.333*****	-0.029	**-0.326*****			0.787
		(1.740)	(13.023)	(1.923)	(-0.468)	(-1.754)			
	5-	0.001	**1.091***	**0.337*****	-0.033		-0.148	**0.251****	0.786
		(0.451)	(11.430)	(1.947)	(-0.541)		(-0.974)	(2.023)	
	6-	0.026	**1.083***	**0.361****	-0.028	-0.256	-0.130	**0.222*****	0.789
		(1.438)	(11.413)	(2.092)	(-0.462)	(-1.373)	(-1.947)	(1.775)	
PS 3 *(Pr ≤ RM0.11)*	***1- (Single)***	-0.001	**1.250***						0.571
		(-0.684)	(8.917)						
	3-	-0.006	**1.266***	**0.752*****	**-1.188***				0.615
		(-0.956)	(9.507)	(1.818)	(-2.886)				
	4-	0.025	**1.271***	**0.779*****	**-1.201***	-0.442			0.618
		(0.739)	(9.525)	(1.877)	(-2.911)	(-0.919)			
	5-	-0.005	**1.235***	**0.684*****	**-1.125***		-0.196	0.012	0.615
		(-0.867)	(8.675)	(1.647)	(-2.726)		(-1.566)	(0.242)	
	6-	0.022	**1.235***	**0.715*****	**-1.143***	-0.386	-0.184	0.018	0.617
		(0.631)	(8.645)	(1.708)	(-2.755)	(-0.792)	(-1.462)	(0.351)	

** , ** and *** denotes significance at 1%, 5% and 10% levels respectively;*
Newey-West robust t-statistics are presented in parenthesis

5.4.2 Time-series Regression for Non-Penny Stocks

5.4.2.1 Regression analysis of Aggregate Non-Penny Stocks' portfolio (AGNP)

Time-series regression results for non-penny stocks are shown in Table 5.3. The intercept term estimated for the single-factor model of CAPM is -0.004% with a *t*-statistic of -1.576. As the *SMB* and *HML* risk premiums are loaded into the three-factor model, the intercept term marginally improves to -0.003% (*t*-stat -1.298). Both the *SMB* and *HML* are found to be significant at 1% level with *SMB* negatively and *HML* positively loaded on the excess returns. Both coefficients of *SMB* and *HML* clearly signifies that the composition of non-penny stocks in the AGNP portfolio are primarily large cap (*SMB* < 0.5) and value (*HML* > 0.3) stocks. The improved adjusted R^2 of 80.3% in the three-factor model is able to well capture the loadings of *SMB* and *HML* on the return variations of AGNPS.

As the momentum factor of *WML* is regressed in the four-factor model, the intercept term increases substantially to 0.039% (*t*-stat 2.408) and is significant at 5% level. *WML* is negatively loaded and all the risk factors of *SMB*, and *HML* are significant at 1% level. The negative loading of *WML* indicates that the AGNPS are loser stocks too, as per the case of AGPS. The adjusted R^2 further improves to 82.2% of the return variations of AGNPS.

Further, the intercept term for the five-factor model drops to -0.003% (*t*-stat is -1.156) when the risk factors of *RMW* and *CMA* are regressed in. While *SMB* and *HML* remains significant at 5% and 1% levels respectively, the new risk factors of *RMW* and *CMA* are insignificant. *RMW* has a negative relation as opposed to the positive relation found for *CMA*. The inclusion of *CMA* has a differing effect when compared to AGPS. In the AGPS portfolio, the *HML* is redundant when *CMA* is loaded-in but *HML* remains significant in the case of AGNPS. The adjusted R^2 declines and is only able to explain for 79.8% of the return variations of AGNPS.

Lastly, when all risk factors of *SMB*, *HML*, *WML*, *RMW* and *CMA* are regressed into the extended six-factor model, the intercept term improves to 0.044% with a t-stat of 2.590 and is significant at 1% level. While *SMB*, *HML*, and *WML* are significant at 5% level, *RMW* and *CMA* remained insignificant. The combined loadings improve the adjusted R^2 by almost 2.5% and is able to capture almost 82.2% of the return variations of AGNPS.

As a concluding remark, the risk premiums of size (*SMB*), value (*HML*) and momentum (*WML*) are well captured in the monthly excess returns of AGNPS while the four-factor and the extended six-factor model is able to explain the return variations of AGNPS. It is also observed that the loading of *WML* in the AGNPS has a significant role in improving the portfolio's alpha as seen in the four- and extended six-factor models.

5.4.2.2 Regression Analysis of Non-Penny Stocks' Quintile Portfolio (NPS1, NPS2 & NPS3)

The time series regression results of three quintile non-penny stock portfolios (NPS1, NPS2 and NPS3) are shown in Table 5.3.

- The estimated alphas for all three non-penny portfolios are economically small and between the range of -0.014% and 0.033%. As these intercept values are close to zero, the loadings of the various risk factors are insufficient to explain the respective portfolio's observed excess returns.
- The risk premiums of size (*SMB*), value (*HML*) and momentum (*WML*) returned significant for all the three quintile portfolios of non-penny stocks. With the negative coefficient in the *SMB* factor, all non-penny stocks are categorically issued by large

cap firms (*SMB*< 0). The coefficient values displayed by *HML* portrays mix composition of stocks among the non-penny portfolios. While the composition of stocks in the NPS1 and NPS2 are value stocks (*HML*> 0), NPS3 consist of growth stocks (*HML*).

- The inclusion of risk factor *WML* has a negative but significant effect on the excess returns of all quintile portfolios. It is noteworthy that when the *WML* factor is regressed into the four-factor model, the intercept term significantly improves with a conclusion that non-penny stocks in the Malaysian market context loads heavily on the momentum effect and construed are loser stocks.

- The loadings of profitability (*RMW*) and investment (*CMA*) factors are insignificant to the excess returns of NPS1, NPS2 and NPS3. While *RMW* has a negative relation for NPS3, *CMA* loading is positive (NPS3 is a portfolio of growth stocks with *HML*< 0). The same justification can be drawn as for penny stocks that large cap firms with growth stocks (NP3) often devote most of their current revenue toward further expansion, thus returning a positive loading of the investment factor (*CMA*). The value stocks composed in NPS1 and NPS2 has a positive loading for the profitability factor (*RMA*).

- The observed adjusted R^2 for all non-penny stock portfolios are well confined between its range with an increase of between 4% and 7.5% in the respective portfolios. The adjusted R^2 is 84.7% for NPS1; 79.8% for NPS2 and 70.4% for NPS3 for the three-factor model. Marginal increase is observed thereof for all the three quintile portfolios when new risk factors are loaded-in. The four-factor model with an adjusted R^2 of almost 86% for NP1; 81% for NP2 and 72% for NPS3 captures the highest return variations in the respective portfolios. As previously observed in the AGNPS, a similar illustrative role is found for *SMB*, *HML* and *WML* in the quintile portfolios of non-penny stocks. The inclusion of *WML* has significant role in improving the portfolio alpha as seen in the four- and extended six-factor models.

Table 5.3: Time-Series Regression Results with Multifactor Models for Non-Penny Stocks

Portfolio	*Model (Factors)*	*Constant (Intercept)*	*R_M-R_F*	*SMB*	*HML*	*WML*	*RMW*	*CMA*	*Adj R^2*
AGNP *(Pr > RM0.31)*	***1- (Single)***	-0.004	**0.642***						0.775
		(-1.576)	(14.310)						
	3-	-0.003	**0.668***	**-0.418***	**0.561***				0.803
		(-1.298)	(15.567)	(-2.826)	(3.094)				
	4-	**0.039****	**0.657***	**-0.483***	**0.540***	**-0.530***			0.822
		(2.408)	(16.051)	(-2.762)	(3.132)	(-2.643)			
	5-	-0.003	**0.655***	**-0.490****	**0.541***		-0.050	0.029	0.798
		(-1.156)	(13.617)	(-2.500)	(2.774)		(-0.242)	(0.606)	
	6-	**0.044***	**0.635***	**-0.394****	**0.460****	**-0.605****	-0.153	0.029	0.822
		(2.590)	(13.850)	(-2.092)	(2.475)	(-2.798)	(0.742)	(1.081)	
NP 1 ***(Highest** *priced NP)*	***1- (Single)***	-0.001	**0.764***						0.783
		(-0.430)	(14.616)						
	3-	-0.005	**0.711***	**-0.234***	**0.500***				0.847
		(-1.512)	(15.312)	(-3.601)	(3.991)				
	4-	**0.033*****	**0.707***	**-0.219***	**0.503***	**-0.464****			0.857
		(1.877)	(15.711)	(-3.458)	(4.141)	(-2.175)			
	5-	-0.004	**0.693***	**-0.236***	**0.507***		0.040	-0.092	0.847
		(-1.401)	(14.134)	(-3.621)	(4.001)		(1.063)	(-0.850)	
	6-	**0.032*****	**0.689***	**-0.219***	**0.502***	**-0.457****	0.043	-0.051	0.857
		(1.826)	(14.462)	(-3.453)	(4.089)	(-2.099)	(1.198)	(-0.478)	
NP 2 ***(Medium** *priced NP)*	***1- (Single)***	-0.003	**0.658***						0.758
		(-1.192)	(13.623)						
	3-	**-0.008***	**0.583***	**-0.185***	**0.241***				0.798
		(-2.817)	(11.982)	(-2.835)	(2.358)				
	4-	0.027	**0.581***	**-0.170***	**0.229****	**-0.437****			0.809
		(1.503)	(12.259)	(-2.670)	(2.292)	(-2.021)			
	5-	**-0.009***	**0.581***	**-0.189***	**0.226****		0.079	0.038	0.800
		(-2.819)	(11.137)	(-2.904)	(2.196)		(1.357)	(0.815)	
	6-	**0.030*****	**0.576***	**-0.174***	**0.209****	**-0.481****	0.087	0.047	0.806
		(1.716)	(11.449)	(-2.747)	(2.100)	(-2.240)	(1.563)	(1.043)	
NP 3 ***(Lowest** *priced NP)*	***1- (Single)***	**-0.008***	**0.505***						0.661
		(-2.822)	(10.781)						
	3-	**-0.014***	**0.391***	**-0.181****	**-0.190****				0.704
		(-4.300)	(6.917)	(-2.069)	(-1.969)				
	4-	0.028	**0.397***	**-0.184****	**-0.163*****	**-0.588****			0.723
		(1.430)	(7.251)	(-2.166)	(-1.726)	(-2.191)			
	5-	**-0.013***	**0.378***	**-0.161*****	**-0.190*****		-0.077	0.035	0.702
		(-3.818)	(6.533)	(-1.804)	(-1.950)		(-1.274)	(0.253)	
	6-	0.031	**0.382***	**-0.164*****	**-0.162*****	**-0.623****	-0.085	0.080	0.722
		(1.588)	(6.850)	(-1.901)	(-1.722)	(-2.300)	(-1.471)	(0.591)	

** , ** and *** denotes significance at 1%, 5% and 10% levels respectively;*
Newey-West robust t-statistics are presented in parenthesis

5.5 SUMMARY OF THE TIME-SERIES REGRESSIONS FOR PENNY AND NON-PENNY STOCKS

Three major findings emerge from the results of time-series regressions compiled in Tables 5.2 and Table 5.3.

5.5.1 Portfolio Alpha

The estimated portfolio alpha or the intercept term for AGPS ranges from -0.043% to 0.001% (within the range of 0.044%) while for AGNPS was between -0.004% to 0.044% (has a range of 0.048%). Though some portfolio alphas for 4-factor and extended 6-factor models of AGNPS returned significant but the magnitude of change in these alphas regardless of AGPS or AGNPS are marginal and economically small to explain the return variations in the respective portfolios (when risk premiums are regressed in the designated asset pricing models). Even the three sub-group portfolios of penny (PS1, PS2, PS3) and non-penny (NPS1, NPS2, NPS3) stocks show similar patterns. This supports the earlier findings (from first part of research) that there is no significant difference in the returns of penny and non-penny stocks in the Malaysian stock market context.

5.5.2 Prominent Risk Premiums

To address the question of which risk premium is prominent and able to explain the return variations for penny (AGPS) and non-penny stocks (AGNPS) in the Malaysian stock market, the test for significance of the difference between two slopes or coefficients is adopted. This test will identify the extent or as to whether the intended risk premium is significantly different between AGPS and AGNP, given each intended risk premium's coefficient, standard error and sample size. The computed *t*-value from this test is then compared with the *p*-value to determine the acceptance or rejection of the null hypothesis. The results of the computation are shown in Table 5.4 below.

Table 5.4: Summary of Findings For Prominent Risk Premiums Between Penny and Non-Penny Stocks in Malaysian Stock Market

Research Questions	***Hypothesis***	***Coefficient of the respective risk premium in AGPS equation #***	***Coefficient of the respective risk premium in AGNP equation #***	***t-value***	***Test Results Accept/ Reject Null Hypothesis***	***Concluding Remarks***
RQ3 : Which risk premium is able to explain the return variations for penny and non-penny stocks in the Malaysian stock market?	**H_{3a} :** Size premium is not able to explain the return variations for PS and NPS	0.4693 [0.2408]	-0.3969 [0.1898]	2.8251^{*}	Reject	Size premium (SMB) is able to explain the return variations between PS and NPS in the Malaysian stock market.
	H_{3b} : Value premium is not able to explain the return variations for PS and NPS	-0.2610 [0.1874]	0.4602 [0.1860]	2.7315^{*}	Reject	Value premium (HML) is able to explain the return variations between PS and NPS in the Malaysian stock market.
	H_{3c} : Momentum premium is not able to explain the return variations for PS and NPS	-0.1129 [0.0844]	-0.6045 [0.2161]	2.1190^{**}	Reject	Momentum premium (WML) is able to explain the return variations between PS and NPS in the Malaysian stock market.
	H_{3d} : Profitability premium is not able to explain the return variations for PS and NPS	-0.0074 [0.0454]	0.0487 [0.0450]	0.8776	Accept	Profitability premium (RMW) is not able to explain the return variations between PS and NPS in the Malaysian stock market.
	H_{3e} : Investment premium is not able to explain the return variations for PS and NPS	0.5080 [0.3526]	-0.1535 [0.2069]	1.6181^{***}	Reject	Investment premium (CMA) is able to explain the return variations between PS and NPS in the Malaysian stock market.

 # S.E values of the respective risk premiums are presented in parenthesis
** , ** and *** denotes significance at 1%, 5% and 10% levels respectively.*

The results clearly show that the risk premiums of size (*SMB*), value (*HML*), momentum (*WML*) and investment (*CMA*) has significant t-values, thus we reject the null hypothesis and conclude that there is significant difference in these risk premiums between AGPS and AGNP. We can further conclude that these risk premiums are able to explain the return variations between penny and non-penny stocks in the Malaysian stock market. The *t*-value of profitability premium (*RMW*) is not significant, thus we rule out any significance of this risk premium to explain the return variations between penny and non-penny stocks.

5.5.3 Best Fit Asset Pricing Models

The question of which is the best fit asset pricing model (APM) to capture the return variations for penny (PS) and non-penny (NPS) stocks in the Malaysian stock market, the test of multiple linear restriction or *F*-test was conducted. The *F*-test is to test whether or not a group of variables (namely the risk premiums) has an effect on the return variations of penny and non-penny stocks. Or simply this test will shed the joint significance of the risk premiums in the restricted asset pricing models of single-factor, three-factors, four-factors and five-factors. The extended six-factor model will thus, be the unrestricted model in this analysis. If the computed *F*-value is greater than Critical-*F* (from the *F* table), then the null hypothesis is rejected and the model is best fit to capture the joint significance of the risk premiums on the return variations of the stocks. The summary of *F*-test of the respective asset pricing models with the concluding remarks is presented in Table 5.5 below. The *F*-test for the single-factor model of CAPM and the Fama and French's three-factor and five-factor model was significant for all price sorted portfolios of penny and non-penny stocks. Nonetheless, the four-factor Carhart's model was only significant for all price sorted portfolios of penny stocks. The null hypothesis is rejected and it is concluded that these models are jointly significant and are deemed as the best fit model to capture the returns variations of penny and non-penny stocks.

Table 5.5: Summary of Findings for Best Fit Asset Pricing Model For Penny and Non-Penny Stocks in Malaysian Stock Market

Research Questions	***Hypothesis***	***F-test values of respective APM for PS*** #		***F-test values of respective APM for NPS*** #		***Concluding Remarks***
RQ4 : Which asset pricing model (APM) is able to capture the return variations for penny (PS) and non-penny (NPS) stocks in the Malaysian stock market?	**H_{4b} :** The single-factor model is not the best fit model to capture the return variations for PS and NPS	*AGPS*	**2.4710**** [163.080]	*AGNPS*	**4.2684*** [204.774]	• The single-factor model is significant for all price sorted PS (PS1, PS2, PS3, AGPS) and NPS (NPS1, NPS2, NPS3, AGNPS) • The single-factor of CAPM is a best fit model to capture the return variations of PS and NPS involving market beta in the Malaysian stock market.
		PS1	**3.7196*** [204.800]	*NPS1*	**7.5670*** [213.626]	
		PS2	**3.1444**** [199.430]	*NPS2*	**4.9216*** [185.599]	
		PS3	**3.5199**** [79.506]	*NPS3*	**3.9579*** [116.232]	
	H_{4b} : The three-factor model is not the best fit model to capture the return variations for PS and NPS	*AGPS*	**2.6804***** [56.810]	*AGNPS*	**2.9489**** [81.240]	• The three-factor model is significant for all price sorted PS (PS1, PS2, PS3, AGPS) and NPS (NPS1, NPS2, NPS3, AGNPS) • The three-factor is a best fit model to capture the return variations of PS and NPS involving Beta, SMB and HML in the Malaysian stock market.
		PS1	**4.4750*** [71.430]	*NPS1*	**2.2447***** [110.274]	
		PS2	**3.8970**** [68.455]	*NPS2*	**2.7216**** [78.787]	
		PS3	**2.4390***** [32.351]	*NPS3*	**2.4811***** [47.717]	
	H_{4c} : The four-factor model is not the best fit model to capture the return variations for PS and NPS	*AGPS*	**2.4108***** [44.700]	*AGNPS*	0.7550 [69.191]	• The four-factor model is significant only for all price sorted PS (PS1, PS2, PS3, AGPS). • The four-factor is a best fit model to capture the return variations of only the PS involving Beta, SMB, HML and WML in the Malaysian stock market.
		PS1	**3.1036***** [60.190]	*NPS1*	0.8676 [89.396]	
		PS2	**3.9793**** [54.016]	*NPS2*	1.8312 [63.366]	
		PS3	**3.1226***** [24.407]	*NP3*	1.1537 [39.417]	
	H_{4d} : The five-factor model is not the best fit model to capture the return variations for PS and NPS	*AGPS*	**4.4067**** [35.370]	*AGNPS*	**7.9756*** [47.521]	• The five-factor model is significant for all price sorted PS (PS1, PS2, PS3, AGPS) and NPS (NPS1, NPS2, NPS3, AGNPS) • The five-factor is a best fit model to capture the return variations of PS and NPS involving Beta, SMB, HML, RMW and CMA in the Malaysian stock market.
		PS1	**7.5927*** [45.860]	*NPS1*	**4.4908**** [66.356]	
		PS2	**5.7078**** [44.305]	*NPS2*	**5.1132**** [48.217]	
		PS3	**4.3540***** [20.804]	*NPS3*	**5.3897**** [28.764]	

 # F-stat values of the respective APM are presented in parenthesis
** , ** and *** denotes significance at 1%, 5% and 10% levels respectively.*

5.6 CONCLUSION

The second part of this thesis is a further continuation of the first part and undertakes to verify the variations of risk premiums in each price sorted portfolios' returns with differing asset pricing models. The time-series regressions are run against the (a) CAPM's single-factor model; (b) Fama-French (1993)'s three-factors model of size and value premiums; (c) Carhart (1997)'s four-factors model which includes momentum premium; (d) five-factor model of Fama-French (2015) incorporating the additional factor of profitability and investment; and (e) an extended six-factor model of time-series regression incorporating all five risk premiums (size, value, momentum, profitability and investment) to analyse the variation of the combined risk premiums in each portfolios' returns.

Three major findings have emerged from the results of the time-series regressions. Firstly, though some portfolio alphas of penny and non-penny stocks are significant but the magnitude of change in these alphas are marginal and economically small to explain the return variations in the respective portfolios when risk premiums are regressed in the designated asset pricing models. This supports the earlier findings (from first research) of no significant difference in the returns of penny and non-penny stocks.

Secondly, the results of the t-value to identify the significant difference of risk premiums between penny and non-penny stocks shows that all risk premiums (except for profitability factor) are significant at 5% level. The prominent effect of size, value, momentum and investment premiums are able to explain the return variations for penny and non-penny stocks in the Malaysian stock market. The Profitability factor was found to be insignificant between penny and non-penny stocks due to the classification of this these stocks. The first part of the research found that penny stocks are mostly growth stocks where else non-penny remained mixed between growth and value stocks.

Basically, growth stocks are issued by small capital companies that have substantial potential for growth in the foreseeable future. Growth companies may currently be growing at a faster pace than the overall market and often devote most of their current revenue toward further expansion (Cussen, 2018).

Thirdly, the computed *F*-test to identify the best fit asset pricing model for penny and non-penny stocks show a differing results. The single-factor CAPM, 3-factor, 4-factor and 5-factor models are significant and able to capture the return variations for penny stocks. Nonetheless, only the single-factor CAPM, 3-factor and 5-factor have significant *F*-stats for non-penny stocks. The 4-factor is not significant to capture the return variations for non-penny stocks.

The compounding implication of knowing the prominent risk premium and the best fit model of asset pricing models can serve to be very useful in analytics studies that compare multiple groups, namely between penny and non-penny stocks. The prominent risk premium can further be exploited for trading strategies of penny and non-penny stocks in an effort to gain abnormal returns. For instance, the size effect remains significant in explaining returns between penny and non-penny stocks. Momentum trading is profitable in short to medium term, however the impact has no role in pricing. The findings from the second research further suggest that momentum anomaly has a link to size and is also consistent with prior findings of Husni (2006) in Malaysia. Other trading strategies that buying small or value penny stocks and short selling large or growth penny stocks do make considerable abnormal profits both over short- and long term holding periods as suggested by Liu et al. (2011)

CHAPTER 6

IMPACT OF MACROECONOMIC DETERMINANTS AND NON-MACROECONOMIC FORCES ON PENNY AND NON-PENNY STOCKS IN THE MALAYSIAN STOCK MARKET (PART 3)

6.1 INTRODUCTION

The third part of this thesis further continues with the analyses on how the returns of penny and non-penny stock portfolios of different categories react to different types of macroeconomic and non-macroeconomic forces. Complying to this notion, this part will undertake to identify a group of selected macroeconomic variables by benchmarking them to similar widely quoted academic literatures that have significant effects on the stock returns in the Malaysian context. Additionally, pertinent non-macroeconomic events in the sample period were selected and classified into economic and non-economic news and categorized as local and global events.

6.2 DESCRIPTION OF VARIABLES

6.2.1 Dependent Variables

The dependent variables in this study are the penny and non-penny stocks' portfolio returns which were computed from the earlier section, namely three penny stock portfolios (PS1, PS2, PS3) together with three quintile portfolios for non-penny stocks (NPS1, NPS2, NPS3). An AGPS portfolio and an AGNPS portfolio were among the examined stock returns too. A brief summary of the dependent variables with the corresponding price range has been presented in Chapter 4.

6.2.2 Independent Variables

This study will explore the empirical influences of domestic and foreign factors on penny and non-penny stocks' returns in Malaysia. Correspondingly, this research will hypothesize the model with nine macroeconomic determinants and ten non-macroeconomic forces. The selection of these variables is based on basic financial theories and empirical literature. A brief summary of the independent or explanatory variables is shown in Tables 6.1 and Table 6.2 below.

Table 6.1: Summary of Independent Macroeconomic Variables

Category of Variables		Selected Variables	Variable Abbreviation	Brief Description	Expected Reaction to Stock Returns
Domestic Macroeconomic Determinants		Gross Domestic Product	**GDP**	GDP is an indicator of real economic activity	**Positive**
		Inflation	**INF**	Inflation is proxied by Consumer Price Index (CPI)	**Negative**
		Money Supply	**M2**	An indicator to evaluate the economic monetary climate and broad money supply is a proxy for M2.	**Positive**
External Determinants	Local Index	Malaysia Stock Price Index	**PI-MSIA**	Stock price index of Malaysia	**Positive**
	Global Index	US Stock Price Index	**PI-US**	Stock price index of US	**Positive**

Table 6.2: Summary of Independent Non-Macroeconomic Variables

Category of Events		**Event Abbreviation**	**Event's Grouping**	**Description of Events**	**Expected Reaction to Stock Returns**
Economic News & Events	**Local**	**LEC1**	Economic event	The implementation of the GST- all goods and services are subject to 6% tax in Malaysia from April 2015	**Negative**
	Global	**GEC1**	Economic event	World oil price plunges to historical low in Nov 2014	**Negative**
Non-Economic News & Events	**Local**	**LNE1**	Political Event	13th.Malaysian General Elections (GE) in May, 2013. BN wins a majority with 133 of the 222 parliamentary seats, while PR secures 89 seats.	**Positive**
	Global	**GNE1**	Global political event	President Obama re-elected second term as US President in Nov, 2012	**Positive**

6.3 RESEARCH QUESTIONS AND HYPOTHESIS

The research questions and their corresponding hypotheses for this part of the study are summarized in Table 6.3 below.

Table 6.3: Summary of Research Questions and Hypothesis of Third Part of The Study

Research Question	Hypothesis
RQ5: What is the cointegration relationship between the selected macroeconomic and non-macroeconomic variables with the returns of the penny and non-penny stocks in the Malaysian stock market?	**$H5_a$:** There is no long-run relationship between the selected macroeconomic and non-macroeconomic variables with the returns of penny stocks in the Malaysian stock market.
	$H5_b$: There is no long-run relationship between the selected macroeconomic and non-macroeconomic variables with the returns of non-penny stocks in the Malaysian stock market.
	$H5_c$: There is no short-run relationship between the selected macroeconomic and non-macroeconomic variables with the returns of penny stocks in the Malaysian stock market.
	$H5_d$: There is no short-run relationship between the selected macroeconomic and non-macroeconomic variables with the returns of non-penny stocks in the Malaysian stock market.
RQ6: Is there a short-run causality between the selected macroeconomic and non-macroeconomic variables with the returns of the penny and non-penny stocks in the Malaysian stock market?	**$H6_a$:** There is no short-run causality between the selected macroeconomic and non-macroeconomic variables with the returns of penny stocks in the Malaysian stock market.
	$H6_b$: There is no short-run causality between the selected macroeconomic and non-macroeconomic variables with the returns of non-penny stocks in the Malaysian stock market.

6.4 EMPIRICAL MODEL AND ESTIMATION STRATEGY

6.4.1 Empirical Model

The following equation is specified to investigate the effects of macroeconomic factors and non-macroeconomic forces on both penny and non-penny stocks.

Equations for Penny Stocks:

$$\boldsymbol{PS1_t} = \alpha_0 + \alpha_1 ln(GDP_t) + \alpha_2(INF_t) + \alpha_3 ln(M2_t) + \alpha_4 ln(PI\text{-}MSIA_t) + \alpha_5 ln(PI\text{-}US_t) + \sum_{w=1}^{1} \lambda_w LEC_{wt} + \sum_{x=1}^{1} \lambda_x GEC_{xt} + \sum_{y=1}^{1} \lambda_y LNE_{yt} + \sum_{z=1}^{1} \lambda_z GNE_{zt} + \mu_i \quad \text{........ } \mathbf{6.1\ (a)}$$

$$\boldsymbol{PS2_t} = \alpha_0 + \alpha_1 ln(GDP_t) + \alpha_2(INF_t) + \alpha_3 ln(M2_t) + \alpha_4 ln(PI\text{-}MSIA_t) + \alpha_5 ln(PI\text{-}US_t) + \sum_{w=1}^{1} \lambda_w LEC_{wt} + \sum_{x=1}^{1} \lambda_x GEC_{xt} + \sum_{y=1}^{1} \lambda_y LNE_{yt} + \sum_{z=1}^{1} \lambda_z GNE_{zt} + \mu_i \quad \text{........ } \mathbf{6.1\ (b)}$$

$$\boldsymbol{PS3_t} = \alpha_0 + \alpha_1 ln(GDP_t) + \alpha_2(INF_t) + \alpha_3 ln(M2_t) + \alpha_4 ln(PI\text{-}MSIA_t) + \alpha_5 ln(PI\text{-}US_t) + \sum_{w=1}^{1} \lambda_w LEC_{wt} + \sum_{x=1}^{1} \lambda_x GEC_{xt} + \sum_{y=1}^{1} \lambda_y LNE_{yt} + \sum_{z=1}^{1} \lambda_z GNE_{zt} + \mu_i \quad \text{........ } \mathbf{6.1\ (c)}$$

$$\boldsymbol{AGPS_t} = \alpha_0 + \alpha_1 ln(GDP_t) + \alpha_2(INF_t) + \alpha_3 ln(M2_t) + \alpha_4 ln(PI\text{-}MSIA_t) + \alpha_5 ln(PI\text{-}US_t) + \sum_{w=1}^{1} \lambda_w LEC_{wt} + \sum_{x=1}^{1} \lambda_x GEC_{xt} + \sum_{y=1}^{1} \lambda_y LNE_{yt} + \sum_{z=1}^{1} \lambda_z GNE_{zt} + \mu_i \quad \text{........ } \mathbf{6.1\ (d)}$$

Equations for Non-Penny Stocks:

$$\boldsymbol{NPS1_t} = \alpha_0 + \alpha_1 ln(GDP_t) + \alpha_2(INF_t) + \alpha_3 ln(M2_t) + \alpha_4 ln(PI\text{-}MSIA_t) + \alpha_5 ln(PI\text{-}US_t) + \sum_{w=1}^{1} \lambda_w LEC_{wt} + \sum_{x=1}^{1} \lambda_x GEC_{xt} + \sum_{y=1}^{1} \lambda_y LNE_{yt} + \sum_{z=1}^{1} \lambda_z GNE_{zt} + \mu_i \quad \text{..... } \mathbf{6.2\ (a)}$$

$$\boldsymbol{NPS2_t} = \alpha_0 + \alpha_1 ln(GDP_t) + \alpha_2(INF_t) + \alpha_3 ln(M2_t) + \alpha_4 ln(PI\text{-}MSIA_t) + \alpha_5 ln(PI\text{-}US_t) + \sum_{w=1}^{1} \lambda_w LEC_{wt} + \sum_{x=1}^{1} \lambda_x GEC_{xt} + \sum_{y=1}^{1} \lambda_y LNE_{yt} + \sum_{z=1}^{1} \lambda_z GNE_{zt} + \mu_i \quad \text{..... } \mathbf{6.2\ (b)}$$

$$\boldsymbol{NPS3_t} = \alpha_0 + \alpha_1 ln(GDP_t) + \alpha_2(INF_t) + \alpha_3 ln(M2_t) + \alpha_4 ln(PI\text{-}MSIA_t) + \alpha_5 ln(PI\text{-}US_t) + \sum_{w=1}^{1} \lambda_w LEC_{wt} + \sum_{x=1}^{1} \lambda_x GEC_{xt} + \sum_{y=1}^{1} \lambda_y LNE_{yt} + \sum_{z=1}^{1} \lambda_z GNE_{zt} + \mu_i \quad \text{..... } \mathbf{6.2\ (c)}$$

$$AGNPS_t = \alpha_0 + \alpha_1 ln(GDP_t) + \alpha_2(INF_t) + \alpha_3 ln(M2_t) + \alpha_4 ln(PI\text{-}MSIA_t) + \alpha_5 ln(PI\text{-}US_t) + \sum_{w=1}^{1} \lambda_w LEC_{wt} + \sum_{x=1}^{1} \lambda_x GEC_{xt} + \sum_{y=1}^{1} \lambda_y LNE_{yt} + \sum_{z=1}^{1} \lambda_z GNE_{zt} + \mu_i \quad \text{..... 6.2 (d)}$$

In the above equations, *ln* represents the natural logarithmic form of the series while parameters $\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6, \alpha_7, \alpha_8,$ and α_9 are the long-term elasticity estimators of penny and non-penny stocks' returns with respect to the selected macroeconomic variables of GDP_t , INF_t , $M2_t$, BCI_t , CSI_t , $PI\text{-}MSIA_t$, $PI\text{-}CHI_t$, $PI\text{-}JPN_t$ and $PI\text{-}US_t$ respectively. Non-macroeconomic determinants are represented by LEC_{wt} and GEC_{xt} for local and global economic events while LNE_{yt} and GNE_{zt} are local and global non-economic events. The other parameters of α_0 and μ_i are the intercept component and residual term. The hypothesized or expected reaction of the selected variables are summarized and shown in Tables 6.1 and Table 6.2 respectively.

6.4.2 Estimation Strategy

As this study investigates the long-run equilibrium relationship or cointegration among the variables, the Autoregressive Distributed Lag (ARDL) approach to cointegration which was first developed Pesaran, Shin and Smith (1996), Pesaran and Shin (1999) and further improved by Pesaran et al. (2001) that was used. This approach has gained wide acceptance due to various econometric advantages over other methods of cointegration, namely the ARDL approach that does not necessitate all variables to be integrated in the same order and applicable if all variables in a model are *I(0)* or *I(1)* or even fractionally integrated (Pesaran & Pesaran, 1997). Pesaran and Shin (1999) argued that the ARDL approach to cointegration provides robust results and super consistent estimates of the long-run coefficients in the case of small samples.

6.5 DATA CHARATERISTICS

6.5.1 Data Description

This study is based on the secondary source of data from July 2010 to June 2015 (5 years). The complete data of 60 monthly observations for the macroeconomic variables namely GDP, M2, PI-MSIA and PI-US were obtained from Thomson DataStream (TDS). All related quarterly data were converted to monthly data in line with the research methodology. All variables were transformed into natural log-form except for INF to reduce sharpness of data or heteroskedasticity and to obtain the growth rate of the relevant variables by their differenced logarithms (Bahmani-Oskooee & Nasir, 2004). INF is the proxy of the CPI of which the data is already in differenced form. As for the non-macroeconomic forces, the selected event was classified into economic and non-economic news and categorized as local and global events. A dummy variable with value of 1 was assigned during the corresponding month on the event date and 0 otherwise. As the study involves cointegration analysis, the data set of 5-years is justifiable as studies of cointegration and causality analysis from Albaity and Ahmad (2008) and Do and Sriboonchitta (2010) who uses a data set of 5-6-year have yield significant results. A detailed statistical analysis was carried out before conducting the time series econometric analysis.

Table 6.4: Descriptive Statistics and Correlation Matrix for Penny Stocks and Independent Variables

DESCRIPTIVE STATISTICS:

	PS1	*PS2*	*PS3*	*AGPS*	*ln(GDP)*	*INF*	*ln(M2)*	*ln(PI-MSIA)*	*ln(PI-US)*
Mean	0.2728	0.1738	0.0872	0.1885	4.6952	0.2170	14.0850	6.3874	7.2854
Median	0.2703	0.1710	0.0874	0.1869	4.6909	0.1909	14.1114	6.3766	7.2225
Maximum	0.3305	0.2050	0.1042	0.2162	4.8227	0.6376	14.2752	6.5028	7.6140
Minimum	0.2331	0.1488	0.0718	0.1680	4.5695	-0.2349	13.8265	6.1686	6.8843
Std. Dev.	0.0167	0.0118	0.0075	0.0116	0.0615	0.1897	0.1338	0.0799	0.2062
Skewness	0.8586	0.5684	0.1112	0.2360	0.2720	0.4613	-0.4284	-0.4791	0.0798
Kurtosis	4.3504	3.3495	2.6089	2.1623	2.2457	2.9708	1.9514	2.7187	1.8127
Jarque-Bera	11.9299*	3.5365	0.5061	2.3111	2.1621	2.1301	4.5842	2.4934	3.5876
Observations	60	60	60	60	60	60	60	60	60

CORRELATION MATRIX:

	PS1	*PS2*	*PS3*	*AGPS*	*ln(GDP)*	*INF*	*ln(M2)*	*ln(PI-MSIA)*	*ln(PI-US)*
PS1	1.0000								
PS2	**0.8707***	1.0000							
PS3	**0.6401***	**0.6658***	1.0000						
AGPS	**0.8647***	**0.7900***	**0.8354***	1.0000					
ln(GDP)	**0.2315*****	**0.2581****	-0.1226	-0.1101	1.0000				
INF	-0.0866	0.0450	-0.1648	-0.1787	0.1421	1.0000			
ln(M2)	**0.2535****	**0.2650****	-0.0256	-0.0392	**0.8129***	0.0125	1.0000		
ln(PI-MSIA)	**0.3942***	**0.4339***	0.1071	-0.1071	**0.6930***	0.0916	**0.8567***	1.0000	
ln(PI-US)	**0.3027****	**0.3657****	-0.0776	-0.0613	**0.8306***	0.1071	**0.9337***	**0.9096***	1.0000

** , ** and *** denotes significance of the coefficient at 1%, 5% and 10% levels respectively*

Table 6.5: Descriptive Statistics and Correlation Matrix for Non-Penny Stocks and Independent Variables

DESCRIPTIVE STATISTICS:									
	NPS1	***NPS2***	***NPS3***	***AGNPS***	***ln(GDP)***	***INF***	***ln(M2)***	***ln(PI-MSIA)***	***ln(PI-US)***
Mean	5.2780	1.0533	0.4928	2.2747	4.6952	0.2170	14.0850	6.3874	7.2854
Median	5.3990	0.9957	0.4787	2.2768	4.6909	0.1909	14.1114	6.3766	7.2225
Maximum	6.1649	1.3010	0.6241	2.6922	4.8227	0.6376	14.2752	6.5028	7.6140
Minimum	4.0847	0.8287	0.4097	1.7995	4.5695	-0.2349	13.8265	6.1686	6.8843
Std. Dev.	0.6247	0.1255	0.0500	0.2568	0.0615	0.1897	0.1338	0.0799	0.2062
Skewness	-0.3552	0.4905	0.8692	-0.1457	0.2720	0.4613	-0.4284	-0.4791	0.0798
Kurtosis	1.7408	2.0118	3.0544	1.7428	2.2457	2.9708	1.9514	2.7187	1.8127
Jarque-Bera	5.2259	4.8469	7.5616**	4.1638	2.1621	2.1301	4.5842	2.4934	3.5876
Observations	60	60	60	60	60	60	60	60	60
CORRELATION MATRIX:									
	NPS1	***NPS2***	***NPS3***	***AGNPS***	***ln(GDP)***	***INF***	***ln(M2)***	***ln(PI-MSIA)***	***ln(PI-US)***
NPS1	1.0000								
NPS2	**0.8493***	1.0000							
NPS3	**0.6448***	**0.9328***	1.0000						
AGNPS	**0.9910***	**0.9120***	**0.7396***	1.0000					
ln(GDP)	**0.7405***	**0.7550***	**0.6123***	**0.7631***	1.0000				
INF	0.0188	0.1357	0.1293	0.0458	0.1421	1.0000			
ln(M2)	**0.9324***	**0.7787***	**0.5469***	**0.9183***	**0.8128***	0.0125	1.0000		
ln(PI-MSIA)	**0.9221***	**0.8527***	**0.6878***	**0.9312***	**0.6930***	0.0916	**0.8567***	1.0000	
ln(PI-US)	**0.8964***	**0.8936***	**0.7197***	**0.9190***	**0.8306***	0.1071	**0.9337***	**0.9096***	1.0000

** , ** and *** denotes significance of the coefficient at 1%, 5% and 10% levels respectively*

6.5.1.1 Descriptive Statistics

A detailed statistical analysis was carried out before conducting the time series econometric analysis. The descriptive statistics for the dependent variables, namely penny stocks and non-penny stocks are presented in Table 6.4 and Table 6.5 above

6.5.1.2 Correlation Matrix

Prior the formation of the regression model for the research, a further check on multi-collinearity was done to detect the probable existence of any linear relationships among the explanatory variables with dependent variables. This was done by reviewing the correlations between the independent and dependent variables (penny and non-penny stocks).

As shown in Table 6.4 and Table 6.5, the dependent variables of penny and non-penny stocks are positively correlated among or within its portfolio stocks. It is found that GDP, M2 and the price indices of Malaysia (PI-MSIA) and US (PI-US) potrays a strong positive correlation within the variables and also with PS1, PS2 and all price sorted non-penny portfolios (NPS1, NPS2, NPS3 and AGNP), but it is not the case with the PS3 and AGPS. INF is totally not correlated to any dependent or independent variables. Basically, all variables are correlated either strongly or moderately among each other.

6.5.2 Unit Root Tests

One of the assumed properties of time series data is its non-stationarity. It is thus necessary to perform a pre-test to ensure that a stationary relationship existed among the variables to avoid problems of spurious regressions. To test for the presence of unit roots, the standard Augmented Dickey-Fuller (ADF) and Philips-Perron (PP) tests without any trend (none) were employed for both the dependent and independent variables (macroeconomic). The results are presented in Table 6.6 and Table 6.7.

Table 6.6: Result of Unit Root Test for Dependent Variables

Portfolio	AUGMENTED DICKEY-FULLER UNIT ROOT TEST STATISTICS		PHILLIPS-PERRON UNIT ROOT TEST STATISTICS	
	Exogenoous: None		Exogenoous: None	
	(At Level)	*(At First Difference)*	*(At Level)*	*(At First Difference)*
PS1	-0.124 [2]	**-7.549* [1]**	-0.334 [5]	**-8.851* [5]**
PS2	-0.218 [0]	**-7.987* [0]**	-0.114 [10]	**-9.329* [9]**
PS3	-0.473 [0]	**-7.681* [0]**	-0.485 [7]	**-7.912* [7]**
AGPS	-0.229 [2]	**-7.234* [1]**	-0.450 [8]	**-9.014* [2]**
NPS1	1.239 [0]	**-6.805* [0]**	1.585 [9]	**-6.770* [8]**
NPS2	0.721 [0]	**-7.0413* [0]**	0.900 [5]	**-7.026* [4]**
NPS3	0.473 [2]	**-6.610* [1]**	0.326 [2]	**-6.894* [2]**
AGNPS	1.106 [0]	**-6.722* [0]**	1.532 [8]	**-6.693* [7]**

*, **, *** *denotes significance at 1%, 5% and 10% level respectively*
*Figures shown in parenthesis represents **lag length** for ADF and **bandwidth** for PP statistical tests*

Table 6.8: Result of Unit Root Test for Independent Variables

Variables	AUGMENTED DICKEY-FULLER UNIT ROOT TEST STATISTICS		PHILLIPS-PERRON UNIT ROOT TEST STATISTICS	
	Exogenoous: None		Exogenoous: None	
	(At Level)	*(At First Difference)*	*(At Level)*	*(At First Difference)*
lnGDP	2.684 [6]	**-2.921* [10]**	0.701 [1]	**-22.263* [6]**
INF	-0.665 [7]	**-4.920* [6]**	-2.719 [6]	**-16.200* [21]**
lnM2	7.099 [0]	**-1.688*** [2]**	7.466 [3]	**-5.580* [5]**
lnPI-MSIA	1.076 [0]	**-7.452* [0]**	1.207 [5]	**-7.533* [7]**
lnPI-US	2.622 [1]	**-8.946* [0]**	2.748 [2]	**-8.831* [3]**

** , **, *** denotes significance at 1%, 5% and 10% level respectively*
Figures shown in parenthesis represents ***lag length*** *for ADF and* ***bandwidth*** *for PP statistical tests*

The results of the unit root test, namely for the dependent variables of penny and non-penny stock revealed all variables were integrated at the order of *I(1)* under both ADF and PP with stationarity recorded at one percent level of significance. The lag length was 0 and 1 under ADF while a varying bandwidth was visible between 5-9 under PP unit root test.

As for the independent variables, both unit root tests of ADF and PP revealed unit root was integrated at order of *I(1)* or at first difference with one percent significance. Correspondingly, the lag length for ADF for the independent variables varied between 0-10 while the PP statistical test bandwidth was between 3-21. This indicates that the dependent and independent variables selected for the empirical estimation in the model are integrated in *I(1)* order of integration. As such, this supports the application of ARDL approach to cointegration in this research.

6.5.3 Selection of Optimal Lag Length Criterion

The selection of optimal lag length is based on the minimum values of *LogL, LR, FPE, AIC, SC* and *HQ* criterions. The computation of optimal lag length selection for the endogenous and exogenous variables is presented in Tables 6.8 and 6.9 for penny and non-penny stocks respectively. Ironically, lag order selected by all the criteria was between 1 to 3 lags for both penny stocks and collectively 1 lag for non-penny stocks.

Table 6.7: Lag Length Criteria for Penny Stocks

VAR – Lag Order Selection Criteria

***Endogenous Variables** : **AGPS** lnGDP INF lnM2 lnPI_MSIA lnPI_US*
***Exogenous Variables** : LEC1, GEC1, LNEC1, GNEC1*

Lag	LogL	LR	FPE	AIC	SC	HQ
0	465.0501	NA	9.48E-15	-15.26492	-14.18963	-14.84702
1	718.9375	409.7831	4.66E-18	-22.91009	**-20.54445***	**-21.99072***
2	757.5107	**54.13781***	**4.62e-18***	-23.00037	-19.34439	-21.57953
3	795.6673	45.52012	5.13E-18	**-23.07604***	-18.12971	-21.15373

***Endogenous Variables** : **PS1** lnGDP INF lnM2 lnPI_MSIA lnPI_US*
***Exogenous Variables** : LEC1, GEC1, LNEC1, GNEC1*

Lag	LogL	LR	FPE	AIC	SC	HQ
0	468.9872	NA	8.26E-15	-15.40306	-14.32777	-14.98517
1	720.8019	406.4377	**4.36e-18***	-22.9755	**-20.60987***	**-22.05614***
2	758.8284	**53.37051***	4.41E-18	-23.04661	-19.39062	-21.62577
3	795.9897	44.3328	5.07E-18	**-23.08736***	-18.14102	-21.16504

***Endogenous Variables** : **PS2** lnGDP INF lnM2 lnPI_MSIA lnPI_US*
***Exogenous Variables** : LEC1, GEC1, LNEC1, GNEC1*

Lag	LogL	LR	FPE	AIC	SC	HQ
0	459.6565	NA	1.15E-14	-15.07567	-14.00038	-14.65777
1	713.2932	409.3787	**5.68e-18***	-22.71204	**-20.34641***	**-21.79268***
2	750.9913	**52.90962***	5.81E-18	-22.77163	-19.11564	-21.35079
3	791.9029	48.80672	5.85E-18	**-22.94396***	-17.99763	-21.02165

***Endogenous Variables** : **PS3** lnGDP INF lnM2 lnPI_MSIA lnPI_US*
***Exogenous Variables** : LEC1, GEC1, LNEC1, GNEC1*

Lag	LogL	LR	FPE	AIC	SC	HQ
0	452.2617	NA	1.49E-14	-14.8162	-13.74091	-14.39831
1	700.8654	**401.2551***	**8.78e-18***	**-22.27598***	**-19.91034***	**-21.35661***
2	736.541	50.07109	9.65E-18	-22.2646	-18.60861	-20.84376
3	770.6151	40.64978	1.24E-17	-22.19702	-17.25069	-20.27471

** denotes lag order selected by the criterion*

***LR** : Sequential modified LR test statistic (each test at 5%)*
***FPE** : Final prediction error*
***AIC** : Akaike information criterion*
***SC** : Schwarz information criterion*
***HQ** : Hannan-Quinn information criterion*

Table 6.8: Lag Length Criteria for Non-Penny Stocks

VAR – Lag Order Selection Criteria

Endogenous Variables* : *AGNP *lnGDP INF lnM2 lnPI_MSIA lnPI_US*
Exogenous Variables *: LEC1, GEC1, LNEC1, GNEC1*

Lag	LogL	LR	FPE	AIC	SC	HQ
0	481.2024	NA	5.38E-15	-15.83166	-14.75637	-15.41377
1	744.9264	**425.6598***	**1.87e-18***	**-23.82198***	**-21.45634***	**-22.90261***
2	777.6185	45.88372	2.28E-18	-23.70591	-20.04993	-22.28507
3	814.4385	43.92557	2.66E-18	-23.73468	-18.78835	-21.81237

Endogenous Variables* : *NP1 *lnGDP INF lnM2 lnPI_MSIA lnPI_US*
Exogenous Variables *: LEC1, GEC1, LNEC1, GNEC1*

Lag	LogL	LR	FPE	AIC	SC	HQ
0	491.4458	NA	3.76E-15	-16.19108	-15.11579	-15.77319
1	766.9827	**444.7262***	**8.63e-19***	**-24.59588***	**-22.23025***	**-23.67652***
2	797.8275	43.29097	1.12E-18	-24.415	-20.75901	-22.99416
3	832.1249	40.91613	1.43E-18	-24.35526	-19.40892	-22.43294

Endogenous Variables* : *NP2 *lnGDP INF lnM2 lnPI_MSIA lnPI_US*
Exogenous Variables *: LEC1, GEC1, LNEC1, GNEC1*

Lag	LogL	LR	FPE	AIC	SC	HQ
0	479.1029	NA	5.79E-15	-15.758	-14.68271	-15.3401
1	740.0949	**421.2502***	**2.22e-18***	**-23.65245***	**-21.28681***	**-22.73308***
2	774.0807	47.69936	2.58E-18	-23.58178	-19.92579	-22.16094
3	809.7825	42.59164	3.13E-18	-23.57132	-18.62498	-21.649

Endogenous Variables* : *NP3 *lnGDP INF lnM2 lnPI_MSIA lnPI_US*
Exogenous Variables *: LEC1, GEC1, LNEC1, GNEC1*

Lag	LogL	LR	FPE	AIC	SC	HQ
0	472.0068	NA	7.43E-15	-15.50901	-14.43372	-15.09112
1	728.9775	**414.7598***	**3.27e-18***	**-23.26237**	**-20.89673***	**-22.34300***
2	762.1917	46.61647	3.92E-18	-23.16462	-19.50864	-21.74378
3	802.1348	47.65136	4.09E-18	-23.30298*	-18.35664	-21.38066

** denotes lag order selected by the criterion*

LR *: Sequential modified LR test statistic (each test at 5%)*
FPE *: Final prediction error*
AIC *: Akaike information criterion*
SC *: Schwarz information criterion*
HQ *: Hannan-Quinn information criterion*

6.6 EMPIRICAL RESULTS AND DISCUSSION

6.6.1 Bounds Testing to Cointegration

In view of the mixed level of integration found among the dependent and independent variables (refer Section 6.5.2) coupled with small sample data of 60 observations, the ARDL bounds testing approach to cointegration was used to test the long-run relations between the variables which was developed by Pesaran et al. (2001). The unrestricted error correction method (UECM) of the ARDL version was used to calculate the *F*-statistic and the empirical equations are as follows:

Empirical Equations for <u>Penny Stocks</u>:

$$\Delta(PS1_t) = \beta_0 + \beta_1 \ln(PS1_{t-1}) + \beta_2 \ln(GDP_{t-1}) + \beta_3(INF_{t-1}) + \beta_4 \ln(M2_{t-1}) + \beta_5 \ln(PI\text{-}MSIA_{t-1}) + \beta_{10}\ln(PI\text{-}US_{t-1}) + \sum_{b=1}^{a} \alpha_{1b}\Delta\ln(PS1_{t-b}) + \sum_{d=0}^{c} \alpha_{2d}\Delta\ln(GDP_{t-d}) + \sum_{f=0}^{e} \alpha_{3f}\Delta(INF_{t-f}) + \sum_{h=0}^{g} \alpha_{4h}\Delta\ln(M2_{t-h}) + \sum_{j=0}^{i} \alpha_{5j}\Delta\ln(PI\text{-}MSIA_{t-j}) + \sum_{l=0}^{k} \alpha_{6l}\Delta\ln(PI\text{-}US_{t-l}) + \sum_{w=0}^{1} \lambda_w LEC_{wt} + \sum_{x=0}^{1} \lambda_x GEC_{xt} + \sum_{y=0}^{1} \lambda_y LNE_{yt} + \sum_{z=0}^{1} \lambda_z GNE_{zt} + \mu_t \quad \text{..............7.1 (a)}$$

$$\Delta(PS2_t) = \beta_0 + \beta_1 \ln(PS2_{t-1}) + \beta_2 \ln(GDP_{t-1}) + \beta_3(INF_{t-1}) + \beta_4 \ln(M2_{t-1}) + \beta_5 \ln(PI\text{-}MSIA_{t-1}) + \beta_{10}\ln(PI\text{-}US_{t-1}) + \sum_{b=1}^{a} \alpha_{1b}\Delta\ln(PS2_{t-b}) + \sum_{d=0}^{c} \alpha_{2d}\Delta\ln(GDP_{t-d}) + \sum_{f=0}^{e} \alpha_{3f}\Delta(INF_{t-f}) + \sum_{h=0}^{g} \alpha_{4h}\Delta\ln(M2_{t-h}) + \sum_{j=0}^{i} \alpha_{5j}\Delta\ln(PI\text{-}MSIA_{t-j}) + \sum_{l=0}^{k} \alpha_{6l}\Delta\ln(PI\text{-}US_{t-l}) + \sum_{w=0}^{1} \lambda_w LEC_{wt} + \sum_{x=0}^{1} \lambda_x GEC_{xt} + \sum_{y=0}^{1} \lambda_y LNE_{yt} + \sum_{z=0}^{1} \lambda_z GNE_{zt} + \mu_t \quad \text{..............7.1 (b)}$$

$$\Delta(PS3_t) = \beta_0 + \beta_1 ln(PS3_{t-1}) + \beta_2 ln(GDP_{t-1}) + \beta_3(INF_{t-1}) + \beta_4 ln(M2_{t-1}) + \beta_5 ln\ (PI\text{-}MSIA_{t-1}) + \beta_{10} ln(PI\text{-}US_{t-1}) + \sum_{b=1}^{a} \alpha_{1b} \Delta ln(PS3_{t-b}) + \sum_{d=0}^{c} \alpha_{2d} \Delta ln(GDP_{t-d}) + \sum_{f=0}^{e} \alpha_{3f} \Delta(INF_{t-f}) + \sum_{h=0}^{g} \alpha_{4h} \Delta ln(M2_{t-h}) + \sum_{j=0}^{i} \alpha_{5j} \Delta ln(PI\text{-}MSIA_{t-j}) + \sum_{l=0}^{k} \alpha_{6l} \Delta ln(PI\text{-}US_{t-l}) + \sum_{w=0}^{1} \lambda_w LEC_{wt} + \sum_{x=0}^{1} \lambda_x GEC_{xt} + \sum_{y=0}^{1} \lambda_y LNE_{yt} + \sum_{z=0}^{1} \lambda_z GNE_{zt} + \mu_t \quad \text{............7.1 (c)}$$

$$\Delta(AGPS_t) = \beta_0 + \beta_1 ln(AGPS_{t-1}) + \beta_2 ln(GDP_{t-1}) + \beta_3(INF_{t-1}) + \beta_4 ln(M2_{t-1}) + \beta_5 ln\ (PI\text{-}MSIA_{t-1}) + \beta_{10} ln(PI\text{-}US_{t-1}) + \sum_{b=1}^{a} \alpha_{1b} \Delta ln(AGPS_{t-b}) + \sum_{d=0}^{c} \alpha_{2d} \Delta ln(GDP_{t-d}) + \sum_{f=0}^{e} \alpha_{3f} \Delta(INF_{t-f}) + \sum_{h=0}^{g} \alpha_{4h} \Delta ln(M2_{t-h}) + \sum_{j=0}^{i} \alpha_{5j} \Delta ln(PI\text{-}MSIA_{t-j}) + \sum_{l=0}^{k} \alpha_{6l} \Delta ln(PI\text{-}US_{t-l}) + \sum_{w=0}^{1} \lambda_w LEC_{wt} + \sum_{x=0}^{1} \lambda_x GEC_{xt} + \sum_{y=0}^{1} \lambda_y LNE_{yt} + \sum_{z=0}^{1} \lambda_z GNE_{zt} + \mu_t \quad \text{............7.1 (d)}$$

Empirical Equations for <u>Non-Penny Stocks</u>:

$$\Delta(NP1_t) = \beta_0 + \beta_1 ln(NP1_{t-1}) + \beta_2 ln(GDP_{t-1}) + \beta_3(INF_{t-1}) + \beta_4 ln(M2_{t-1}) + \beta_5 ln\ (PI\text{-}MSIA_{t-1}) + \beta_{10} ln(PI\text{-}US_{t-1}) + \sum_{b=1}^{a} \alpha_{1b} \Delta ln(NP1_{t-b}) + \sum_{d=0}^{c} \alpha_{2d} \Delta ln(GDP_{t-d}) + \sum_{f=0}^{e} \alpha_{3f} \Delta(INF_{t-f}) + \sum_{h=0}^{g} \alpha_{4h} \Delta ln(M2_{t-h}) + \sum_{j=0}^{i} \alpha_{5j} \Delta ln(PI\text{-}MSIA_{t-j}) + \sum_{l=0}^{k} \alpha_{6l} \Delta ln(PI\text{-}US_{t-l}) + \sum_{w=0}^{1} \lambda_w LEC_{wt} + \sum_{x=0}^{1} \lambda_x GEC_{xt} + \sum_{y=0}^{1} \lambda_y LNE_{yt} + \sum_{z=0}^{1} \lambda_z GNE_{zt} + \mu_t \quad \text{............7.2 (a)}$$

$$\Delta(NP2_t) = \beta_0 + \beta_1 ln(NP2_{t-1}) + \beta_2 ln(GDP_{t-1}) + \beta_3(INF_{t-1}) + \beta_4 ln(M2_{t-1}) + \beta_5 ln\ (PI\text{-}MSIA_{t-1}) + \beta_{10} ln(PI\text{-}US_{t-1}) + \sum_{b=1}^{a} \alpha_{1b} \Delta ln(NP2_{t-b}) + \sum_{d=0}^{c} \alpha_{2d} \Delta ln(GDP_{t-d}) + \sum_{f=0}^{e} \alpha_{3f} \Delta(INF_{t-f}) + \sum_{h=0}^{g} \alpha_{4h} \Delta ln(M2_{t-h}) + \sum_{j=0}^{i} \alpha_{5j} \Delta ln(PI\text{-}MSIA_{t-j}) + \sum_{l=0}^{k} \alpha_{6l} \Delta ln(PI\text{-}US_{t-l}) + \sum_{w=0}^{1} \lambda_w LEC_{wt} + \sum_{x=0}^{1} \lambda_x GEC_{xt} + \sum_{y=0}^{1} \lambda_y LNE_{yt} + \sum_{z=0}^{1} \lambda_z GNE_{zt} + \mu_t \quad \text{............7.2 (b)}$$

$$\Delta(NP3_t) = \beta_0 + \beta_1 ln(NP3_{t-1}) + \beta_2 ln(GDP_{t-1}) + \beta_3(INF_{t-1}) + \beta_4 ln(M2_{t-1}) + \beta_5 ln(PI\text{-}MSIA_{t-1}) + \beta_{10} ln(PI\text{-}US_{t-1}) + \sum_{b=1}^{a} \alpha_{1b} \Delta ln(NP3_{t-b}) + \sum_{d=0}^{c} \alpha_{2d} \Delta ln(GDP_{t-d}) + \sum_{f=0}^{e} \alpha_{3f} \Delta(INF_{t-f}) + \sum_{h=0}^{g} \alpha_{4h} \Delta ln(M2_{t-h}) + \sum_{j=0}^{i} \alpha_{5j} \Delta ln(PI\text{-}MSIA_{t-j}) + \sum_{l=0}^{k} \alpha_{6l} \Delta ln(PI\text{-}US_{t-l}) + \sum_{w=0}^{1} \lambda_w LEC_{wt} + \sum_{x=0}^{1} \lambda_x GEC_{xt} + \lambda_y LNE_{yt} + \lambda_z GNE_{zt} + \mu_t \quad \ldots\ldots\ldots \mathbf{7.2\ (c)}$$

$$\Delta(AGNP_t) = \beta_0 + \beta_1 ln(AGNP_{t-1}) + \beta_2 ln(GDP_{t-1}) + \beta_3(INF_{t-1}) + \beta_4 ln(M2_{t-1}) + \beta_5 ln(PI\text{-}MSIA_{t-1}) + \beta_{10} ln(PI\text{-}US_{t-1}) + \alpha_{1b} \Delta ln(AGNP_{t-b}) + \alpha_{2d} \Delta ln(GDP_{t-d}) + \alpha_{3f} \Delta(INF_{t-f}) + \alpha_{4h} \Delta ln(M2_{t-h}) + \alpha_{5j} \Delta ln(PI\text{-}MSIA_{t-j}) + \alpha_{6l} \Delta ln(PI\text{-}US_{t-l}) + \lambda_w LEC_{wt} + \lambda_x GEC_{xt} + \lambda_y LNE_{yt} + \lambda_z GNE_{zt} + \mu_t \quad \ldots\ldots\ldots \mathbf{7.2\ (d)}$$

The joint significance *F*-test for the null hypothesis of no cointegration is presented in Tables 6.10 and 6.11 for penny and non-penny stocks respectively. The calculated Pesaran et al. (2001) *F*-statistics for long-run relationship between the variables cointegration is F_{PS1} = 3.796; F_{PS2} = 4.418; F_{PS3} = 8.619; F_{AGPS} = 3.968. While the *F*-statistics for PS2 and PS3 with the independent variables are higher than upper critical bound at 2.5% and 1% levels respectively, the *F*-statistics for PS1 and AGPS is at 5% level. As for non-penny stocks, the F_{NPS1} = 12.944; F_{NPS2} = 13.051; F_{NPS3} = 12.003 and F_{AGNPS} = 12.940. The calculated *F*-statistics between for NPS1, NPS2, NP3 and AGNPS with the independent variables are higher than upper critical bound (4.68) at 1% level of significance.

These findings validate the existence of long-run association between the variables. Hence, the null hypothesis of no long-run relationship between the selected macroeconomic and non-macroeconomic variables with the returns of penny and non-penny stocks in the Malaysian stock market is rejected (Hypothesis H_{5a} and H_{5b}, refer Table 6.3).

Table 6.9: Results of ARDL Cointegration Test for Penny Stocks

Bounds Testing to Cointegration				
Dependent Variable	**Δ(PS1)**	**Δ(PS2)**	**Δ(PS3)**	**Δ(AGPS)**
Optimal Lag Length (Selected Model)	**2,0,0,2,2,0**	**2,3,1,3,3,3**	**1,0,0,0,2,0**	**2,3,1,3,3,1**
F-Statistics	**3.7962*** **	**4.4175** **	**8.6194***	**3.9683*** **

** , **, *** and # denotes significance level at 1%, 2.5%, 5% and 10% levels respectively*

Critical Value Bonds:		
Significance	***I(0)***	***I(1)***
10%	*2.26*	*3.35*
5%	*2.62*	*3.79*
2.5%	*2.96*	*4.18*
1%	*3.41*	*4.68*

R-squared	0.8033	0.8283	0.4062	0.8365
Adjusted R-squared	0.7330	0.6994	0.2479	0.7308
Schwarz Criterion	-2.942	-2.2611	-2.3579	-2.5697
F-statistic	11.435	6.4299	2.5656	7.9088
Prob (F-statistic)	0.0000	0.0000	0.0111	0.0000

Table 6.10: Results of ARDL Cointegration Test for Non-Penny Stocks

Bounds Testing to Cointegration				
Dependent Variable	**Δ(NP1)**	**Δ(NP2)**	**Δ(NP3)**	**Δ(AGNP)**
Optimal Lag Length (Selected Model)	**1,0,0,0,0,0**	**1,4,0,4,0,0**	**1,0,0,0,0,0**	**1,0,0,0,0,0**
F-Statistics	**12.944***	**13.051***	**12.003***	**12.940***

** , **, *** and # denotes significance level at 1%, 2.5%, 5% and 10% levels respectively*

Critical Value Bonds:		
Significance	***I(0)***	***I(1)***
10%	*2.26*	*3.35*
5%	*2.62*	*3.79*
2.5%	*2.96*	*4.18*
1%	*3.41*	*4.68*

R-squared	0.6548	0.7655	0.6649	0.6669
Adjusted R-squared	0.5829	0.6514	0.5950	0.5975
Schwarz Criterion	-3.8479	-3.0875	-3.0778	-3.6669
F-statistic	9.1044	6.7093	9.5222	9.6103
Prob (F-statistic)	0.0000	0.0000	0.0000	0.0000

6.6.2 Long-Run Coefficients of Variables

The existence of long-run relationship between the dependent and independent variables can further be explored to interpret the marginal effects of independent variables on the returns of penny and non-penny stocks. The results of long-run coefficients of the ARDL model for penny and non-penny stocks are reported in Tables 6.12 and 6.13 respectively.

Table 6.11: Long-Run Coefficients of ARDL Model for Penny Stocks

Dependent Variable	**Δ(PS1)**			**Δ(PS2)**			**Δ(PS3)**			**Δ(AGPS)**		
Regressors	***Coefficient***	***Standard Error***	***t-Statistic***	***Coefficient***	***Standard Error***	***t-Statistic***	***Coefficient***	***Standard Error***	***t-Statistic***	***Coefficient***	***Standard Error***	***t-Statistic***
Constant	-0.5565	1.4085	-0.3951	**-4.4290**	**2.4080**	**-1.8400*****	-0.4991	1.9800	-0.2521	**-4.0917**	**2.2698**	**-1.8027*****
ln(GDP)	**0.1115**	**0.1821**	**2.1010****	**1.3770**	**0.5490**	**2.5110***	**0.1197**	**0.0693**	**1.7262*****	**1.1230**	**0.5139**	**2.1855****
INF	-0.0128	0.0299	-0.4277	-0.0720	0.0560	-1.2820	0.0158	0.0424	0.3724	-0.0528	0.0528	-1.0006
ln(M2)	-0.0502	0.1192	-0.4210	-0.2760	0.1710	-1.6180	0.0267	0.1670	0.1599	-0.2575	0.1688	-1.5249
ln(PI-MSIA)	**0.1599**	**0.2066**	**1.8738*****	**0.8730**	**0.3990**	**2.1850****	**0.0473**	**0.2836**	**1.8668*****	**-0.8618**	**0.3811**	**-2.2613****
ln(PI-US)	**-0.5120**	**0.2290**	**-2.2390****	-0.0386	0.1071	-0.3605	-0.1698	0.1552	-1.0943	**-0.4226**	**0.2007**	**-2.1060****
LEC1	0.0315	0.0451	0.6981	0.1570	0.0750	1.1010	0.0704	0.0594	1.1850	0.2245	0.2596	0.8650
GEC1	**-0.1387**	**0.0508**	**-2.7294***	**-0.1340**	**0.057**	**-2.350****	**-0.1248**	**0.0580**	**-2.1510****	**-0.1682**	**0.0622**	**-2.7040***
LNE1	**0.1712**	**0.0603**	**2.8392***	**0.2490**	**0.090**	**2.754***	**0.1941**	**0.0701**	**2.7702***	**0.2724**	**0.0979**	**2.7831***
GNE1	**-0.0959**	**0.0457**	**-2.0975****	-0.0700	0.053	-1.305	-0.0853	0.0607	-1.4045	-0.0646	0.0519	-1.2448

** , ** and *** denotes significance of the coefficient at 1%, 5% and 10% levels respectively*

Table 6.12: Long-Run Coefficients of ARDL Model for Non-Penny Stocks

Dependent Variable	**Δ(NPS1)**			**Δ(NPS2)**			**Δ(NPS3)**			**Δ(AGNPS)**		
Regressors	***Coefficient***	***Standard Error***	***t-Statistic***	***Coefficient***	***Standard Error***	***t-Statistic***	***Coefficient***	***Standard Error***	***t-Statistic***	***Coefficient***	***Standard Error***	***t-Statistic***
Constant	-0.8386	1.0137	-0.8272	-2.0649	1.5852	-1.3027	-1.9542	1.3516	-1.4459	-1.5201	1.1571	-1.3137
ln(GDP)	0.0639	0.1274	0.5018	0.5701	0.3976	1.4337	**0.1906**	**0.1760**	**1.9826*** **	**0.1228**	**0.1481**	**1.9293*** **
INF	-0.0107	0.0228	-0.4700	-0.0173	0.0300	-0.5759	-0.0101	0.0303	-0.3347	-0.0077	0.0259	-0.2963
ln(M2)	0.1019	0.0924	1.1028	0.0128	0.1204	0.1063	0.0910	0.1195	0.7611	0.1112	0.1035	1.0748
ln(PI-MSIA)	**-0.0613**	**0.1410**	**-2.4344***	0.0393	0.2050	0.1919	0.1167	0.1800	0.6484	0.0270	0.1560	0.1732
ln(PI-US)	**0.0682**	**0.0772**	**2.8842***	0.1403	0.1280	1.0958	-0.1318	0.1033	-1.2754	-0.1081	0.0883	-1.2249
LEC1	0.0071	0.0321	0.2200	0.0389	0.0428	0.9094	0.0289	0.0429	0.6726	0.0174	0.0366	0.4758
GEC1	**-0.0582**	**0.0321**	**-1.8156*** **	**-0.0958**	**0.0383**	**-2.4996***	**-0.1085**	**0.0428**	**-2.5360***	**-0.0820**	**0.0365**	**-2.2436***
LNE1	**0.0874**	**0.0326**	**2.6822***	**0.1680**	**0.0478**	**3.5143***	**0.1395**	**0.0462**	**3.0201***	**0.1162**	**0.0385**	**3.0218***
GNE1	**0.0468**	**0.0324**	**1.9448*** **	**0.0057**	**0.0372**	**1.9523*** **	-0.0600	0.0430	-1.3961	-0.0483	0.0365	-1.3229

, ** and * denotes significance of the coefficient at 1%, 5% and 10% levels respectively*

6.6.2.1 Long-Run Coefficients of Macroeconomic Determinants

GDP is positively associated with all the portfolio returns of penny and non-penny stocks. All the price sorted portfolios of penny stocks (PS1,PS2, PS3 and AGPS) together with NPS3 and AGNPS were significant at varying level of significance between 1% and 10% with GDP. Though other portfolios, namely the top two non-penny stocks portfolio of NPS1 and NPS2 did not possess significant levels, but the overall observed reaction to GDP is positive. This finding is consistent with the positive relation between economic activity and stock market as mentioned by Geske and Roll (1983), Chen et al. (1986), Fama, (1990), Lee (1992), Mukherjee et al. (1995), Asteriou and Price (2000), Herriott (2001), Gan et al. (2006), Antonios (2010), Birz and Lott Jr (2011), Yasir et al. (2013), Jareño and Negrut (2016).

The relationships between inflation (INF) and stock price were hypothesized as negative in this study and this relationship was found true for price sorted portfolios of PS1, PS2, AGPS and all non-penny stocks' portofolios (NPS1, NPS2, NPS3, AGNPS). Only the lowest priced penny stock of PS3 returned a positive. Non of the portfolios of penny and non-penny stocks was statistically significant. The negative relationship between inflation and stock returns of non-penny is consistent with the findings of Fama (1981). According to Fama (1981), due to the positive and significant correlation between real activity (GDP) and stock prices, the occurrence of inflation causes a slowdown in real activity, thus decreasing the stock prices and its returns. Nonetheless, the positive relationship recorded for the the lowest priced penny stock (PS3) in the Malaysian stock market rakes a differing view. Perhaps as penny stocks are low priced stocks and looked upon as gambling like stock (Eraker & Ready, 2015), penny stock investors might look upon these stocks as a good hedge against inflation (Asprem, 1989; Shahbaz, 2017) while sustaining their wealth (Kevin, 2000).

Mixed reaction is seen for money supply (M2) with the stock returns of penny and non-penny. Positive association is found for portfolio returns of PS3, NPS1, NPS2, NPS3 and AGNPS while other portfolios of PS1, PS2 and AGPS is negative. No statistical significance is recorded for these stocks. A predictable positive impact on stock returns was hypothesized for M2 based on the fact that Malaysian stock market is informationally inefficient to macroeconomic variables particularly money supply (Habibullah & Baharumshah, 1996) and holds true to the all priced non-penny stocks of NPS1, NPS2, NPS3, AGNPS and lowest priced penny stocks of PS3 respectively. Perhaps this finding relates to the fact that variations in money supply causes wealth effect and resultantly investors move to readjust their portfolio in their effort to achieve the desired equilibrium (Asgharian et al., 2013; Guru-Charan et al., 2009) between high priced non-penny and low priced penny stocks.

The effects of PI-MSIA were significantly negative to highest priced non-penny stock of NPS1 and the lowest priced penny stock PS3. All other portfolios were glaringly positive and the portfolios of penny stocks of PS1, PS2, PS3, AGPS and NPS1 was found to be significant between 5% and 10% levels. It can be summarized that the top two price sorted penny stocks and the bottowm two non-penny stock clearly moves in tandem with the positive relation hypothesized in this study. Only the highest price non-penny stock (NPS1) and PS3 defies the market movement. Perhaps when the market index is on the rise, profit taking activities among all the highest non-penny and the lowest penny stocks is a contributing factor to this scenario. Sensing the rise in the market index, stock investors will seek to lock in their gains when the returns have risen appreciably (Blanchard, Rhee & Summers, 1993).

The PI-US was reportedly negative to the stock returns of all penny stocks (PS1, PS2, PS3, AGPS), NPS2, NPS3 and AGNPS. Studies of US market influence on foreign markets have persistently shown the unique role of US in the market integration (Karim & Karim, 2008; Karim & Majid, 2010). The positive relation reported for the highest and the medium priced non-penny (NPS1, NPS2) fits the hypothesized positive reaction as expected in this study but it is not in tandem for the lowest priced of non-penny stocks and all priced penny stocks. The only conclusion that can be gathered from these reaction is that penny stock players in the stock market of Malaysia are not responsive to the movements of other markets as penny stocks are deemed more of an gambling like investment to gain short-term profits (Eraker & Ready, 2015).

6.6.2.2 Long-Run Coefficients of Non-Macroeconomic Forces

The long-run relationship between the returns of non-penny and penny stocks' portfolio with non-macroeconomic forces is reported in the second portion of Tables 6.12 and Table 6.13 respectively.

The implementation of Goods and Services Tax (GST) at 6% on 1 April, 2015 (LEC1) was hypothesized to give negative reaction to stock investors. The unpopular tax was levied on most goods and had an adverse effect on the real-income of Malaysians and was projected to declines in investment activities namely in securities. Nevertheless, the long-run coefficients of LEC1 in Tables 6.12 and 6.13 are reportedly positive but not significant for all stock portfolios. The results clearly differ from the predicted negative reaction. Under closer scrutiny, it is noted that capital gains from share trading is tax-free and the impact of GST on the overall share trading market is minimal as only the brokerage and clearing fee is subjected to GST ("How GST affecting our Share Investment?", 2015). The sentiment of investors has fade away with this minimal financial impact, thus garnering the positive sentiments and returns as evidenced for all share returns in the Malaysian market context.

The global economic news of GEC1 reports a firm negative relationship between this variable and stock returns of penny and non-penny stocks. GEC1 which refers to the global plunge of oil price to its historical low in Nov 2014. It is found that the returns of all penny and non-penny stocks are adversely affected by the global plunge of oil price to its historical low. Evidently all stock returns were negative and significant between 1% and 10% levels and are in tandem with the hypothesized negative reactions.

Moving to the non-economic events, local political events like the 13th General Elections (GE13) in May 2013 which was represented by LNE1 had positive relation to the stock returns of all portfolios. All penny and non-penny stock returns were significant at 1% level. This finding is consistent with the view of Allvine and O'Neill (1980), Worthington (2006), Floros (2008), Abidin el al. (2010), Liew and Rowland (2016) that political events such as elections have significant effects on the stock market which reflects the economic performance.

On the global front, the re-election of President Obama for a second term as US President (GNE2) was generally insignificant to the market players of penny stock in Malaysia. The reaction of penny stocks (PS1, PS2, PS3, AGPS) and NPS3, AGNPS stock investors was not within the hypothesized outcome as these investors reacted negatively to the news. Only the top two priced non-penny stocks (NPS1 and NPS2) had a positive and of significant reaction to this news. As a concluding remark, penny stock investors who mainly consist of retail investors are least interested in global events as compared to non-penny investors.

6.6.2.3 Summary of Long-Run Coefficients of Variables

The summary of long-run coefficients of macroeconomic determinants and non-macroeconomic forces is shown in Table 6.14 and Table 6.15. The empirical analysis indicates that independent macroeconomic variables of GDP, INF and non-macroeconomic forces of LNE1 (political news involving GE13) and GEC1 (global economic news pertaining to the plunge in world oil prices) move in tandem with the hypothesized reaction to the returns of penny and non-penny stocks. Mixed reactions were observed for GNE1 (global non-economic news involving the re-election of Presiden Obama of US) while LEC1 (economic news with regards to the implementation of GST) and gave a totally opposing reaction to the returns of the stocks.

Table 6.13: Comparison of Long-Run Coefficients between Variables

Variables		***Long-Run <u>Positive</u> Coefficients***								***Long-Run <u>Negative</u> Coefficients***							
		PS1	**PS2**	**PS3**	**AGPS**	**NPS1**	**NPS2**	**NPS3**	**AGNP**	**PS1**	**PS2**	**PS3**	**AGPS**	**NPS1**	**NPS2**	**NPS3**	**AGNP**
MACROECON	***GDP***	**0.1115****	**1.377***	**0.1197*****	**1.1230****	0.0639	0.5701	**0.1906*****	**0.1228*****								
	INF									-0.0128	-0.072	0.0158	-0.0528	-0.0107	-0.0173	-0.0101	-0.0077
	M2			0.0267		0.1019	0.0128	0.0910	0.1112	-0.0502	-0.2760		-0.2575				
	PI-MSIA	**0.1599*****	**0.8730****	**0.0473*****			0.0393	0.1167	0.0270				**-0.8618****	**-0.0613***			
	PI-US					**0.0682***	0.1403			**-0.5120****	-0.0386	-0.1698	**-0.4226****			-0.1318	-0.1081
NON-MACROECON	***LEC1***	0.0315	0.1570	0.0704	0.2245	0.0071	0.0389	0.0289	0.0174								
	GEC1									**-0.1387***	**-0.1340****	**-0.1248****	**-0.1682***	**-0.0582*****	**-0.0958***	**-0.1085***	**-0.0820***
	LNE1	**0.1712***	**0.2490***	**0.1941***	**0.2724***	**0.0874***	**0.1680***	**0.1395***	**0.1162***								
	GNE1					**0.0468*****	**0.0057*****			**-0.0959****	-0.0700	-0.0853	-0.0646			-0.0600	-0.0483

** , ** and *** denotes significance of the coefficient at 1% , 5% and 10% levels respectively*

Table 6.14: Summary of Long-Run Coefficients of Variables

Category of Variables/ Events		*Selected Variables/ Events*	*Hypothesized Reaction to Stock Returns*	*Analyzed Reaction to Stock Returns*	
				Positive	*Negative*
MACROECONOMIC DETERMINANTS					
Domestic Macroeconomic Determinants		**GDP**	**Positive**	**PS1****,**PS2***,**PS3*****,**AGPS**** NP1,NP2,**NP3*****, **AGNP*****	
Domestic Macroeconomic Determinants		**INF**	Negative		PS1, PS2, PS3, AGPS NP1, NP2, NP3, AGNP
Domestic Macroeconomic Determinants		**M2**	Positive	PS3 NP1, NP2, NP3, AGNP	PS1, PS2, AGPS
External Determinants	**Local Index**	**PI-MSIA**	Positive	**PS1*****, **PS2****, **PS3***** NP2, NP3, AGNP	**AGPS**** **NP1***
External Determinants	**Global Index**	**PI-US**	Positive	**NP1***, NP2	**PS1****, PS2, PS3, **AGPS**** NP3, AGNP
NON-MACROECONOMIC FORCES:					
Economic News & Events	**Local**	**LEC1**	Negative	PS1, PS2, PS3, **AGPS***** NP1, NP2, NP3, **AGNP*****	
Economic News & Events	**Global**	**GEC1**	Negative		**PS1***, **PS2****, **PS3****, **AGPS***** **NP1*****, **NP2***,**NP3***,**AGNP***
Non-Economic News & Events	**Local**	**LNE1**	**Positive**	**PS1***, **PS2***, **PS3***, **AGPS*** **NP1***, **NP2***, **NP3***, **AGNP***	
Non-Economic News & Events	**Global**	**GNE1**	Positive	**NP1*****, **NP2*****	**PS1****, PS2, PS3, AGPS NP3, AGNP

*, ** and *** denotes significance of the coefficient at 1%, 5% and 10% levels respectively

6.6.3 Short-Run Elasticities of Variables

As the Bounds Testing validated the existence of long-run association between the variables, the ARDL model was reparametrized into error correction model (ECM). The bounds testing approach uses linear specification for dynamic ECM without losing information about the long-run relationship (Banerrjee & Newman, 1993). The short-run dynamics and long-run relationship of the underlying independent variables on the returns of penny and non-penny stocks' portfolios are reported in Tables 6.16 (a-d) and Table 6.17 (a-d) respectively.

6.6.3.1 Short-Run Elasticities for Penny Stocks

PS1

Table 6.16 below reports the results of the short-term elasticities of the dependent variable PS1. The ECM_{t-1} estimate for the portfolio returns of PS1 is -0.9818% and significant at 1% level. This implies that any change in the short-run towards long-run stock returns is corrected by 98.18% per year.

Independent macroeconomic variable GDP_{t-} is significant at 1% level and positive with the largest coefficient of 0.1095%. Other variables of the 1^{st}-lagged difference of $M2_{t-1}$ contributes positively and statistically significant too. Inversely, negative short-run elasticities can be traced to 1^{st}-lagged difference of $PI\text{-}MSIA_{t-1}$ with statistical significance at 1% level. The results for independent non-macroeconomic variables reveals that except for $LEC1_t$, all other non-macroeconomic forces has a positive and significant short-run elasticity in relation to stock returns of at 1% level.

With reference to the diagnostic test for the model as presented at the bottom of the table, normality is not violated and there is no heteroscedasticity and serial correlation present in the residuals of the model across the sample period.

Table 6.15: Short-Run Elasticities of The Selected ARDL Model (PS1)

Dependent Variable	ΔPS1		
Selected ARDL Model	**2,0,0,2,2,0**		
Regressors	***Coefficient***	***Standard Error***	***t-Statistic***
Constant	-0.5464	1.3999	-0.3903
$\Delta PS1_{t-1}$	-0.2058	0.1480	-1.3903
$\Delta lnGDP_t$	**0.1095**	**0.1781**	**2.6145***
ΔINF_t	-0.0125	0.0290	-0.4320
$\Delta lnM2_t$	-0.4330	0.7342	-0.5898
$\Delta lnM2_{t-1}$	**1.4684**	**0.7467**	**1.9664*****
$\Delta lnPI\text{-}MSIA_t$	**0.5648**	**0.2597**	**2.1746****
$\Delta lnPI\text{-}MSIA_{t-1}$	**-0.7353**	**0.2557**	**-2.8754***
$\Delta lnPI\text{-}US_t$	-0.0379	0.1055	-0.3591
$\Delta LEC1_t$	0.0309	0.0429	0.7190
$\Delta GEC1_t$	**-0.1362**	**0.0405**	**-3.3601***
$\Delta LNE1_t$	**0.1681**	**0.0397**	**4.2386***
$\Delta GNE1_t$	**-0.0941**	**0.0402**	**-2.3418***
ECM_{t-1}	**-0.9818**	**0.2163**	**-4.5383***

Summary Statistics		***Residual Diagnostics Test (p-value)***	
R-squared	*0.5572*	*Serial Correlation*	*0.1198*
Adjusted R-squared	*0.7990*	*Normality*	*0.5580*
F-statistic	*3.5228*	*Heteroskedasticity*	*0.3864*
Prob (F-statistic)	*0.0006*		
Durbin-Watson stat	*2.1218*		

** , ** and *** denotes significance of the coefficient at 1%, 5% and 10% levels respectively*

PS2

Table 6.17 reports the results of short-run elasticity of the dependent variables PS2. The coefficients on the lagged error correction term (ECM_{t-1}) as reported in Table 6.17 is -0.9609% and is statistically significant at 1% level. In this context, the speed of adjustment from the previous year's disequilibrium in stock returns of PS2 to the current year's equilibrium is estimated to be 96%.

The independent macroeconomic variables of GDP_t, $PI\text{-}MSIA_t$ and 2nd-lagged difference of $M2_{t-2}$ are found to be statistically significant with positive impact on the short-run stock returns of PS2. Negative and significant imparts of short-run elasticities were found for 2nd-lagged differenced terms of GDP_{t-2} and 2nd-lagged difference terms of $PI\text{-}MSIA_{t-2}$.

With regard to the independent non-macroeconomic events, $LEC1_t$ and $LNE1_t$ were significant and positive with respect to short-run stock returns of PS2. Other variables with negative and significant short-run elasticities were found for $GEC1_t$.

The diagnostic test for the model clearly indicates that normality is not violated and there is no heteroscedasticity and serial correlation is present in the residuals of the model across the sample period.

Table 6.16: Short-Run Elasticities of The Selected ARDL Model (PS2)

Dependent Variable	**ΔPS2**		
Selected ARDL Model	**2,3,1,3,3,3**		
Regressors	***Coefficient***	***Standard Error***	***t-Statistic***
Constant	-4.2559	2.1111	-2.0159
$\Delta PS2_{t-1}$	-0.1883	0.1638	-1.1496
$\Delta lnGDP_t$	**0.4299**	**0.2220**	**1.9363*******
$\Delta lnGDP_{t-1}$	-0.2099	0.2368	-0.8864
$\Delta lnGDP_{t-2}$	**-0.6357**	**0.2469**	**-2.5747***
ΔINF_t	0.0107	0.0421	0.2532
$\Delta lnM2_t$	-0.8747	0.9532	-0.9176
$\Delta lnM2_{t-1}$	-1.7779	1.3139	-1.3531
$\Delta lnM2_{t-2}$	**2.4190**	**1.1160**	**2.1675****
$\Delta lnPI\text{-}MSIA_t$	**0.0621**	**0.4396**	**2.1413****
$\Delta lnPI\text{-}MSIA_{t-1}$	-0.1998	0.4730	-0.4223
$\Delta lnPI\text{-}MSIA_{t-2}$	**-0.8449**	**0.3649**	**-2.3156****
$\Delta lnPI\text{-}US_t$	0.1691	0.2380	0.7105
$\Delta lnPI\text{-}US_{t-1}$	-0.0407	0.2326	-0.1750
$\Delta lnPI\text{-}US_{t-2}$	0.3692	0.2240	1.6481
$\Delta LEC1_t$	**0.1507**	**0.0618**	**2.4389****
$\Delta GEC1_t$	**-0.1288**	**0.0525**	**-2.4521****
$\Delta LNE1_t$	**0.2390**	**0.0542**	**4.4095***
$\Delta GNE1_t$	-0.0670	0.0496	-1.3508
ECM_{t-1}	**-0.9609**	**0.2472**	**-3.8868***

Summary Statistics		***Residual Diagnostics test (p-value)***	
R-squared	*0.6320*	*Serial Correlation*	*0.8349*
Adjusted R-squared	*0.6559*	*Normality*	*0.7444*
F-statistic	*2.2898*	*Heteroskedasticity*	*0.4929*
Prob (F-statistic)	*0.0146*		
Durbin-Watson stat	*2.0315*		

** , ** and *** denotes significance of the coefficient at 1%, 5% and 10% levels respectively*

PS3

Table 6.18 reports the results of short-run elasticities of the dependent variable PS3. The computed ECM_{t-1} is -0.9801% and is significant at 1% level implying that a deviation from the long-run equilibrium is corrected by 98% over the following year.

The GDP_t and $M2_t$ has positive coefficient linked to the stock returns of PS3. These coefficients are siginificant at 1% and 5% levels respectively. Inversely, the 1st-lagged difference of $PI\text{-}MSIA_{t-1}$ is negatively significant at 5% levels to the short-run returns of PS3.

Only two non-macroeconomic forces was significant to the returns of PS in the short-run. The independent non-macroeconomic variable of $GEC1_t$ is predictably negative with a coefficient of -0.1223% and significant at 5% level. The other variable of $LNE3_t$ have a positive and significant impact of 1% for the short-run stock returns of PS3.

Further reference to the residual diagnostic test indicates the presence of normality with no heteroscedasticity and serial correlation in the residuals of the model across the sample period.

Table 6.17: Short-Run Elasticities of The Selected ARDL Model (PS3)

Dependent Variable	**ΔPS3**		
Selected ARDL Model	**1,0,0,0,2,0**		
Regressors	***Coefficient***	***Standard Error***	***t-Statistic***
Constant	-0.4892	1.9286	-0.2537
$\Delta lnGDP_t$	**0.2201**	**0.2410**	**2.5132***
ΔINF_t	0.0155	0.0412	0.3753
$\Delta lnM2_t$	**0.0262**	**0.1634**	**2.1602****
$\Delta lnPI\text{-}MSIA_t$	-0.0146	0.3546	-0.0412
$\Delta lnPI\text{-}MSIA_{t-1}$	**-0.6324**	**0.2785**	**-2.2705****
$\Delta lnPI\text{-}US_t$	-0.1664	0.1460	-1.1398
$\Delta LEC1_t$	0.0690	0.0590	1.1705
$\Delta GEC1_t$	**-0.1223**	**0.0584**	**-2.0965****
$\Delta LNE1_t$	**0.1902**	**0.0563**	**3.3763***
$\Delta GNE1_t$	-0.0836	0.0562	-1.4873
ECM_{t-1}	**-0.9801**	**0.1589**	**-6.1691***

Summary Statistics		***Residual Diagnostics test (p-value)***	
R-squared	*0.6062*	*Serial Correlation*	*0.2000*
Adjusted R-squared	*0.4479*	*Normality*	*0.3621*
F-statistic	*2.5656*	*Heteroskedasticity*	*0.3391*
Prob (F-statistic)	*0.0111*		
Durbin-Watson stat	*1.8058*		

** , ** and *** denotes significance of the coefficient at 1%, 5% and 10% levels respectively*

AGPS

The short-run dynamics results for stock returns of AGPS is presented in Table 6.19. Estimated ECM_{t-1} is -0.8642% with 1% level of significance. The estimate significantly implies that any change in the short-run towards long-run stock returns of AGPS is corrected by 86.42% per annum. The results also find the 1st-lagged ($AGPS_{t-1}$) differences of AGPS to be negatively linked but statistically not significant.

In reference to the short-run elasticities reported for the independent macroeconomic variables, GDP_t together with $PI\text{-}MSIA_t$ and 2nd-lagged differenced terms of $M2_{t-2}$ has positive and significant effects on the stock returns of AGPS. Nonetheless, 2nd-lagged differenced terms of GDP_{t-2} gave adverse and significant effects.

The independent non-macroeconomic variables of $LEC1_t$, $GEC1$ and $LNE2_t$ were in the list of significant short-run elasticities in respect to the stock returns of AGPS. While $LEC1_t$ and $LNE2_t$ reports positive short-run effect on the returns of AGPS at 1% level, the other variable of $GEC1_t$ had had negative and significant effects at 5% level.

With regards to the residual diagnostics test values, the model has the desired econometric properties in terms of normality without the presence of autocorrelation or heteroscedasticity.

Table 6.18: Short-Run Elasticities of The Selected ARDL Model (AGPS)

Dependent Variable	**ΔAGPS**		
Selected ARDL Model	**2,3,1,3,3,1**		
Regressors	***Coefficient***	***Standard Error***	***t-Statistic***
Constant	**-3.5359**	**1.7935**	**-1.9715*******
$\Delta AGPS_{t-1}$	-0.2501	0.1572	-1.5906
$\Delta lnGDP_t$	**0.3044**	**0.1999**	**2.3224****
$\Delta lnGDP_{t-1}$	-0.0641	0.2048	-0.3132
$\Delta lnGDP_{t-2}$	**-0.5162**	**0.2197**	**-2.3490****
ΔINF_t	0.0128	0.0356	0.3587
$\Delta lnM2_t$	-0.5733	0.8516	-0.6732
$\Delta lnM2_{t-1}$	-0.7692	1.1286	-0.6816
$\Delta lnM2_{t-2}$	**2.5140**	**0.9644**	**2.6068***
$\Delta lnPI\text{-}MSIA_t$	**0.0957**	**0.3841**	**2.2491****
$\Delta lnPI\text{-}MSIA_{t-1}$	-0.5956	0.4014	-1.4837
$\Delta lnPI\text{-}MSIA_{t-2}$	-0.3414	0.2400	-1.4225
$\Delta lnPI\text{-}US_t$	0.1068	0.2073	0.5152
$\Delta LEC1_t$	**0.1034**	**0.0525**	**2.9712***
$\Delta GEC1_t$	**-0.1454**	**0.0460**	**-3.1605****
$\Delta LNE1_t$	**0.2354**	**0.0486**	**4.8431***
$\Delta GNE1_t$	-0.0558	0.0428	-1.3034
ECM_{t-1}	**-0.8642**	**0.2241**	**-3.8558***

Summary Statistics		***Residual Diagnostics test (p-value)***	
R-squared	*0.6565*	*Serial Correlation*	*0.4280*
Adjusted R-squared	*0.4343*	*Normality*	*0.7755*
F-statistic	*2.9541*	*Heteroskedasticity*	*0.4983*
Prob (F-statistic)	*0.0022*		
Durbin-Watson stat	*2.0636*		

** , ** and *** denotes significance of the coefficient at 1%, 5% and 10% levels respectively*

6.6.3.2 Short-Run Elasticities for Non-Penny Stocks

NPS1

Short-run elasticities of the dependent variable, NP1 is reported in Table 6.20. The results reveal that the estimate of ECM_{t-1} is equivalent to -0.9217 and significant at 1% level. This implies that any change in short-run towards long-run stock returns of NPS1 is corrected by 92.17% per year.

The results of the independent macroeconomic variables also indicate that a rise in GDP_t; has a positive and significant effect at 1% level on the returns of NP1. Inversely, $PI\text{-}MSIA_t$ is found to be negative and significant at 5% level on the returns of NPS1.

As for the non-macroeconomic variables, a positive and significant impact to short-run returns of NP1 is found only for $LNE1_t$ at 1% level. The other significant results which have given negative impacts are $GEC1_t$ at 10% level.

The diagnostic values of the model indicate that it has the desired econometric properties. Autocorrelation and normality is not neglected in the residuals of the model.

Table 6.19: Short-Run Elasticities of The Selected ARDL Model (NPS1)

Dependent Variable	**ΔNP1**		
Selected ARDL Model	**1,0,0,0,0,0**		
Regressors	***Coefficient***	***Standard Error***	***t-Statistic***
Constant	-0.7729	0.9282	-0.8327
$\Delta lnGDP_t$	**0.0589**	**0.1162**	**2.5069***
ΔINF_t	-0.0099	0.0210	-0.4698
$\Delta lnM2_t$	0.0939	0.0822	1.1419
$\Delta lnPI\text{-}MSIA_t$	**-0.0565**	**0.1273**	**-2.4436****
$\Delta lnPI\text{-}US_t$	-0.0629	0.0710	-0.8860
$\Delta LEC1_t$	0.0065	0.0296	0.2201
$\Delta GEC1_t$	**-0.0537**	**0.0293**	**-1.8315*****
$\Delta LNE1_t$	**0.0806**	**0.0283**	**2.8432***
$\Delta GNE1_t$	-0.0432	0.0288	-1.4977
ECM_{t-1}	**-0.9217**	**0.1298**	**-7.1003***

Summary Statistics:		***Residual Diagnostic test (p-value):***	
R-squared	*0.7820*	*Serial Correlation*	*0.3430*
Adjusted R-squared	*0.6824*	*Normality*	*0.1172*
F-statistic	*1.8852*	*Heteroskedasticity*	*0.1200*
Prob (F-statistic)	*0.0507*		
Durbin-Watson stat	*1.9808*		

*, ** and *** denotes significance of the coefficient at 1%, 5% and 10% levels respectively*

NPS2

Table 6.21 reports the short-run elasticities of the dependent variable NPS2. The coefficients on the ECM_{t-1} is -0.9659% and significant at 1% level. The result suggests that a deviation from the long-run equilibrium in the stock returns of NP2 in one year is corrected by almost 97% over the following year.

The independent macroeconomic variables, namely $PI\text{-}MSIA_t$, 1st-lagged difference of GDP_{t-1} and 2nd-lagged difference of $M2_{t-2}$ have a positive and significant effect on the stock returns of NPS2. Negative and significant short-run elasticities on the returns of NP2 are found for for 2nd-lagged difference of GDP_{t-2} and $M2_{t-2}$; 3rd -lagged difference of GDP_{t-3} and $M2_{t-3}$

The impact of $LNE1_t$ were predictably positive and significant at 1% level on the short-run stock returns of NP2 while $GEC1_t$ imposed a varying negative and significant impact.

The diagnostic test confirms the absence of heteroskedasticity and normality of the model is not neglected.

Table 6.20: Short-Run Elasticities of The Selected ARDL Model (NPS2)

Dependent Variable	**ΔNP2**		
Selected ARDL Model	**1,4,0,4,0,0**		
Regressors	***Coefficient***	***Standard Error***	***t-Statistic***
Constant	-1.9945	1.5746	-1.2667
$\Delta lnGDP_t$	**0.2084**	**0.1550**	**2.3442****
$\Delta lnGDP_{t-1}$	**0.2173**	**0.1670**	**1.9611*****
$\Delta lnGDP_{t-2}$	**-0.3799**	**0.1728**	**-2.1991****
$\Delta lnGDP_{t-3}$	**-0.3035**	**0.1610**	**-1.8850*****
ΔINF_t	-0.0167	0.0286	-0.5830
$\Delta lnM2_t$	-0.2589	0.6598	-0.3924
$\Delta lnM2_{t-1}$	0.1642	0.8348	0.1967
$\Delta lnM2_{t-2}$	**1.9547**	**0.8310**	**2.3523****
$\Delta lnM2_{t-3}$	**-1.4988**	**0.7524**	**-1.9919*****
$\Delta lnPI\text{-}MSIA_t$	**0.0380**	**0.2001**	**2.1899****
$\Delta lnPI\text{-}US_t$	-0.1355	0.1244	-1.0896
$\Delta LEC1_t$	0.0376	0.0409	0.9195
$\Delta GEC1_t$	**-0.0926**	**0.0366**	**-2.5286***
$\Delta LNE1_t$	**0.1623**	**0.0389**	**4.1711***
$\Delta GNE1_t$	-0.0055	0.0359	-0.1523
ECM_{t-1}	**-0.9659**	**0.1400**	**-6.9008***

Summary Statistics:		***Residual Diagnostic test (p-value):***	
R-squared	*0.5284*	*Serial Correlation*	*0.2336*
Adjusted R-squared	*0.4989*	*Normality*	*0.5494*
F-statistic	*2.3029*	*Heteroskedasticity*	*0.5339*
Prob (F-statistic)	*0.0157*		
Durbin-Watson stat	*2.0233*		

, ** and * denotes significance of the coefficient at 1%, 5% and 10% levels respectively*

NPS3

The short-run dynamics results for stock returns of NPS3 is presented in Table 6.22. The estimate of ECM_{t-1} is -0.9766% (significant at 1% level) which significantly suggests that a deviation from the long-run equilibrium is corrected by 97.7% over the following year.

The GDP_t and $PI\text{-}MSIA_t$ of the stock returns of NP3 is positively linked and statistically significant at 5% level. Other independent macroeconomic variables were not significant over the short-run.

The non-macroeconomic variables of $LNE1_t$; is reported to pose a positive and significant elasticity of 1% level. The other variable of $GEC1_t$ is significant at 1% level with negative short-run coefficients.

With reference to the p-values of the diagnostics test, the model has the desired econometric properties in terms of normality with no heteroscedasticity.

Table 6.21: Short-Run Elasticities of The Selected ARDL Model (NPS3)

Dependent Variable	ΔNP3		
Selected ARDL Model	1,0,0,0,0,0		
Regressors	***Coefficient***	***Standard Error***	***t-Statistic***
Constant	-1.9085	1.3076	-1.4596
$\Delta lnGDP_t$	**0.1861**	**0.1655**	**2.1246****
ΔINF_t	-0.0099	0.0296	-0.3344
$\Delta lnM2_t$	0.0888	0.1150	0.7725
$\Delta lnPI\text{-}MSIA_t$	**0.1140**	**0.1802**	**2.3326****
$\Delta lnPI\text{-}US_t$	-0.1287	0.0998	-1.2898
$\Delta LEC1_t$	0.0282	0.0416	0.6775
$\Delta GEC1_t$	**-0.1060**	**0.0415**	**-2.5516***
$\Delta LNE1_t$	**0.1362**	**0.0399**	**3.4100***
$\Delta GNE1_t$	-0.0586	0.0406	-1.4433
ECM_{t-1}	**-0.9766**	**0.1306**	**-7.4755***

Summary Statistics		***Residual Diagnostics test (p-value)***	
R-squared	*0.7831*	*Serial Correlation*	*0.1616*
Adjusted R-squared	*0.6582*	*Normality*	*0.3729*
F-statistic	*2.5390*	*Heteroskedasticity*	*0.2593*
Prob (F-statistic)	*0.0151*		
Durbin-Watson stat	*2.0425*		

** , ** and *** denotes significance of the coefficient at 1%, 5% and 10% levels respectively*

<u>**AGNPS**</u>

Table 6.23 contains the results of the short-run elasticities of the dependent variable AGNPS. Firstly, the ECM_{t-1} is -0.9724% are significant at 1% level. The coefficient of -0.9724 denotes that a deviation from the long-run equilibrium level of stock returns for AGNP in one year is corrected by 97.24% over the following year.

The independent macroeconomic variables of GDP_t and $PI\text{-}MSIA_t$ is reported to impact positively on the short-run stock returns of AGNP. These variables are statistically significant between 1% and 5% levels respectively. Other independent variables were not significant towards the short-run stock returns of AGNP.

The independent non-macroeconomic variables were observed to have mixed reactions to the short-run stock returns of AGNP. While $LNE1_t$ has a positive and significant impact at 1% level, $GEC1_t$ was negative with significance at 5% level.

The presented diagnostic values clearly indicate the presence of normality in the model. Heteroscedasticity is ruled out in the residuals of the model across the sample period.

Table 6.22: Short-Run Elasticities of The Selected ARDL Model (AGNPS)

Dependent Variable	**ΔAGNP**		
Selected ARDL Model	**1,0,0,0,0,0**		
Regressors	***Coefficient***	***Standard Error***	***t-Statistic***
Constant	-1.4782	1.1144	-1.3265
$\Delta lnGDP_t$	**0.1194**	**0.1405**	**2.8496***
ΔINF_t	-0.0075	0.0252	-0.2960
$\Delta lnM2_t$	0.1082	0.0982	1.1018
$\Delta lnPI\text{-}MSIA_t$	**0.0263**	**0.1527**	**2.1720****
$\Delta lnPI\text{-}US_t$	-0.1052	0.0851	-1.2355
$\Delta LEC1_t$	0.0169	0.0355	0.4769
$\Delta GEC1_t$	**-0.0797**	**0.0353**	**-2.2577****
$\Delta LNE1_t$	**0.1130**	**0.0340**	**3.3270***
$\Delta GNE1_t$	-0.0469	0.0346	-1.3581
ECM_{t-1}	**-0.9724**	**0.1291**	**-7.5315***

Summary Statistics		***Residual Diagnostics test (p-value)***	
R-squared	*0.9248*	*Serial Correlation*	*0.3105*
Adjusted R-squared	*0.7522*	*Normality*	*0.5196*
F-statistic	*2.2985*	*Heteroskedasticity*	*0.3607*
Prob (F-statistic)	*0.0268*		
Durbin-Watson stat	*1.9995*		

** , ** and *** denotes significance of the coefficient at 1%, 5% and 10% levels respectively*

6.6.3.3 Summary of Short-Run Elasticities of Variables

The summary of short-run dynamic impact of independent variables (macroeconomic determinants and non-macroeconomic forces) on dependent variables (penny and non-penny stocks' portfolios) is shown in Table 6.24, Table 6.25 and Table 6.26. The coefficient of the error correction term (ECM_{t-1}) for all dependent variables are significant at 1% level, thus verifying the short-run relationship between the dependent and independent variables of this research (Hypothesis 5c and 5d). Highly significant negative sign of the ECM_{t-1} reinforces the existence of long-run relationship among the variables (results from the bounds test for cointegration). The speed of adjustment from previous year's disequilibrium in the returns of penny and non-penny stock to current year's equilibrium is between 95% to 98%.

Macroeconomic determinants of *GDP* are found to have positive short-run dynamics on the returns of penny and non-penny stocks. The other contending variable with strong positive short-run returns of penny and non-penny stocks. is the price index of Malaysia (*PI-MSIA*). The remaining independent variables garnered mixed reaction to the short-run dynamics of penny and non-penny stocks' returns. The non-macroeconomic forces comprising of *LEC1* and *LNE1* have positive effects to the returns of penny and non-penny stocks in the short-run while *GEC1* and *GNE1* have significant negative effects. The results of the short-run dynamics in relation to the returns of stock returns of Malaysia simply shows that Malaysian stock players are least interested in the global affairs and events in their stock investments.

On a brief note to the diagnostics test, the presence of normality is enhanced and there is no neglected autocorrelation or heteroscedasticity present in the residuals of the models across the sample period. Hence, the outcome clearly indicates that all models in the analysis have the desired econometric properties.

Table 6.23: Comparison of Short-Run Elasticities Between Variables

	Variables	*Short-Run Positive Elasticities*								*Short-Run Negative Elasticities*							
		PS1	**PS2**	**PS3**	**AGPS**	**NPS1**	**NPS2**	**NPS3**	**AGNPS**	**PS1**	**PS2**	**PS3**	**AGPS**	**NPS1**	**NPS2**	**NPS3**	**AGNPS**
PF	***$PS1_{t-1}$***									-0.2058							
	$PS2_{t-1}$										-0.1883						
	$AGPS_{t-1}$												-0.2501				
MA	***GDP_t***	**0.1095***	**0.4299*****	**0.2201***	**0.3044****	**0.0589***	**0.2084****	**0.1861****	**0.1194***								
	GDP_{t-1}						**0.2173*****				-0.2099		-0.0641				
	GDP_{t-2}										**-0.6357***		**-0.5162****		**-0.3799****		
	GDP_{t-3}														**-0.3035*****		
	INF_t		0.0107	0.0155	0.0128					-0.0125				-0.0099	-0.0167	-0.0099	-0.0075
	$M2_t$			**0.0262****		0.0939		0.0888	0.1082	-0.4330	-0.8747		-0.5733		-0.2589		
	$M2_{t-1}$	**1.4684*****					0.1642				-1.7779		-0.7692				
	$M2_{t-2}$				**2.5140***		**1.9547****										
	$M2_{t-3}$		**2.4190****												**-1.4988*****		
	$PI\text{-}MSIA_t$	**0.5648****	**0.0621****		**0.0957****		**0.0380***	**0.1140****	**0.0263****			-0.0146		**-0.0565****			
	$PI\text{-}MSIA_{t-1}$									**-0.7353***	-0.1998	**-0.6324****	-0.5956				
	$PI\text{-}MSIA_{t-2}$										**-0.8449****		-0.3414				
	$PI\text{-}US_t$		0.1691		0.1068					-0.0379		-0.1664		-0.0629	-0.1355	-0.1287	-0.1052
	$PI\text{-}US_{t-1}$										-0.0407						
	$PI\text{-}US_{t-2}$		0.3692														
NMA	***$LEC1_t$***	0.0309	**0.1507****	0.0690	**0.1034***	0.0065	0.0376	0.0282	0.0169								
	$GEC1_t$									**-0.1362***	**-0.1288****	**-0.1223****	**-0.1454****	**-0.0537*****	**-0.0926***	**-0.1060***	**-0.0797****
	$LNE1_t$	**0.1681***	**0.2390***	**0.1902***	**0.2354***	**0.0806***	**0.1623***	**0.1362***	**0.1130***								
	$GNE1_t$									**-0.0941***	-0.0670	-0.0836	-0.0558	-0.0432	-0.0055	-0.0586	-0.0469
ECM_{t-1}										**-0.9818***	**-0.9609***	**-0.9801***	**-0.8642***	**-0.9217***	**-0.9659***	**-0.9766***	**-0.9724***

**** , ** and *** denotes significance of the coefficient at 1% , 5% and 10% levels respectively***

Table 6.24: Summary of Short-Run Elasticities of Variables for Penny Stocks

Description of Portfolios		*Variables*	*Short-Run Positive Elasticities*	*Short-Run Negative Elasticities*	ECM_{t-1}
PS1 *(RM0.22 < Pr ≤ RM0.31)*	**High** priced PS	**PF**		$PS1_{t-1}$	**-0.9818***
		MA	$\mathbf{GDP_t}^{*}$; $\mathbf{M2_{t-1}}^{***}$ $\mathbf{PI\text{-}MSIA_t}^{**}$ $PI\text{-}US_t$	INF_t ; $M2_t$; $\mathbf{PI\text{-}MSIA_{t-1}}^{*}$; $PI\text{-}US_t$	
		NMA	$LEC1_t$; $\mathbf{LNE_t}^{*}$	$\mathbf{GEC1_t}^{*}$; $\mathbf{GNE1_t}^{*}$	
PS2 *(RM0.12 < Pr ≤ RM0.21)*	**Medium** priced PS	**PF**		$PS2_{t-1}$	**-0.9609***
		MA	$\mathbf{GDP_t}^{**}$; INF_t ; $\mathbf{M2_{t-3}}^{**}$ $\mathbf{PI\text{-}MSIA_t}^{**}$; $PI\text{-}US_t$; $PI\text{-}US_{t-2}$	GDP_{t-1} ; $\mathbf{GDP_{t-2}}^{*}$ $M2_t$; $M2_{t-1}$; $PI\text{-}MSIA_{t-1}$ $PI\text{-}MSIA_{t-2}$; $PI\text{-}US_t$	
		NMA	$\mathbf{LEC1_t}^{**}$; $\mathbf{LNE_t}^{*}$	$\mathbf{GEC1_t}^{**}$; $GNE1_t$	
PS3 *(Pr ≤ RM0.11)*	**Lowest** priced PS	**PF**			**-0.9801***
		MA	$\mathbf{GDP_t}^{*}$; INF_t ; $\mathbf{M2_t}^{**}$	$PI\text{-}MSIA_t$; $\mathbf{PI\text{-}MSIA_{t-1}}^{**}$ $PI\text{-}US_t$	
		NMA	$LEC1_t$; $\mathbf{LNE_t}^{*}$	$\mathbf{GEC1_t}^{**}$; $GNE1_t$	
AGPS *(Pr ≤ RM0.31)*	**Assignment of all PS**	**PF**		$AGPS_{t-1}$	**-0.8642***
		MA	$\mathbf{GDP_t}^{**}$; INF_t ; $\mathbf{M2_{t-2}}^{*}$	$\mathbf{GDP_{t-1}}$; $\mathbf{GDP_{t-2}}^{**}$; $M2_t$ $M2_{t-1}$; $PI\text{-}MSIA_{t-1}$; $PI\text{-}MSIA_{t-2}$	
		NMA	$\mathbf{LEC1_t}^{*}$; $\mathbf{LNE_t}^{*}$	$\mathbf{GEC1_t}^{**}$; $GNE1_t$	

* , ** and *** *denotes significance of the coefficient at 1 percent, 5 percent and 10 percent levels respectively*

Table 6.25: Summary of Short-Run Elasticities of Variables for Non-Penny Stocks

Description of Portfolios		*Variables*	*Short-Run Positive Elasticities*	*Short-Run Negative Elasticities*	ECM_{t-1}
NPS1 *(Quintile portfolio)*	**Highest mean** priced NPS	**MA**	$\mathbf{GDP_t}^{*}$; $M2_t$	INF_t ; $\mathbf{PI\text{-}MSIA_t}^{**}$ $PI\text{-}US_t$	**-0.9217***
		NMA	$LEC1_t$; $\mathbf{LNE_t}^{*}$	$\mathbf{GEC1_t}^{*}$; $GNE1_t$	
NPS2 *(Quintile portfolio)*	**Medium mean** priced NPS	**MA**	$\mathbf{GDP_t}^{**}$; $\mathbf{GDP_{t-1}}^{***}$; $M2_{t-1}$; $\mathbf{M2_{t-2}}^{**}$; $\mathbf{PI\text{-}MSIA_t}^{*}$	$\mathbf{GDP_{t-2}}^{**}$; $\mathbf{GDP_{t-3}}^{**}$; INF_t ; $M2_t$; $M2_{t-3}$; $PI\text{-}US_t$	**-0.9659***
		NMA	$LEC1_t$; $\mathbf{LNE_t}^{*}$	$\mathbf{GEC1_t}^{*}$; $GNE1_t$	
NPS3 *(Quintile portfolio)*	**Lowest mean** priced NPS	**MA**	$\mathbf{GDP_t}^{**}$; $M2_t$; $\mathbf{PI\text{-}MSIA_t}^{**}$	INF_t ; $PI\text{-}US_t$;	**-0.9766***
		NMA	$LEC1_t$; $\mathbf{LNE_t}^{*}$	$\mathbf{GEC1_t}^{*}$; $GNE1_t$	
AGNPS *(Pr > RM0.31)*	**Assignment of all NPS**	**MA**	$\mathbf{GDP_t}^{*}$; $M2_t$; $\mathbf{PI\text{-}MSIA_t}^{*}$	INF_t ; $PI\text{-}US_t$;	**-0.9724***
		NMA	$LEC1_t$; $\mathbf{LNE_t}^{*}$	$\mathbf{GEC1_t}^{*}$; $GNE1_t$	

**** , ** and *** denotes significance of the coefficient at 1 percent, 5 percent and 10 percent levels respectively***

6.6.4 Stability Test

The stability of the long- and short-run coefficients was tested using cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMsq) techniques presented by Brown et al. (1975). Figures 6.1 to Figure 6.4 present the graphs of the CUSUM and CUSUMsq tests for penny and non-penny stocks respectively. The plots of CUSUM and CUSUMsq statistics for both penny and non-penny stocks are well within the straight lines representing the critical bounds at 5% significance level, implying that all coefficients in the ECM are relatively stable and the null hypothesis cannot be rejected. Additionally, following Bahmani-Oskooee and Nasir (2004), it can be concluded that the empirical equations of penny and non-penny stocks in the ARDL estimates are correctly specified too.

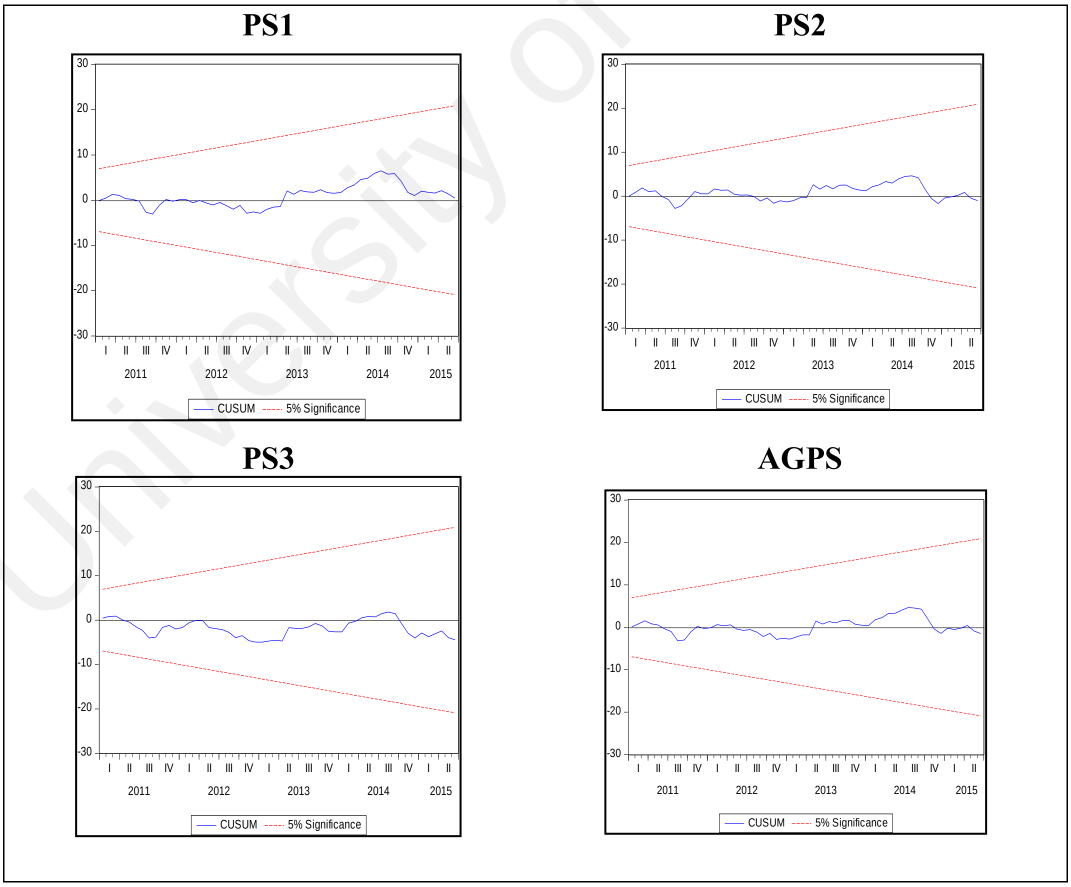


Figure 6.1: Plot of CUSUM for Penny Stocks

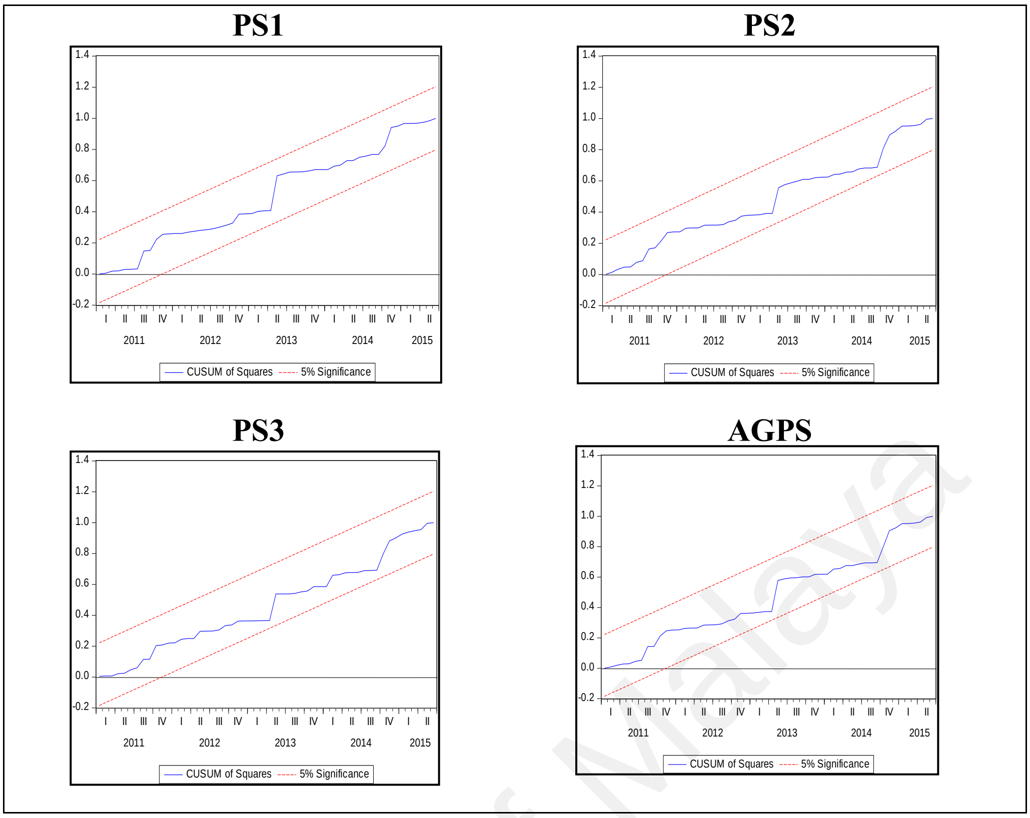


Figure 6.2: Plot of CUSUMsq for Penny Stocks

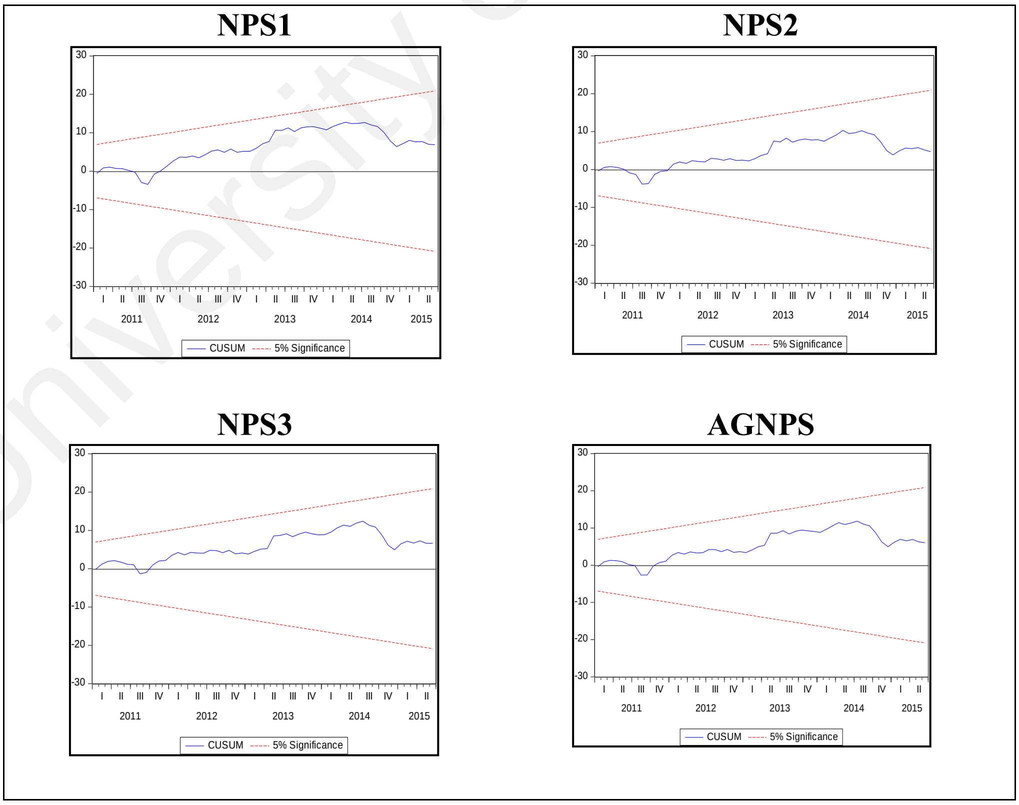


Figure 6.3: Plot of CUSUM for Non-Penny Stocks

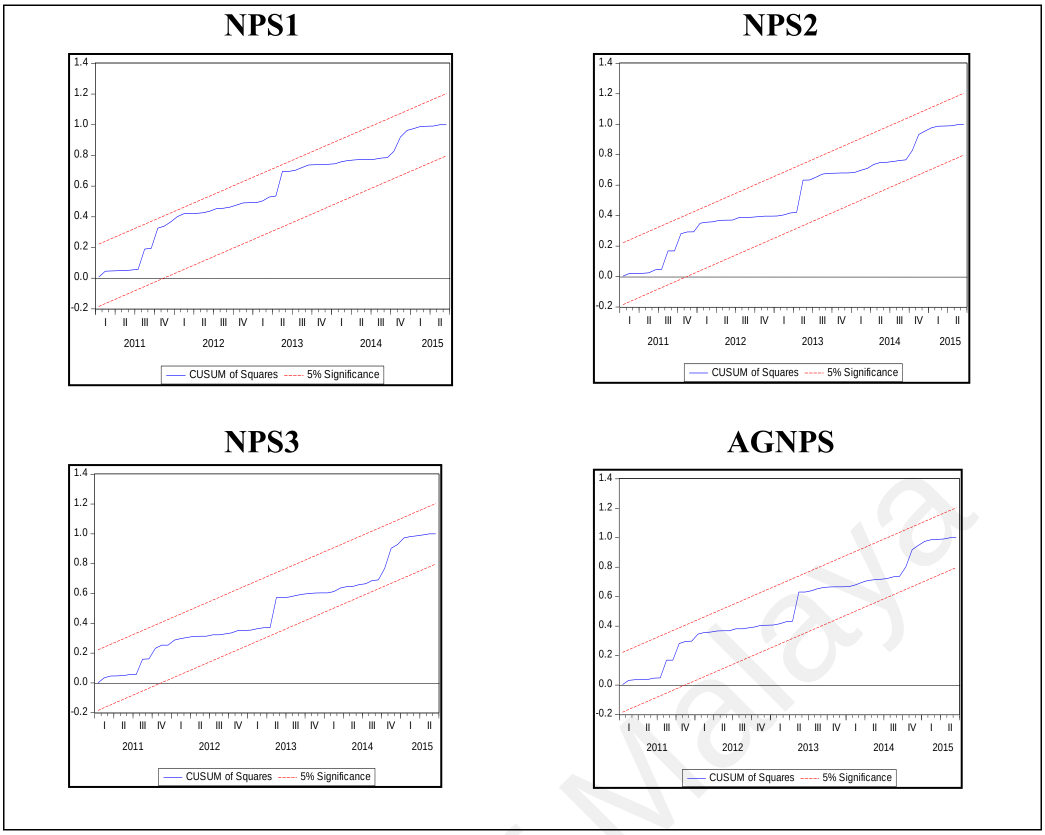


Figure 6.4: Plot of CUSUMsq for Non-Penny Stocks

6.6.5 VECM Granger Causality Analysis

The Granger causality test was performed to ascertain the existence of cointegration among the dependent and independent variables. The existence of a cointegrating relationship among the variables suggested that there must be Granger causality in at least one direction, but did not indicate the direction of temporal causality between them. Both the short- and long-run Granger causality between the variables were examined in this section.

The lag order of equation 7.1(a-d) and 7.2(a-d) is 1 under *Schwarz Information Criterion* (refer to Tables 6.9 and Table 6.10) and significance of the differenced variables can be measured directly through the corresponding *t*-statistics. The results of the short-run Granger-causality are presented in Table 6.27 to Table 6.34 for each penny and non-penny stocks' portfolios.

6.6.5.1 Granger Causality Analysis for Penny Stocks

PS1

The Granger causality analysis for PS1 is shown in Table 6.26. For the equation of PS1, statistical significance is noted for $PS1_{t-1}$, GDP_{t-1}, $M2_{t-1}$, $PI\text{-}MSIA_{t-1}$, $GEC1_{t}$, $LNE1_{t}$ and $GNE1_{t}$ and Granger-cause to the returns of PS1 in the short-run. Comparatively, *PS1* is statistically significant and Granger-cause in the equations of *GDP* and *PI-MSIA* in the short-run. Correspondingly, while *GDP* and *PI-MSIA* have displayed a bidirectional causality with the returns of PS1 in the short-run, other variables of $PS1_{t-1}$,$M2_{t-1}$, $GEC1_{t}$, $LNE1_{t}$ and $GNE1_{t}$ have collectively shown a short-run unidirectional causality to the returns of PS1.

The existence of unidirectional causality from all independent variables to the returns of PS1 in the short-run is confirmed with the statistically significant ECT_{t-1} at 1% level and with coefficient of -0.4524%.

The residual diagnostics test of LM has a probability Chi-Square of more than 0.05, thus we cannot reject the null hypothesis and conclude that there is no evidence of serial correlation in the equation of PS1 in the short-run.

Table 6.26: Short Run Granger Causality Analysis (PS1)

Sources of Causation		Variables					
		ΔPS1$_t$	**ΔGDP$_t$**	**ΔINF$_t$**	**ΔM2$_t$**	**ΔPI-MSIA$_t$**	**ΔPI-US$_t$**
Short-Run	***ECT_{t-1}***	**-0.4524* [-0.1503]**	**0.3893* [-0.1266)**	0.0065 [-0.8846]	0.0272 [-0.0318]	**0.3555* [-0.0852]**	0.1537 [-0.1282]
Macroeconomic Variables	**ΔPS1$_{t-1}$**	**-0.4550* [-0.1239]**	**-0.3794* [-0.1043)**	-0.2707 [-0.7291]	-0.0416 [-0.0262]	-0.0077 [-0.0702]	0.1449 [-0.1057]
	ΔGDP$_{t-1}$	**-0.1658** [-0.1411]**	**-0.3699* [-0.1189]**	-0.2702 [-0.8308]	0.0171 [-0.0299]	**0.2765* [-0.0800]**	0.1245 [-0.1204
	ΔINF$_{t-1}$	0.0110 [-0.0303]	-0.0485 [-0.0255]	-0.3065 [-0.1781]	0.0007 [-0.0064]	-0.0223 [-0.0172]	-0.0250 [-0.0258]
	ΔM2$_{t-1}$	**1.8388* [-0.7127]**	-0.6358 [-0.6004]	2.7191 [-4.1953]	-0.0424 [-0.1508]	-0.3568 [-0.4041	-0.5710 [-0.6082]
	ΔPI-MSIA$_{t-1}$	**-1.0173* [-0.2373]**	**-0.5371* [-0.1999]**	-0.1244 [-1.3968]	-0.0503 [-0.0502]	0.0383 [-0.1346]	**0.6463* [-0.2025]**
	ΔPI-US$_{t-1}$	-0.1522 [-0.1729]	-0.0287 [-0.1457]	0.0096 [-1.0178]	0.0012 [-0.0366]	0.0007 [-0.0980]	**-0.3244* [-0.1476]**
Non-Macroeconomic Forces	**LEC1$_t$**	0.0425 [-0.0506]	0.0620 [-0.0426]	0.1568 [-0.2979]	-0.0146 [-0.0107]	-0.0034 [-0.0287]	-0.0231 [-0.0432]
	GEC1$_t$	**-0.1632* [-0.0433]**	0.0000 [-0.0365]	0.0973 [-0.2548	-0.0014 [-0.0092]]	0.0274 [-0.0245]	0.0478 [-0.0369]
	LNE1$_t$	**0.1944* [-0.0404]**	0.0112 [-0.0340]	0.1780 [-0.2377]	0.0041 [-0.0086]	0.0316 [-0.0229]	0.0045 [-0.0345]
	GNE1$_t$	**-0.0877* [-0.0418]**	0.0123 [-0.0352]	-0.0485 [-0.2461]	-0.0034 [-0.0089	0.0012 [-0.0237]	-0.0289 [-0.0357]
Diagnostics	***Breusch-Godfrey Serial Correlation LM Test:***						
	F-statistic	*0.0805*		*Prob. F(1,45)*		*0.7780*	
	*Obs*R-squared*	*0.1035*		***Prob. Chi-Square(1)***		***0.7476***	

, ** and *** denotes significance of the coefficient at 1%, 5% and 10% levels respectively
The numbers in parentheses are standard errors.

PS2

Table 6.27 reports the Granger analysis for $PS2_{t-1}$, GDP_{t-1}, $PI\text{-}MSIA_{t-1}$, $GEC1_t$ and $LNE1_t$ returned significant in the equation of PS2 and constitutes as Granger-cause to the short-run returns of PS2. Inversely $PS2_t$ is statistically significant at 1% level and Granger-cause in the equations of *GDP* and *PI-MSIA* in the short-run, thus depicting a bidirectional causality between *PS2*, *GDP* and *PI-MSIA*. Nonetheless, $PS2_{t-1}$, $GEC1_t$ and $LNE1_t$ has a significant unidirectional causality in the short-run leading to the returns of PS2.

The ECT_{t-1} has a coefficient of -0.4280% and significant at 1% level, and this confirms the existence of unidirectional causality from all independent variables to the returns of PS2 in the short-run.

The residual diagnostics test of LM has a probability Chi-Square of 0.8667 is more than 0.05, thus we cannot reject the null hypothesis and conclude that there is no evidence of serial correlation in the equation of PS2 in the short-run.

Table 6.27: Short Run Granger Causality Analysis (PS2)

Sources of Causation		Variables					
		$\Delta PS2_t$	ΔGDP_t	ΔINF_t	$\Delta M2_t$	$\Delta PI\text{-}MSIA_t$	$\Delta PI\text{-}US_t$
Short-Run	ECT_{t-1}	**-0.4280* [-0.1367]**	**0.2461* [-0.1001]**	-0.7351 [-0.6463]	-0.0309 [-0.0240]	**0.1641* [-0.0717]**	**0.2068* [-0.0930]**
Macroeconomic Variables	$\Delta PS2_{t-1}$	**-0.4973* [-0.1261]**	**-0.2293 [-0.0924]**	-0.0919 [-0.5962]	0.0089 [-0.0222]	0.0946 [-0.0662]	0.1006 [-0.0858]
	ΔGDP_{t-1}	**-0.3412** [-0.1733]**	**-0.3994* [-0.1269]**	-0.5506 [-0.8190]	-0.0144 [-0.0304]	**0.1913** [-0.0909]**	0.1454 [-0.1178]
	ΔINF_{t-1}	0.0307 [-0.0400]	**-0.0719* [-0.0293]**	-0.2028 [-0.1893]	0.0042 [-0.0070]	-0.0400 [-0.0210]	-0.0509 [-0.0272]
	$\Delta M2_{t-1}$	0.8366 [-0.8784]	-0.6109 [-0.6433]	1.8681 [-4.1521]	-0.1389 [-0.1543]	-0.2143 [-0.4609]	-0.2359 [-0.5973]
	$\Delta PI\text{-}MSIA_{t-1}$	**-1.1452* [-0.2874]**	**-0.4572* [-0.2105]**	-0.1932 [-1.3584]	-0.0296 [-0.0505]	0.1493 [-0.1508]	**0.6906* [-0.1954]**
	$\Delta PI\text{-}US_{t-1}$	-0.0611 [-0.2095]	0.0151 [-0.1534]	0.0839 [-0.9901]	0.0240 [-0.0368]	0.0218 [-0.1099]	**-0.3579* [-0.1424]**
Non-Macroeconomic Forces	$LEC1_t$	0.0824 [-0.0617]	0.0544 [-0.0452	0.1610 [-0.2916]	-0.0135 [-0.0108]	-0.0051 [-0.0324]	-0.0252 [-0.0420]
	$GEC1_t$	**-0.1163** [-0.0536]**	0.0034 [-0.0392	0.0234 [-0.2532]	-0.0013 [-0.0094]	0.0326 [-0.0281]	0.0590 [-0.0364]
	$LNE1_t$	**0.1664* [-0.0490]**	0.0052 [-0.0359]	0.1662 [-0.2317]	0.0034 [-0.0086]	0.0305 [-0.0257]	0.0070 [-0.0333]
	$GNE1_t$	-0.0558 [-0.0511]	0.0105 [-0.0374]	-0.0592 [-0.2415]	-0.0068 [-0.0090]	0.0003 [-0.0268]	-0.0229 [-0.0348]
Diagnostics	***Breusch-Godfrey Serial Correlation LM Test:***						
	F-statistic	*0.0219*		*Prob. F(1,45)*	*0.8831*		
	*Obs*R-squared*	*0.0281*		***Prob. Chi-Square(1)***	***0.8667***		

**** , ** and *** denotes significance of the coefficient at 1%, 5% and 10% levels respectively***
The numbers in parentheses are standard errors.

PS3

The Granger causality analysis involving PS3 is reported in Table 6.28. In the equation leading from PS3, macroeconomic indicators of $PS3_{t-1}$, GDP_{t-1}, $M2_{t-1}$, $PI\text{-}MSIA_{t-1}$, together with non-macroeconomic forces of $GEC1_t$ and $LNE1_t$ were statistically significant and Granger-cause the returns of PS3 in short-run. $PS3_t$ is reportedly significant at 1% level and Granger-cause in the equations of *GDP* and *PI-MSIA*. As such, we can conclude that while $PS3_{t-1}$, $M2_{t-1}$, $GEC1_t$ and $LNE1_t$ portrays a unidirectional Granger-causality to the returns of PS3 in the short-run while a bidirectional causality is noted for *GDP* and *PI-MSIA* in relation to the returns of PS3.

The results further report that the ECT_{t-1} coefficient is -0.5192% with 1% level significance which clearly implies the existence of unidirectional short-run causality from all selected macroeconomic and non-macroeconomic variables to the returns of PS3.

The residual diagnostics test of LM is more than 0.05, thus we cannot reject the null hypothesis and conclude that there is no evidence of serial correlation in the equation of PS3 in the short-run.

Table 6.28: Short Run Granger Causality Analysis (PS3)

Sources of Causation		Variables					
		ΔPS3$_t$	**ΔGDP$_t$**	**ΔINF$_t$**	**ΔM2$_t$**	**ΔPI-MSIA$_t$**	**ΔPI-US$_t$**
Short-Run	***ECT$_{t-1}$***	**-0.5192* [-0.1361[**	**0.2266* [-0.0855]**	-0.7713 [-0.5677]	-0.0165 [-0.0213]	**0.1807* [-0.0627]**	**0.1697* [-0.0843]**
Macroeconomic Variables	**ΔPS3$_{t-1}$**	**-0.3640* [-0.1400]**	**-0.2919* [-0.0879]**	-0.0938 [-0.5843]	-0.0084 [[-0.0219]	0.0683 [-0.0646]	0.1035 [-0.0868]
	ΔGDP$_{t-1}$	**-0.5023* [-0.1943]**	**-0.3755* [-0.1219]**	-0.6535 [-0.8104]	-0.0052 [-0.0304]	**0.2313* [-0.0895]**	0.1569 [-0.1204]
	ΔINF$_{t-1}$	0.0433 [-0.0429]	**-0.0590* [-0.0269]**	-0.2184 [-0.1793]	0.0026 [-0.0067]	**-0.0362*** [-0.0198]**	-0.0411 [-0.0266]
	ΔM2$_{t-1}$	**1.9498* [-0.9967]**	-0.4317 [-0.6258]	2.0207 [-4.1579]	-0.0961 [-0.1560]	-0.2253 [-0.4593]	-0.3421 [-0.6176]
	ΔPI-MSIA$_{t-1}$	**-1.6076* [-0.321]1**	**-0.4870* [-0.2020]**	-0.2246 [-1.3420]	-0.0390 [-0.0503]	0.1387 [-0.1482]	**0.6888* [-0.1993]**
	ΔPI-US$_{t-1}$	0.2344 [-0.2475]	-0.0752 [-0.1554]	-0.0901 [-1.0326]	0.0094 [-0.0387]	0.0644 [-0.1140]	-0.2914 [-0.1533]
Non-Macroeconomic Forces	**LEC1$_t$**	0.1052 [-0.0693]	0.0687 [-0.0435]	0.2182 [-0.28941	-0.0124 [-0.0108]	-0.0246 [-0.0319]	-0.0463 [-0.0429]
	GEC$_t$	**-0.1268* [-0.0606]**	-0.0101 [-0.0380]	0.0069 [-0.2530]	-0.0026 [-0.0095]	0.0338 [-0.0279]	0.0587 [-0.0376]
	LNE$_t$	**0.2051* [-0.0551]**	0.0094 [-0.03461]	0.1557 [-0.2299]	0.0031 [-0.0086]	0.0321 [-0.0254]	0.0080 [-0.0341]
	GNE$_t$	-0.0631 [-0.0581]	0.0226 [-0.0365]	-0.0488 [-0.2427]	-0.0049 [-0.0091]	-0.0010 [-0.0268]	-0.0275 [-0.0361]
Diagnostics	***Breusch-Godfrey Serial Correlation LM Test:***						
	F-statistic		*0.0558*		*Prob. F(1,45)*	*0.8143*	
	*Obs*R-squared*		*0.0719*		***Prob. Chi-Square(1)***	***0.7886***	

**** , ** and *** denotes significance of the coefficient at 1%, 5% and 10% levels respectively***
The numbers in parentheses are standard errors.

AGPS

The final Granger analysis involving AGPS is presented in Table 6.29. Based on the reported significance in the AGPS equation, $AGPS_{t-1}$, GDP_{t-1}, $M2_{t-1}$, $PI\text{-}MSIA_{t-1}$, together with non-macroeconomic forces of $GEC1_t$ and $LNE1_t$ is a Granger-cause to the returns of AGPS in the short-run. Inversely, $AGPS_t$ is significant and a Granger-cause in the equations of GDP_t and $PI\text{-}MSIA_t$, thus we note a bidirectional causality from *GDP* ; *PI-MSIA* with AGPS. The other variables of $AGPS_{t-1}$, $M2_{t-1}$, $GEC1_t$ and $LNE1_t$ displays a unidirectional Granger-causality to the short-run returns of AGPS.

In conclusion, the ECT_{t-1} was significant at 1% level with a coefficient of -0.4278, paving the existence of a unidirectional causality from all the independent macroeconomic and non-macroeconomic variables to the returns of AGPS in the short-run.

As for the residual diagnostics test of LM, the Chi-Square is more than 0.05, thus there is no evidence of serial correlation in the equation of AGPS in the short-run.

Table 6.29: Short Run Granger Causality Analysis (AGPS)

Sources of Causation		Variables					
		ΔAGPS$_t$	**ΔGDP$_t$**	**ΔINF$_t$**	**ΔM2$_t$**	**ΔPI-MSIA$_t$**	**ΔPI-US$_t$**
Short-Run	***ECT$_{t-1}$***	**-0.4278*** **-0.1361**	**0.3241*** **-0.1093**	-0.6191 -0.7434	-0.0126 -0.0276	**0.2457*** **-0.0765**	0.1983 -0.1063
Macroeconomic Variables	**ΔAGPS$_{t-1}$**	**-0.5015*** **[-0.1260]**	**-0.3421*** **[-0.1012]**	-0.1322 [-0.6881]	-0.0116 [-0.0255]	0.0686 [-0.0708]	0.1307 [-0.0984]
	ΔGDP$_{t-1}$	**-0.2903***** **[-0.1531]**	**-0.3541*** **[-0.1230]**	-0.5084 [-0.8362]	-0.0012 [-0.0310]	**0.2353*** **[-0.0860]**	0.1418 [-0.1196]
	ΔINF$_{t-1}$	0.0234 [-0.0334]	**-0.0631*** **[-0.0268]**	-0.2501 [-0.1824]	0.0019 [-0.0068]	**-0.0375*** **[-0.0188]**	-0.0402 [-0.0261]
	ΔM2$_{t-1}$	**1.5958*** **[-0.7691]**	-0.4806 [-0.6176]	2.3769 [-4.2003]	-0.0856 -0.1557]	-0.2701 [-0.4320]	-0.4271 [-0.6009]
	ΔPI-MSIA$_{t-1}$	**-1.2201*** **[-0.2515]**	**-0.5109*** **[-0.2020]**	-0.1508 [-1.3736]	-0.0384 [-0.0509]	0.1257 [-0.1413]	**0.6865*** **[-0.1965]**
	ΔPI-US$_{t-1}$	-0.0588 [-0.1864]	-0.0423 [-0.1497]	0.0136 [-1.0179]	0.0121 [-0.0377]	0.0320 [-0.1047]	**-0.3198*** **[-0.1456]**
Non-Macroeconomic Forces	**LEC1$_t$**	0.0782 [-0.0537]	0.0594 [-0.0431]	0.1706 [-0.2932]	-0.0139 [-0.0109]	-0.0117 [-0.0302]	-0.0310 [-0.0419]
	GEC$_t$	**-0.1410*** **[-0.0468]**	-0.0030 [-0.0376]	0.0373 [-0.2555]	-0.0021 [-0.0095]	0.0358 [-0.0263]	0.0597 [-0.0366]
	LNE$_t$	**0.1866*** **[-0.0428]**	0.0077 [-0.0344]	0.1672 [-0.2338]	0.0034 [-0.0087]	0.0310 [-0.0240]	0.0066 [-0.0334]
	GNE$_t$	-0.0634 [-0.0448]	0.0183 [-0.0360]	-0.0485 [-0.2449]	-0.0048 [-0.0091]	-0.0008 [-0.0252]	-0.0284 [-0.0350]
Diagnostics	***Breusch-Godfrey Serial Correlation LM Test:***						
	F-statistic		*0.0283*	*Prob. F(1,45)*		*0.8672*	
	*Obs*R-squared*		*0.0364*	***Prob. Chi-Square(1)***		***0.8486***	

, ** and *** denotes significance of the coefficient at 1%, 5% and 10% levels respectively
The numbers in parentheses are standard errors.

6.6.5.2 Granger Causality Analysis for Non-Penny Stocks

NPS1

The short- and long-run Granger causality analysis for the dependent variable NPS1 is reported in Table 6.30. The first section reports the short-run effects of macroeconomic and non-macroeconomic variables. GDP_{t-1} ; $M2_{t-1}$; $PI\text{-}MSIA_{t-1}$; $GEC1_t$; and $LNE1_t$ are statistically significant in the NPS1 equation and Granger-cause to the returns of NPS1 in the short-run between 1% and 5% levels. Inversely, $NP1_t$ has a statistical short-run significant and Granger-cause in the GDP_t, $M2_t$ and $PI\text{-}MSIA_t$ equations. In sum, while there is a unidirectional Granger-causality from $GEC1_t$; and $LNE1_t$ to the stock returns of NP1 in the short-run, while a bidirectional causality is found for GDP_t , $M2_t$ and $PI\text{-}MSIA_t$.

Referring to the short-run causality results, the significance of the ECT_{t-1} at 1% level in the NPS1 equation provides the existence of a unidirectional long-run causality from all the independent macroeconomic and non-macroeconomic variables to the returns of NPS1.

As for the residual diagnostics test of LM, the Chi-Square is more than 0.05. There is no evidence of serial correlation in the equation of AGPS in the short-run.

Table 6.30: Short Run Granger Causality Analysis (NPS1)

Sources of Causation		Variables					
		$\Delta NP1_t$	ΔGDP_t	ΔINF_t	$\Delta M2_t$	$\Delta PI\text{-}MSIA_t$	$\Delta PI\text{-}US_t$
Short-Run	ECT_{t-1}	**-0.5727** [-0.2707]**	**0.7978* [-0.3460]**	0.0899 [-0.0823]	**4.8659* [-2.1462]**	**1.0616* [-0.1383]**	0.4610 [-0.3013]
Macroeconomic Variables	$\Delta NP1_{t-1}$	-0.2390 [-0.2432]	**-0.7414* [-0.3108]**	**-4.0490** [-1.9281]**	-0.0592 [-0.0740]	**-0.2572** [-0.1242]**	0.2159 [-0.2707]
	ΔGDP_{t-1}	**-0.1459** [-0.0894]**	**-0.5812* [-0.1142]**	-0.4663 [-0.7087]	-0.0051 [-0.0272]	0.0533 [-0.0457]	0.0152 [-0.0995]
	ΔINF_{t-1}	-0.0189 [-0.0214]	-0.0400 [-0.0274]	-0.2709 [-0.1698]	0.0008 [-0.0065]	-0.0099 [-0.0109]	-0.0192 [-0.0238]
	$\Delta M2_{t-1}$	**1.0282** [-0.4947]**	-0.8747 [-0.6323]	3.7409 [-3.9227]	-0.0769 [-0.1505]	0.1301 [-0.2527]	-0.0974 [-0.5507]
	$\Delta PI\text{-}MSIA_{t-1}$	**-0.4178** [-0.2401]**	**-0.8960* [-0.3069]**	-3.1335 [-1.9036]	-0.0809 [-0.0730]	-0.3418 [-0.1226]	0.5624 [-0.2672]
	$\Delta PI\text{-}US_{t-1}$	0.0048 [-0.1287]	-0.0254 [-0.1645]	-0.6285 [-1.0207]	0.0111 [-0.0392]	0.0145 [-0.0658]	**-0.2825*** [-0.1433]**
Non-Macroeconomic Forces	$LEC1_t$	0.0222 [-0.0361]	0.0572 [-0.0461]	0.1350 [-0.2860]	-0.0138 [-0.0110]	0.0124 [-0.0184]	-0.0055 [-0.0402]
	$GEC1_t$	**-0.0575** [-0.0304]**	0.0013 [-0.0388]	0.0997 [-0.2409]	0.0014 [-0.0092]	0.0247 [-0.0155]	0.0470 [-0.0338]
	$LNE1_t$	**0.0791* [-0.0287]**	-0.0050 [-0.0367]	0.1137 [-0.2275]	0.0025 [-0.0087]	0.0132 [-0.0147]	-0.0031 [-0.0319]
	$GNE1_t$	-0.0246 [-0.0296]	0.0077 [-0.0379]	0.0152 [-0.2350]	-0.0052 [-0.0090]	0.0044 [-0.0151]	-0.0276 [-0.0330]
Diagnostics	***Breusch-Godfrey Serial Correlation LM Test:***						
	F-statistic	*2.2300*		*Prob. F(1,45)*	*0.1423*		
	*Obs*R-squared*	*2.7384*		***Prob. Chi-Square(1)***	***0.1198***		

**** , ** and *** denotes significance of the coefficient at 1%, 5% and 10% levels respectively***
The numbers in parentheses are standard errors.

NPS2

The Granger causality analysis for NPS2 is reported in Table 6.31. In the NPS2 equation, $NP2_{t-1}$; GDP_{t-1} ; $M2_{t-1}$ *and* $PI\text{-}MSIA_{t-1}$ from the macroeconomic variables with $LNE1_t$ and $GEC1_t$ from the non-macroeconomic variables are statistically significant and Granger-cause the returns of NPS2. Equations of GDP_t; INF_t *and* $PI\text{-}MSIA_t$, clearly depicts the significance of *NPS2* as the Granger-cause to these variables in the short-run. Nonetheless, it can be concluded a unidirectional causality in the short-run from $NP2_{t-1}$; $M2_{t-1}$, $LNE1_t$ and $GEC1_t$ towards the stock returns of NP2 and bidirectional causality from GDP_t *and* $PI\text{-}MSIA_t$.

The empirical results further show that the ECt_{t-1} coefficient is -0.4269% and significant at 5% level, implying the existence of unidirectional short-run causality from all selected macroeconomic and non-macroeconomic variables.

The residual diagnostics test of LM is more than 0.05, thus we cannot reject the null hypothesis and conclude that there is no evidence of serial correlation in the equation of NPS2 in the short-run.

Table 6.31: Short Granger Causality Analysis (NPS2)

Sources of Causation		Variables					
		$\Delta NP2_t$	ΔGDP_t	ΔINF_t	$\Delta M2_t$	$\Delta PI\text{-}MSIA_t$	$\Delta PI\text{-}US_t$
Short-Run	ECT_{t-1}	**-0.4269** [-0.2047]**	**0.4142*** [-0.2132]**	**3.1523* [-1.3004]**	0.0746 [-0.0498]	**0.7440* [-0.1030]**	0.2851 [-0.1946]
Macroeconomic Variables	$\Delta NP2_{t-1}$	**-0.4334* [-0.1752]**	**-0.4194* [-0.1825]**	**-2.6536* [-1.1131]**	-0.0664 [-0.0426]	**-0.1975* [-0.0882]**	0.1611 [-0.1666]
	ΔGDP_{t-1}	**-0.1165** [-0.1105]**	**-0.5164* [-0.1151]**	-0.0207 [-0.7021]	0.0077 [-0.0269]	**0.1662* [-0.0556]**	0.0675 [-0.1051]
	ΔINF_{t-1}	-0.0266 [-0.0268]	-0.0343 [-0.0280]	-0.2269 [-0.1706]	0.0024 [-0.0065]	-0.0046 [-0.0135]	-0.0208 [-0.0255]
	$\Delta M2_{t-1}$	**1.4914* [-0.6137]**	-0.8391 [-0.6394]	3.9548 [-3.8997]	-0.0605 [-0.1494]	-0.1317 [-0.3089]	-0.4017 [-0.5835]]
	$\Delta PI\text{-}MSIA_{t-1}$	**-0.7311* [-0.2377]**	**-0.6496* [-0.2476]**	-2.0594 [-1.5103]	-0.0804 [-0.0578]	**-0.2352*** [-0.1196]**	**0.5817* [-0.2260**
	$\Delta PI\text{-}US_{t-1}$	-0.0775 [-0.1544]	0.0013 [-0.1608]	-0.5656 [-0.9809]	0.0015 [-0.0376]	0.0035 [-0.0777]	**-0.2894*** [-0.1468]**
Non-Macroeconomic Forces	$LEC1_t$	0.0279 [-0.0445]	0.0532 [-0.0464]	0.1030 [-0.2828]	-0.0156 [-0.0108]	0.0020 [-0.0224]	-0.0111 [-0.0423]
	$GEC1_t$	**-0.0912* [-0.0377]**	0.0059 [-0.0393]	0.1396 [-0.2397]	0.0011 [-0.0092]	**0.0348*** [-0.0190]**	0.0511 [-0.0359]
	$LNE1_t$	**0.1343* [-0.0351]**	0.0049 [-0.0366]	0.1708 [-0.2233]	0.0035 [-0.0086]	0.0238 [-0.0177]	0.0007 [-0.0334]
	$GNE1_t$	-0.0173 [-0.0359]	-0.0009 [-0.0374]	-0.0186 [-0.2284]	-0.0048 [-0.0088]	0.0117 [-0.0181]	-0.0177 [-0.0342]
Diagnostics	***Breusch-Godfrey Serial Correlation LM Test:***						
	F-statistic	*2.2243*		*Prob. F(1,45)*		*0.1428*	
	*Obs*R-squared*	*2.7319*		***Prob. Chi-Square(1)***		***0.1184***	

**** , ** and *** denotes significance of the coefficient at 1%, 5% and 10% levels respectively***
The numbers in parentheses are standard errors.

NPS3

In the NPS3 equation of the Granger causality results shown in Table 6.32 below, statistical significance is noted for $NP3_{t-1}$, GDP_{t-1} ; $M2_{t-1}$ *and* $PI\text{-}MSIA_{t-1}$, $LNE1_t$ and $GEC1_t$, thus the Granger-cause to the short-run returns of NPS3. Inversely, in the short-run equation of GDP_t , $M2_t$ and $PI\text{-}MSIA_t$ is found to be significant at 1% level and constitutes as a Granger-cause to NP3. Summarily, $LNE1_t$ and $GEC1_t$ variables have a unidirectional Granger-causality to the short-run returns of NP3 but GDP_t , $M2_t$ and $PI\text{-}MSIA_t$ has a bidirectional causality with the short-run stock returns of NPS3.

The ECT_{t-1} is significant at 1% level and -0.5014%, and proves the existence of a unidirectional causality from all the independent macroeconomic and non-macroeconomic variables to the returns of NP3 in the short-run.

The residual diagnostics test of LM is more than 0.05, thus we cannot reject the null hypothesis and conclude that there is no evidence of serial correlation in the equation of NPS3 in the short-run.

Table 6.32: Short Run Granger Causality Analysis (NPS3)

Sources of Causation		Variables					
		$\Delta NP3_t$	ΔGDP_t	ΔINF_t	$\Delta M2_t$	$\Delta PI\text{-}MSIA_t$	$\Delta PI\text{-}US_t$
Short-Run	ECT_{t-1}	-0.5014* [-0.1819]	0.3658* [-0.1616]	0.0504 [-0.0386]	2.0625* [-1.0265]	0.5290* [-0.0895]	0.2091 [-0.1587]
Macroeconomic Variables	$\Delta NP3_{t-1}$	-0.2943*** [-0.1564]	-0.3872* [-0.1389]	-1.7888** [-0.8827]	-0.0552 [-0.0332]	-0.0820 [-0.0769]	0.1184 [-0.1365]
	ΔGDP_{t-1}	-0.1738** [-0.1334]	-0.4463* [-0.1184]	0.2539 [-0.7526]	0.0173 [-0.0283]	0.2142* [-0.0656]	0.0868 [-0.1164]
	ΔINF_{t-1}	-0.0352 [-0.0306]	-0.0341 [-0.0272]	-0.2537 [-0.1726]	0.0022 [-0.0065]	-0.0127 [-0.0150]	-0.0229 [-0.0267]
	$\Delta M2_{t-1}$	1.4736** [-0.7025]	-0.7839 [-0.6240]	3.8078 [-3.9652]	-0.0557 [-0.1490]	-0.1036 [-0.3455]	-0.3233 [-0.6130]
	$\Delta PI\text{-}MSIA_{t-1}$	-0.7368* [-0.2536]	-0.6160* [-0.2253]	-1.3186 [-1.4313]	-0.0681 [-0.0538]	-0.0922 [-0.1247]	0.6032* [-0.2213]
	$\Delta PI\text{-}US_{t-1}$	-0.0900 [-0.1709]	0.0136 [-0.1518]	-0.3492 [-0.9644]	0.0035 [-0.0362]	-0.0149 [-0.0840]	-0.3510* [-0.1491]
Non-Macroeconomic Forces	$LEC1_t$	0.0542 [-0.0515]	0.0460 [-0.0457]	0.0947 [-0.2907]	-0.0169 [-0.0109]	0.0116 [-0.0253]	-0.0058 [-0.0449]
	$GEC1_t$	-0.1189 [-0.0435]	0.0064 [-0.0386]	0.1464 [-0.2455]	0.0004 [-0.0092]	0.0394 [-0.0214]	0.0491 [-0.0380]
	$LNE1_t$	0.1582* [-0.0403]	0.0077 [-0.0358]	0.1919 [-0.2273]	0.0040 [-0.0085]	0.0322 [-0.0198]	0.0055 [-0.0351]
	$GNE1_t$	-0.0423 [-0.0413]	0.0042 [-0.0367]	-0.0116 [-0.2333]	-0.0042 [-0.0088]	0.0082 [-0.0203]	-0.0200 [-0.0361]
Diagnostics	*Breusch-Godfrey Serial Correlation LM Test:*						
	F-statistic	*1.2190*		*Prob. F(1,45)*	*0.2754*		
	*Obs*R-squared*	*1.5297*		***Prob. Chi-Square(1)***	***0.2161***		

**** , ** and *** denotes significance of the coefficient at 1%, 5% and 10% levels respectively***
The numbers in parentheses are standard errors.

AGNPS

Table 6.33 depicts the Granger analysis results for the dependent variable AGNP. In short-run equation of $AGNP_t$, macroeconomic variables of $AGNP_{t-1}$, GDP_{t-1} , $M2_{t-1}$ *and* $PI\text{-}MSIA_t$ together with non-macroeconomic forces of $LNE1_t$ and $GEC1_t$ was significant to the Granger-cause short-run returns of AGNP. In the short-run equations of GDP_t, INF_t, and $PI\text{-}MSIA_t$, the returns of $AGNP_t$ is found to be one of the elements to Granger-cause to these variables. Briefly, while there is a short-run unidirectional Granger-causality from $M2_t$, $LNE1_t$ and $GEC1_t$ to the returns of AGNP, bidirectional causality is noted for GDP_t and $PI\text{-}MSIA_t$ with the short-run returns of AGNP.

In conclusion, the ECT_{t-1} was significant but negative at 1% level implying the existence of a unidirectional causality from all the independent macroeconomic and non-macroeconomic variables to the returns of AGNP in the short-run.

The residual diagnostics test of LM has a probability Chi-Square of more than 0.05, thus we cannot reject the null hypothesis and conclude that there is no evidence of serial correlation in the equation of AGNP in the short-run.

Table 6.33: Short Run Granger Causality Analysis (AGNPS)

Sources of Causation		Variables					
		$\Delta AGNP_t$	ΔGDP_t	ΔINF_t	$\Delta M2_t$	$\Delta PI\text{-}MSIA_t$	$\Delta PI\text{-}US_t$
Short-Run	ECT_{t-1}	**-0.4618* [-0.2046]**	**0.5026* [-0.2166]**	**3.0142* -1.3601]**	0.0770 [-0.0516]	**0.7226* [-0.1053]**	0.2882 [-0.2017]
Macroeconomic Variables	$\Delta AGNP_{t-1}$	**-0.3583** [-0.1806]**	**-0.5139* [-0.1912]**	**-2.6053** [-1.2006]**	-0.0699 [-0.0455]	-0.1457 [-0.0929]	0.1771 [-0.1781]
	ΔGDP_{t-1}	**-0.1456** [-0.1083]**	**-0.4892* [-0.1147]**	0.0548 [-0.7201]	0.0102 [-0.0273]	**0.1651* [-0.0557]**	0.0617 [-0.1068]
	ΔINF_{t-1}	-0.0262 [-0.0258]	-0.0336 [-0.0274]	-0.2433 [-0.1717]	0.0021 [-0.0065]	-0.0097 [-0.0133]	-0.0226 [-0.0255]
	$\Delta M2_{t-1}$	**1.4110* [-0.5910]**	-0.8153 [-0.6256]	3.8168 [-3.9286]	-0.0619 [-0.1490]	-0.0699 [-0.3040]	-0.3109 [-0.5827]
	$\Delta PI\text{-}MSIA_{t-1}$	**-0.6726* [-0.2328]**	**-0.7152* [-0.2464]**	-1.9815 [-1.5474]	-0.0823 [-0.0587]	-0.1904 [-0.1198]	**0.5997* [-0.2295]**
	$\Delta PI\text{-}US_{t-1}$	-0.0622 [-0.1486]	-0.0165 [-0.1573]	-0.5244 [-0.9881	0.0015 [-0.0375]	0.0060 [-0.0765]	**-0.3027* [-0.1466]**
Non-Macroeconomic Forces	$LEC1_t$	0.0330 [-0.0432]	0.0495 [-0.0457]	0.1016 [-0.2872]	-0.0158 [-0.0109]	0.0095 [-0.0222]	-0.0055 [-0.0426]
	$GEC1_t$	**-0.0904* [-0.0365]**	0.0043 [-0.0386]	0.1311 [-0.2425]	0.0009 [-0.0092]	**0.0361*** [-0.0188]**	0.0517 [-0.0360]
	$LNE1_t$	**0.1235* [-0.0339]**	0.0045 [-0.0359]	0.1714 [-0.2256]	0.0035 [-0.0086]	0.0254 [-0.0175]	0.0022 [-0.0335]
	$GNE1_t$	-0.0270 [-0.0349]	0.0045 [-0.0370]	-0.0043 [-0.2320]	-0.0043 [-0.0088]	0.0087 [-0.0180]	-0.0215 [-0.0344]
Diagnostics	***Breusch-Godfrey Serial Correlation LM Test:***						
	F-statistic	*2.0667*		*Prob. F(1,45)*		*0.1575*	
	*Obs*R-squared*	*2.5467*		***Prob. Chi-Square(1)***		***0.1105***	

**** , ** and *** denotes significance of the coefficient at 1%, 5% and 10% levels respectively***
The numbers in parentheses are standard errors.

6.6.5.3 Summary of VECM Granger Causality Analysis

The summary of short-run Granger analysis is presented in Table 6.34. Among the notable findings are:

- The existence of unidirectional causality from all the independent variables to the returns of penny and non-penny stocks is confirmed in the long-run with the statistically significant ECT_{t-1} that is at 1% level. These findings validate the existence of short run association between the variables. Thus, the null hypothesis of no short-run causality between the selected macroeconomic and non-macroeconomic variables with the returns of penny and non-penny stocks in the Malaysian stock market is rejected (hypothesis H_{6a} and H_{6b})
- GDP_t and $PI\text{-}MSIA_t$ are the significant Granger-cause to the returns of all price sorted portfolios of penny and non-penny stocks in the short-run. GDP_t and $PI\text{-}MSIA_t$ have a bidirectional causality in the short-run to all portfolios while lagged returns of portfolios $PS1_{t-1}$, $PS2_{t-1}$, $PS3_{t-1}$, $AGPS_{t-1}$, $NP2_{t-1}$, $NP3_{t-1}$, $AGNP_{t-1}$ has a similar bidirecional short-run Granger-causality with its respective portfolios.

- $M2_{t-1}$ is statistically significant in the PS1, PS3, AGPS, NPS2 and AGNP equations, thus displays a strong unidirectional Granger-causality to the returns of these portfolios.

- As for the non-macroeconomic forces, all price sorted portfolios regardless of penny and non-penny reacted significantly to $LNE1_t$ and $GNE1_t$ and conclusively displayed a unidirectional Granger-causality to their short-run returns.

Table 6.34: Summary of Short- and Long-Run Granger Causality Analysis

Dependent Variables *(Granger equation)*	**Sources of Causation**			
	Short-run *(Granger-cause)*			**Short-run** (ECT_{t-1})
	Unidirectional		*Bidirectional*	
	Macroeconomic Determinants	*Non-Macroeconomic Forces*	*Macroeconomic Determinants/ Portfolio*	
PS1	$M2_{t-1}^{*}$	$GEC1_t^{*}$ $LNE1_t^{*}$;$GNE1_t^{*}$	GDP_t^{*} $PI\text{-}MSIA_t^{*}$ $PS1_{t-1}^{*}$	**-0.4524***
PS2		$GEC1_t^{*}$ $LNE1_t^{*}$	GDP_t^{**} $PI\text{-}MSIA_t^{*}$ $PS2_{t-1}^{*}$	**-0.4973***
PS3	$M2_{t-1}^{*}$	$GEC1_t^{*}$ $LNE1_t^{*}$	GDP_t^{*} $PI\text{-}MSIA_t^{*}$ $PS3_{t-1}^{*}$	**-0.5192***
AGPS	$M2_{t-1}^{*}$	$GEC1_t^{*}$ $LNE1_t^{*}$	GDP_t^{*} $PI\text{-}MSIA_t^{*}$ $AGPS_{t-1}^{*}$	**-0.4278***
NPS1		$GEC1_t^{*}$ $LNE1_t^{*}$	GDP_t^{*}; $M2_t^{**}$ $PI\text{-}MSIA_t^{*}$	**-0.5727***
NPS2	$M2_{t-1}^{*}$	$GEC1_t^{*}$ $LNE1_t^{*}$	GDP_t^{*} $PI\text{-}MSIA_t^{*}$ $NP2_{t-1}^{*}$	**-0.4417***
NPS3		$GEC1_t^{*}$ $LNE1_t^{*}$	GDP_t^{*}; $M2_t^{**}$ $PI\text{-}MSIA_t^{*}$ $NP3_{t-1}^{*}$	**-0.5014***
AGNP	$M2_{t-1}^{*}$	$GEC1_t^{*}$ $LNE1_t^{*}$	GDP_t^{*} $PI\text{-}MSIA_t^{*}$ $AGPS_{t-1}^{*}$	**-0.4618***

* , ** *and* *** *denotes significance of the coefficient at 1%, 5% and 10% levels respectively.*

6.7 CONCLUSION

The third research question of this thesis deals with an empirical analysis to investigate the impact of macroeconomic and non-macroeconomic variables affecting penny and non-penny stocks in the Malaysian stock market. The research objectives for this part are twofold, namely to examine the long-run equilibrium (cointegration) and the existence and direction of a causal relationship between selected macroeconomic variables and non-macroeconomic forces with the returns of penny and non-penny stocks. The ADF and PP unit root test was applied for the integrating properties of the variables and the ARDL bounds testing approach for cointegration. As for the direction of causality between the variables, the VECM Granger causality approach was used.

The results revealed that the variables are cointegrated for long-run relationship. Independent macroeconomic variables of GDP and price index of Malaysia (PI-MSIA) together with non-macroeconomic forces representing local political event of Malaysia's 13^{th} general election (*LNE1*) and global economic news related to the decline in world oil price (*GEC1*) move in tandem with the hypothesized reaction to the returns of penny and non-penny stocks. The implementation of GST (*LEC1*) gave a totally opposing reaction (positive) to the returns of the stocks as compared to the hypothesized negative reaction. As for the short-run elasticities, the coefficient of the error correction term (ECM_{t-1}) for all dependent variables are significant at 1% level. The highly significant negative sign of the ECM_{t-1} reinforces the existence of the long-run relationship among the variables. The macroeconomic determinants of *GDP* together with non-macroeconomic forces of *LNE1* are found to have positive short-run dynamics on the returns of all penny and non-penny stocks. Inversely, *GEC1* has a significant adverse effect on the short-run returns of penny and non-penny stocks. Other non-macroeconomic forces had mixed reactions.

The causality analysis confirms the existence of unidirectional causality from all independent variables to the returns of dependent variables in the long-run with the statistically significant ECT_{t-1} at 1% level. The *GDP* and the stock price index of Malaysia (*PI-MSIA)* has a significant Granger-cause to the returns of all price sorted portfolios of penny and non-penny stocks in the short-run. As for the non-macroeconomic forces, all price sorted portfolios regardless of penny and non-penny, have reacted significantly to the Malaysian 13th. GE (*LNE1*) and the global oil price plunge (*GEC1*). The forces have conclusively displayed a unidirectional Granger-causality to short-run returns of all price sorted penny and non-penny stocks.

This study differs from previous studies in various aspects. Firstly, it adopts the non-macroeconomic forces with the common macroeconomic variables in analyzing their significance towards the stock returns of penny and non-penny. This dynamic approach is combined with the advanced methodological approach of the ARDL model. Both the statistical and economic significance of the factors affecting penny and non-penny stocks in an emerging market like Malaysia is given due emphasis. Notwithstanding, this study is also an effort to analyze how returns on penny and non-penny stock portfolios of different categories or groups react to different types of macroeconomic and non-macroeconomic forces. The empirical results of this study may be used as valuable information by local and global stock investors in developing a view of the economy so as to facilitate their financial planning process. Malaysian market follows the weak-form of Efficient Market Hypothesis (EMH) (Ibrahim & Abdul Rahman, 2003; Balkiz, 2003). Studies by Suleman et al., (2010) further confirms that Malaysia is one of the country where investors can gain arbitrage benefits because of the market inefficiency. As such, investors can predict the stock price movement based on historical data or news announcement and could profit from methods formulated based on historical price patter.

CHAPTER 7

CONCLUSION

7.1. INTRODUCTION

Notably, many industry practitioners have regarded penny stocks as high risk and high reward investments. However, there is little academic research to confirm this view. This paper seeks to examine the characteristics and pricing behavior of penny stocks comprehensively in the context of Malaysian stock market. This effort is warranted considering that a significant portion (almost 90%) of Malaysian listed stocks are penny stocks that are traded below US$5.00.

7.2. FIRST PART

To Investigate the Performance of Penny and Non-Penny Stocks in Malaysian Stock Market in Terms of Return and Risk Premiums

Even lthough penny stocks play an essential role in the market and spur wide-spread interests among investors, they receive little attention from the academia due to low these liquidity and lack of information or transparency. In many empirical asset pricing studies, this stock is even excluded from the sample of the stocks. The first part of the study examined the performance of penny stocks and compare them with non-penny stocks in the Malaysian stock market during the analysis period between July 2009 to June 2015 (60 months). Two research questions was set for the first part of analysis, namely (1) to investigate if there is any significant difference in returns between penny and non-penny stocks in the Malaysian stock market; and (2) to investigate if there is any significant difference in risk premiums between penny and non-penny stocks in the Malaysian stock market.

Prior to the analysis of the research questions of this study and its corresponding hypotheses, the study undertook to adopt a price identification criterion for penny stocks for the Malaysian stock market. This step is deemed necessary considering there is no prior studies done on Malaysian penny stocks nor is there any official price criterion set by the Malaysian Securities Commission to identify penny stocks. In this regard, this study created a price identification criterion for penny stocks. It was set that stocks with the price of RM0.31 and below ($Pr \leq$ RM0.31) were categorized as penny stocks while the rest were categorized as non-penny stocks ($Pr >$ RM0.31). The selection of this price rule was maintained and adopted in the creation of penny and non-penny stocks' portfolio. Three penny stock portfolios were created that were: PS1 (RM0.22 < $Pr \leq$ RM0.31); PS2 (RM0.12 < $Pr \leq$ RM0.21); and PS3 ($Pr \leq$ RM0.11). The rest of non-penny stocks were assigned in three quintile portfolios based on the ranking of the average monthly closing prices. The highest mean price of non-penny quintile will be NPS1 followed by NPS2 (medium priced) and NPS3 (lowest priced non-penny). For statistical comparison of penny and non-penny stocks, an aggregate penny stock (AGPS) portfolio and an aggregate non-penny stock (AGNP) portfolio comprising of all of penny and non-penny stocks respectively was computed too.

The findings from the first part concludes that there is no significance in returns between penny and non-penny stock in the Malaysian market context (first research question). Nevertheless, significant difference in risk premiums (except for profitability premium) have been found between penny and non-penny stocks (second research question). It was found that the mean value of beta, size premiums, value premiums, momentum premiums and investment premiums displayed significant difference between penny and non-penny stocks. These findings also showed that Malaysian penny stocks were mostly growth stocks which were riskier (higher beta), more volatile, had low market capitalization, prominent to momentum effects and had a higher investment premium as compared to non-penny stocks.

Previous studies on penny stocks, namely by Lui et al. (2011, 2013, 2015) and Rhee and Wu (2012) gave conclusive characteristics of US based listed penny stocks. These studies had found US listed penny stocks were characterized by high return, high beta, small size, high book-to-market ratio, high idiosyncratic volatility, poor past performance and the liquidity costs of penny stocks were significantly higher than the high priced stocks. Though these studies encapsulate the characteristics of listed penny stocks in a specific manner, it is defined according to the market conditions and regulations in the US and should not be generalized to other equity markets namely in Asia. Evidently, it was found that there was no mean difference in the returns between penny and non-penny stocks in Malaysia. Though Malaysian penny stocks are characterized by smaller market capitalization, higher beta, higher book-to-market ratio, and higher idiosyncratic volatility on the average but the crucial point of no difference in the returns between penny and non-penny stocks is an important finding to be considered.

Two compounding contribution from the first research are: (1) The creation of an own identification criterion for penny stocks in the context of Malaysia serves as a distinct empirical and theoretical contribution in the penny stock financial literature; (2) The detailed analysis and the findings from the section can fill an important gap in understanding the factors that influence the performance of penny and non-penny stock in an emerging market like Malaysia. Such an understanding is important to equip financial managers with applied knowledge on the determining factors that affect firms' performance based on pricing differences and to undertake appropriate measure in the portfolio management. From an empirical point of view, it provides an important data for comparing determinants of performance of penny and non-penny stocks between developed and developing economies.

7.3. SECOND PART

To Analyse the Returns and Risk Premiums between Penny and Non-Penny Stocks in Malaysian Market

The second part of the research is a further continuation from the first part and undertakes to verify the variation of risk premiums in each portfolios' rate of return with differing asset pricing models in line with the research objectives. The time-series regressions were run against the CAPM's single factor model; Fama-French (1993)'s three factors model of size and value premiums; Carhart (1997)'s four factors model which includes momentum premium; and the five-factor model of Fama-French (2015) incorporating the additional factor of profitability and investment. Comparatively, a final time-series regression incorporating all five risk premiums (size, value, momentum, profitability and investment) was done to analyse the variation of the combined risk premiums in each portfolios' rate of return. Each factor or the risk premium was gradually introduced through the single factor model to the six-factor model (extended) to illustrate the change in the magnitude of estimated alphas (Jensen's alpha) and the corresponding change in the adjusted *R*-square (R^2) values as the additional factors were captured.

Two research questions were set for the second part of analysis, that were (1) to identify the risk premium that is able to explain the return variations for penny and non-penny stocks in the Malaysian stock market; and (2) to identify which asset pricing model is able to capture the return variations for penny and non-penny stocks in the Malaysian stock market. Three major findings emerged from the results of the time-series regressions. Firstly, the estimated portfolio alpha or the intercept term for AGPS ranges from -0.043% to 0.001% (within the range of 0.044%) while for AGNPS was between -0.004% to 0.044% (has a range of 0.048%). Though some portfolio alphas for 4-factor and extended 6-factor models of AGNPS returned significant but the magnitude of change in these alphas regardless of AGPS or AGNPS were marginal and economically small to explain the return variations in the respective portfolios when risk premiums were regressed in the designated asset pricing models. Similar patterns were observed for the three sub-group portfolios for penny (PS1, PS2, PS3) and non-penny (NPS1, NPS2, NPS3) stocks. This finding gives credence to the earlier findings (from first part) that there is no significant difference in the mean returns between penny and non-penny stocks.

Secondly, the test for significance of the difference between two slopes or coefficients was adopted to address the first research question (identifying the prominent risk premium). This test was to identify as to whether an intended risk premium when regressed into the asset pricing model was able to explain the return variations for penny and non-penny stocks. The computed t-test clearly showed that the risk premiums of size (SMB), value (HML), momentum (WML) and investment (CMA) has significant t-values (with p-value of less than 0.05), thus these risk premiums were able to explain the return variations between penny and non-penny stocks in the Malaysian stock market. The t-value of profitability premium (RMW) was not significant and the null hypotheses is duly accepted where this factor was unable to explain the return variations between penny and non-penny stocks.

Thirdly, the test of multiple linear restriction or *F*-test was conducted to identify the best fit asset pricing model that can capture the return variations for penny and non-penny stocks in the Malaysian stock market (second research question). The computed F-test showed that the single factor CAPM, 3-factor, 4-factor and 5-factor models were significant and able to capture the return variations for penny stocks. Nonetheless, the single factor CAPM, 3-factor and 5-factor models (except for the 4-factor model) had significant F-stats for non-penny stocks.

The primary aim of the second research is twofold, namely the search for risk premium that adequately explains the return variation for penny and non-penny stocks and the best fit model that is able to capture these return variations in the Malaysian stock market context. Effectively, the collective use of the five asset pricing models namely the single-factor CAPM, three-factor, four-factor and five-factor together with a modified six-factor models were used to test and compare the risk-return dynamics. This study is significant as this is the first study that used a modified six-factor asset pricing model together with other commonly used asset pricing models. The collective use of these asset pricing models serves to enlighten the capability of each risk premiums involving penny and non-penny stock returns in Malaysia. Since Malaysia is one of the emerging economies, the risk premiums identified will provide knowledge to the potential investors about the key factors affecting share prices in Malaysia and accordingly assist them in optimizing their investment and trading strategies and diversification benefits for this class of financial assets. The use of the modified six-factor model adopted in this study serves to contribute to the literature of the theoretical aspects of asset pricing literature too.

7.4. THIRD PART

To Investigate the Impact of Macroeconomic and Non-Macroeconomic Variables on Penny and Non-Penny Stocks in the Malaysian Market

The third part of this thesis further continues to investigate the impact of macroeconomic and non-macroeconomic variables on the returns of penny and non-penny stocks in the Malaysian market. Complying to this notion, this part undertook to identify a group of selected macroeconomic variables by benchmarking them to similar widely quoted academic literatures that have significant effects on the stock returns in the Malaysian context. Additionally, pertinent non-macroeconomic events in the sample period were selected and classified into economic and non-economic news and categorized as local and global events.

Two pertinent research question were set for this part of analysis: (1) to investigate the cointegration relationship between the selected macroeconomic and non-macroeconomic variables with the returns of the penny and non-penny stocks in the Malaysian stock market; and (2) to investigate if there is a short run causality between the selected macroeconomic and non-macroeconomic variables with the returns of penny and non-penny stocks in the Malaysian stock market. The ADF and PP unit root test were applied for the integrating properties of the variables and the ARDL bounds testing approach for cointegration. As for the direction of causality between the variables, the VECM Granger causality approach was used.

The results revealed that the variables were cointegrated for long-run relationship (research question 1). Independent macroeconomic variables of *GDP* and the price index of Malaysia together with non-macroeconomic forces representing local political events (Malaysian GE13) and the decline in world oil price move in tandem with the hypothesized reaction to the returns of penny and non-penny stocks. As for the short-run elasticities, the coefficient of the error correction term (*ECMt-1*) for all independent variables are significant at 1% level and reinforces the existence of the long-run relationship among the variables. The causality analysis confirms the existence of unidirectional causality from all independent variables to the returns of dependent variables in the long-run with the statistically significant *ECTt-1* at 1% and 10% (research question 2). The *GDP* and the stock price index of Malaysia are a significant Granger-cause to the returns of all price sorted portfolios of penny and non-penny stocks in the short-run. In the context of Malaysian economy, changes in *GDP* and *PI-MSIA* prove to be an important macroeconomic force that can explain variations in penny stock returns. Specifically, an appreciating Malaysian economy has a positive influence on stock returns. The significance of *GDP* can be justified as Malaysia has been using it as the core tool to maintain price stability and the positive impact of *GDP* on stock market return is consistent with some previous studies (Abdullah et al., 2014; Chia & Lim, 2015; Ibrahim, 1999, 2000, 2002, 2003; Ratneswary & Rasiah, 2010). Malaysian market follows the weak-form of Efficient Market Hypothesis (EMH) (Balkiz, 2003; Ibrahim & Abdul Rahman, 2003). Studies by Suleman et al. (2010) further confirms that Malaysia is one of the countries where investors can gain arbitrage benefits because of the market inefficiency. As such, investors can predict the stock price movement based on historical data or news announcement and could profit from methods formulated based on historical price patters. The pertinent finding from this chapter can be exploited by investors to take appropriate investment decisions by assessing the movement of *GDP* and consequently the movement of stock market returns. The significance of the Malaysian stock price index proves the earlier findings of Yeoh et al. (2010) of providing extensive information of investable and attractive opportunities to both the local and foreign investors.

This study is also the first attempt to examine the impact of non-macroeconomic variables on Malaysian penny stock returns together with macroeconomic variables. The findings showed that unexpected events such as politics and economic policies were important determinants of penny stock returns. Inversely, the expected events such as sports news did not have significant impact on the returns of penny as well as non-penny stocks. This could be justified via the efficient market hypothesis where such publicly available information was already incorporated into the stock prices. The findings, especially on the high significance of the non-macroeconomic variables, could be developed to form an insightful model in predicting movements of the penny stock returns. On comparison between macroeconomic and non-macroeconomic forces in Malaysian's penny stock return movements, this study discovered that the non-macroeconomic forces had stronger impact. Notwithstanding, the non-macroeconomic forces had much stronger explanatory power in explaining penny stock returns compared to the macroeconomic variables.

This study differs from previous studies in various aspects. Primarily, this study is empirical analysis to investigate the impact of macroeconomic and non-macroeconomic variables affecting the return of different categories of penny and non-penny stocks' portfolios in Malaysian stock market. The study undertook to adopt the non-macroeconomic forces with the common macroeconomic variables in analyzing their significance towards the stock returns of penny and non-penny. This dynamic approach is combined with the advanced methodological approach of the ARDL model. Both the statistical and economic significance of the factors affecting penny and non-penny stock in an emerging market like Malaysia was given due emphasis. Notwithstanding, the empirical results of this study may be used as valuable information by local and global stock investors in developing a view of the Malaysian economy and its effects on the returns of penny and non-penny stocks so as to facilitate their financial and investment planning process.

7.5. IMPLICATION OF THE STUDIES

This thesis presents the three related empirical studies on: (1) performance of the Malaysian penny stocks; (2) risk-return analysis of penny stocks; and (3) the impact of macroeconomic and non-macroeconomic determinants on penny and non-penny stocks in the Malaysian market. As there is hardly any study on penny stocks in Malaysia, this research has created an identification criterion for penny stocks by means of a price rule and adopted the criteria of stocks with the price of RM0.31 and below to be penny stocks ($Pr \leqslant$ RM0.31) while the rest are categorized as non-penny stocks ($Pr >$ RM0.31). The findings from the first part reveals that penny stocks that are found in the Malaysian stock market are characterized by smaller market capitalization, higher beta, higher book-to-market ratio, and higher idiosyncratic volatility on the average. On a comparative basis, Malaysia penny stocks differs slightly with that of US pennies. The study by Liu et al. (2011) who examined the characteristics, pricing behavior and trading strategies of US listed penny stocks, found that US pennies are characterized with high return, high beta, small size, high book-to-market ratio, high idiosyncratic volatility, poor past performance and the liquidity costs of penny stocks are significantly higher than high priced stocks.

The second part of the research is a further continuation from the first part and undertakes to verify the variation of firm characteristics-based risk premiums in each portfolios' rate of return with differing asset pricing models. It was found that the prominent effects of size, value, momentum and investment premiums are able to explain the return variations for penny and non-penny stocks in the Malaysian stock market. Additionally, the single factor CAPM, 3-factor, 4-factor and 5-factor models are significant and able to capture the return variations for penny stocks. The compounding implication of knowing the prominent risk premium and the best fit model of asset pricing models can serve to be very useful in analytics studies that compare multiple groups, namely between penny and non-penny stocks. The risk premiums identified provides knowledge to potential investors about the key factors which affect share prices in Malaysia and assist in optimizing and diversifying their investment strategies. The prominent risk premium can further be exploited for trading strategies of penny and non-penny stocks in an effort to gain abnormal returns. For instance, the size effect remains significant in explaining returns between penny and non-penny stocks. Momentum trading is profitable in short to medium term, however the impact has no role in pricing. The findings from the second research further suggest that momentum anomaly has a link to size and is also consistent with prior findings of Husni (2006) in Malaysia. Other trading strategies that buying small or value penny stocks and short selling large or growth penny stocks do make considerable abnormal profits both over short and long term holding periods as suggested by Liu et al. (2011)

The third study examined the relationships between selected macroeconomic and non-macroeconomic variables with penny and non-penny stocks' returns. The results have revealed that the variables are cointegrated for long-run relationship. Independent macroeconomic variables of GDP and price index of Malaysia together with non-macroeconomic forces representing political events and the decline in world oil price move in tandem with the hypothesized reaction to the returns of penny and non-penny stocks. The study shows that the Malaysian stock market respond to the changes in the macroeconomic variables in the long run despite being impacted by other short-term variables. The study thus confirms the significance of the macroeconomic variables on the stock prices in Malaysia in the long run. Malaysian market follows the weak-form of Efficient Market Hypothesis (Balkiz, 2003; Ibrahim & Abdul Rahman, 2003). Studies by Suleman et al. (2010) further confirms that Malaysia is one of the countries where investors can gain arbitrage benefits because of the market inefficiency. As such, investors can predict the stock price movement based on historical data or news announcement and could profit from methods formulated based on historical price patter. Thus, interested investors investing in the Malaysian stock market should be prepared for the long-term investment. The study also highlights the need of the government to initiate policies so that the macroeconomic variables do not negatively influence the stock market in lieu of the good growth pace predicted for the Malaysian economy.

7.6. LIMITATIONS OF THE STUDY AND FUTURE RESEARCH

The main limitation of this study is that it is confined to one market. The findings and conclusion from this study cannot be generalized for other markets, even among the Asian equity markets. Each country has its own market structure and is independent of one another and vary on the uniqueness of the securities traded. Even the clientele compositions among the Asian equity markets are different. As such, the uniqueness of these markets certainly warrants individual studies in terms of market trading prices and performances with regard to penny stocks. A comparison of penny stocks in each market will be of great contribution to the penny stock financial literature.

The time interval used in this study is another pertinent limitation. This study is based on a time interval of 60 months (5-years) from July 2010 to Jun 2015 using monthly data. Although the study is based on the post-revamp period of Bursa Malaysia, but a longer time horizon might give more insight into the dynamics of different variable that might affect the returns of penny stocks. Perhaps a cross-comparison analysis between the pre- and post-revamp period of Bursa Malaysia can shed more information on the dynamic returns of penny stocks.

Conclusively, a wider scope of variables and areas of study would probe their impact on the stock returns of penny and non-penny stocks. Trading and investment strategies of

Malaysian based penny stocks and an evaluation of their performance relative to non-penny stocks would facilitate the financial and investment planning process of potential investors too. An assessment of institutional holdings of penny stock is another area that should be explored. Lastly, it will be interesting to study the return dynamics of penny stocks before-, during- and after- a crisis period. This will help to understand the pricing behaviour of penny stocks during these periods.

REFERENCES

Ab Rahman, S. M., Hatta, S. A. M., & Ismail, H.F. (2013). Macroeconomic Variables of Stock Prices (KLCI). *The 5th. International Conference on Financial Criminology (ICFC) 2013*. Retrieved from http://mak.trunojoyo.ac.id/wp-content/uploads/2014/04/P23_MACROECONOMIC-VARIABLES-OF-STOCK-PRICES_Siti-Maziah1.pdf

Abdullah, A. M., Saiti, B., & Masih, A. M. M. (2014). Causality between Stock Market Index and Macroeconomic Variables: A Case Study for Malaysia. *Munich Personal RePEc Archive Paper No. 56987*. Retrieved from http://mpra.ub.uni-muenchen.de/56987/

Abdullah, D. A., & Hayworth, S. C. (1993). Macroeconometrics of Stock Price Fluctuations. *Quarterly Journal of Business and Economics*, 50-67.

Abidin, S.Z., Old, C. & Martin, T. (2010). Effects of New Zealand General Elections on Stock Market Returns. *International Review of Business Research Papers, 6*(6), 1-12. Retrieved from https://researchcommons.waikato.ac.nz/handle/10289/6577

Abugri, B. A. (2008). Empirical Relationship between Macroeconomic Volatility and Stock Return: Evidence from Latin American Markets, *International Review of Financial Analysis, 17*, 396-410.

Acharya, V.V. & Pedersen, L.H. (2005), Asset Pricing with Liquidity Risk, *Journal of Financial Economics, 77*(3), 375-410.

Adam, A., & Tweneboah, G. (2008). Macroeconomic factors and stock market movement: Evidence from Ghana. *MPRA Paper No. 14079*. Retrieved from https://mpra.ub.uni-muenchen.de/14079/2/MPRA_paper_14079.pdf

Adaramola, A. O. (2011). The Impact of Macroeconomic Indicators on Stock Prices in Nigeria. *Developing Country Studies, 1*(2), 1-14

Aggarwal, R. K., & Wu, G. (2006). Stock market manipulations. *The Journal of Business, 79*(4), 1915-1953.

Aghion, P., Van Reenen, J., Zingales, L. (2013). Innovation and Institutional Ownership. *American Economic Review 103*, 277–304.

Ahmed, S. (2008). Aggregate Economic Variables and Stock Market in India, *International Research Journal of Finance and Economics, 14*: 14-64.

Ahmed, S., Coulibaly, B., & Zlate, A. (2017). International Financial Spillovers to Emerging Market Economies: How Important Are Economic Fundamentals? *Journal of International Money and Finance, 76*, 133-152

Al-Tamimi, H. A. H., Alwan, A. A., & Abdel Rahman, A. A. (2011). Factors Affecting Stock Prices in the UAE Financial Markets. *Journal of Transnational Management, 16*(1), 3-19.

Al-Zararee, A. N., & Ananzeh, I. E. N. (2014). The Relationship between Macroeconomic Variables and Stock Market Returns: A Case of Jordan for the

Period 1993-2013. *International Journal of Business and Social Science, 5*(5). Retrieved from http://ijbssnet.com/journals/Vol_5_No_5_1_April_2014/22.pdf

Albaity, M. (2011). Impact of the Monetary Policy Instruments on Islamic Stock Market Index Return. *Economics The Open-Access, Open-Assessment E-journal*, pp. 1-28.

Albaity, M., & Ahmad, R. (2008). Performance of Syariah and Composite Indices: Evidence from Bursa Malaysia. *Asian Academy of Management Journal of Accounting and Finance*, *4*(1), 23-43.

Albaity, Mohamed Shikh. (2011). Impact of The Monetary Policy Instruments on Islamic Stock Market Index Return, *Economics Discussion Papers, No. 2011-26,* Kiel Institute for the World Economy (IfW), Kiel. Retrieved from http://www.economics-ejournal.org/economics/discussionpapers/2011-26

Albaity, Mohamed Shikh. & Shanmugam, T. (2012). An Analysis of Volatility Co-Movements between Malaysia, US, UK and Japan Stock Markets. *Asian Journal of Finance & Accounting, 4*(2), 155-179. Retrieved from https://www.researchgate.net/publication/259474482

Alam, N. (2013). Macroeconomic Variables, Firm Characteristics and Stock Returns during Good and Bad Times: Evidence from SEA. *Asian Journal of Finance & Accounting, 5*(2), 159-182.

Ali, U. A., Adam, A., Ahmad, T. A. & Umar A.A. M. (2015). Stock Market Returns and Macroeconomic Variables in Nigeria: Testing for Dynamic Linkages with a Structural Break. *Scholars Journal of Economics. Business and Management, 2*(8A), 816-828.

Ali, U. A., Adam, A., Zunaidah, S., & Ahmad, T. A. (2015a). Causal Relationship between Stock Market Returns and Macroeconomic Variables in Nigeria. *IOSR Journal of Humanities and Social Science (IOSR-JHSS), 20*(5), 74-96

Ali, U. A., Adam, A., Zunaidah, S., & Ahmad, T. A. (2015b). An Autoregressive Distributive Lag for the Analysis of Macroeconomic Variables on Stock Market Returns in Nigeria. *Research Journal of Social Sciences, 8*(4), 112-133.

Ali, U. A., Adam, A., Zunaidah, S., & Ahmad, T. A. (2015c). The Review of Stock Returns and Macroeconomic Variables. *International Journal of Academic Research in Business and Social Sciences, 5*(5), 154-181

Alile, H. I. (1984). The Nigerian Stock Exchange: Historical Perspective, Operations and Contributions to Economic Development. *Central Bank of Nigeria Bullion, 11*, 65-69.

Allvine, F. and O'Neill, D. (1980). Stock Market Returns and The Presidential Election Cycle, *Financial Analysts Journal, 36*(5),49-56

Amihud Y, & Mendelson (1986). Asset Pricing and the Bid-Ask Spread, *Journal of Financial Economics 17*, 223-249.

Amihud, Y., Mendelson, H., & Uno, J. (1999). Number of Shareholders and Stock Prices: Evidence from Japan. *The Journal of finance, 54*(3), 1169-1184.

Amihud, Y. (2002). Illiquidity and Stock Returns: Cross-Section and Time-Series Effects. *Journal of financial markets, 5*(1), 31-56.

Anayochukwu, O. B. (2012). The Impact of Stock Market Returns on Foreign Portfolio Investment in Nigeria. *Journal of Business and Management (IOSRJBM), 2*(4), 10-19

Andersen, T.G., Bollerslev, T., Diebold, F.X., & Vega, C., (2007). Real-Time Price Discovery in Global Stock, Bond and Foreign Exchange Markets. *Journal of International Economics, 73*, 251–277.

Ang, A., Hodrick, R. J., Xing, Y., & Zhang, X. (2006), The Cross-Section of Volatility and Expected Returns, *Journal of Finance 61*(1), 259-299. Retrieved from https://www.jstor.org/stable/pdf/3699341.pdf

Ang, A., Hodrick, R. J., Xing, Y., & Zhang, X. (2009). High idiosyncratic volatility and low returns: International and further US evidence. *Journal of Financial Economics, 91*(1), 1-23. Retrieved from https://www.nber.org/papers/w13739.pdf

Ang, A., Shtauber, A. A., & Tetlock, P. C. (2013). Asset Pricing in The Dark: The Cross-Section of OTC Stocks. *The Review of Financial Studies, 26*(12), 2985-3028. Retrieved from http://www.jstor.org/stable/pdf/24464764.pdf

Antonios, A. (2010). Stock Market and Economic Growth: An Empirical Analysis for Germany. *Business and Economics Journal, Vol.2010: BEJ-1*, 1-12. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.466.1377&rep=rep1&type=pdf

Anusakumar, S. V., Ali, R., & Hooy, C. W. (2017). The Effect of Investor Sentiment on Stock Returns: Insight from Emerging Asian Markets. *Asian Academy of Management Journal of Accounting and Finance, 13*(1), 159–178. Retrieved from https://doi.org/10.21315/aamjaf2017.13.1.7

Appel, I. R., Gormley, T. A., & Keim, D. B. (2016). Passive Investors, Not Passive Owners. *Journal of Financial Economics, 121*(1), 111-141.

Arouri M.E.H., Jawadi F., Nguyen D.K. (2010a), Evolving Stock Market Efficiency. *The Dynamics of Emerging Stock Markets*. Contributions to Management Science. Physica-Verlag HD, 91-121.

Arouri M.E.H., Jawadi F., Nguyen D.K. (2010b), Emerging Markets: Overview and Performance Analysis. *The Dynamics of Emerging Stock Markets.* Contributions to Management Science. Physica-Verlag HD, 1-27.

Asai, M., & Shiba, T. (1995). The Japanese Stock Market and the Macroeconomy: An Empirical Investigation. *Asia-Pacific Financial Markets, 2*(3), 259-267.

Asaolu, T. O., & Ogunmuyiwa, M. S. (2011). An Econometric Analysis of the Impact of Macroeconomic Variables on Stock Market Movement in Nigeria. *Asian Journal of Business Management, 3*(1), 72-78.

Asgharian, H., Hou, A. J., & Javed, F. (2013). The Importance of the Macroeconomic Variables in Forecasting Stock Return Variance: A GARCH-MIDAS Approach. *Journal of Forecasting, 32*(7), 600-612.

Asmy, M., Rohilina, W., Hassama, A., & Fouad, M. (2009). Effects of Macroeconomic Variables on Stock Prices in Malaysia: An Approach of Error Correction Model. *MPRA Paper No. 20970*. Retrieved from http://mpra.ub.uni-muenchen.de/20970/

Asprem. M, (1989), Stock Prices, Asset Portfolios and Macroeconomic Variables in Ten European Countries, *Journal of Banking and Finance, 13*, 589-612.

Asteriou, D., & Price, S. (2000). Financial Development and Economic Growth: Time Series Evidence for the case of UK. *Ekonomia, 4*(2), 122-141.

Attari, J., Irfan, M., & Safdar, L. (2013). The Relationship between Macroeconomic Volatility and the Stock Market Volatility*: Empirical Evidence from Pakistan. Pakistan Journal of Commerce & Social Sciences, 7*(2), 309-320.

Auzairy, N. A., Ahmad, R., & Ho, C. S. F. (2011). Stock Market Deregulation, Macroeconomic Variables and Stock Market Performances. *International Journal of Trade, Economics and Finance, 2*(6), 495-500

Azman, Sulhi. (2017, July 27). *Invest Malaysia 2017 Reaffirms Malaysia as Advanced Emerging Market — Bursa*. Artilce from The Edge. Retrieved from http://www.theedgemarkets.com/article/invest-malaysia-2017-reaffirms-malaysia-advanced-emerging-market-%E2%80%94-bursa

Babayemi, A. W., Asare, B. K., Onwuka, G. I., Singh, R. V., & James, T. O. (2013). Empirical Relationship between the Stock Markets and Macroeconomic Variables: Panel Cointegration Evidence from African Stock Markets. *International Journal of Engineering Science Innovative technology (DESIT), 2*(4), 394-400.

Bahmani-Oskooee, M., & Nasir, A. B. M. (2004). ARDL Approach to test the Productivity Bias Hypothesis. *Review of Development Economics, 8*(3), 483-488.

Baker, M., & Wurgler, J. (2006). Investor Sentiment and the Cross-Section of Stock Returns. *Journal of Finance, 61*(4), 1645–1680. Retrieved from https://doi.org/10.1111/j.1540-6261.2006.00885.x

Baker, M., & Wurgler, J. (2007). Investor Sentiment in the Stock Market. *The Journal of Economic Perspectives, 21*(2), 129–151. Retrieved from https://doi.org/10.1257/jep.21.2.129

Baker, S. R., Bloom, N., & Davis, S. J. (2016). Measuring Economic Policy Uncertainty. *The Quarterly Journal of Economics, 131*(4), 1593-1636.

Bali, T.G and Cakici, N, (2010, World Market Risk, Country-Specific Risk and Expected Returns in International Stock Markets, *Journal of Banking & Finance, 34*, 1152–1165

Bali, T.G., Cakici.N, Xuemin Yan & Zhe Zhang, (2005), Does Idiosyncratic Risk Really Matter?, *The Journal of Finance*, *Vol 60* (2). 905–929

Balkiz, O. (2003, December). Testing Informational Market Efficiency on Kuala Lumpur Stock Exchange. *In Malaysian Finance Association 5th Annual Symposium, Cyberjaya, Malaysia, April.*

Ballie, R. T. & DeGennaro, R. P. (1990). Stock Returns and Volatility. *Journal of Financial and Quantitative Analysis, 25*(2), 203-214

Banerjee, A. V. and Newman, A. F., (1993). Occupational Choice and the Process of Development. *Journal of Political Economy, 101*(2), 274-298.

Banerjee, A., Dolado, J., & Mestre, R. (1998). Error‐Correction Mechanism Tests for Cointegration in a Single‐Equation Framework. *Journal of Time Series Analysis, 19*(3), 267-283.

Banton, C. (2017, Nov). Investing: What Does Standard Deviation Measure in a Portfolio? *Investopedia*. Retrieved from https://www.investopedia.com/ask/answers/022015/what-does-standard-deviation-measure-portfolio.asp

Banz, R. W., (1981), The Relationship Between Return and Market Value of Common Stocks, *Journal of Financial Economics, 9*, 3-18

Barillas, F., & Shanken, J. (2018). Comparing Asset Pricing Models. *The Journal of Finance, 73*(2), 715-754.

Başçi, E. S., & Karaca, S. S. (2013). The Determinants of Stock Market Index: VAR Approach to Turkish Stock Market. *International Journal of Economics and Financial Issues, 3*(1), 163-171.

Basu, S, (1977), Investment Performance of Common Stocks in Relation to their Price Earnings Ratios: A Test of Efficient Market Hypothesis, *Journal of Finance, 32(3)*, 663-682.

Barrows, C.W & Naka, A (199), Use of Macroeconomic Variables to Evaluate Selected Hospitality Stock Returns in the U.S, *International Journal of Hospitality Management. Vol. 13*, 119-128

Bauman, W. S., Conover, C. M. & Miller, R. E. (1998), Growth Versus Value and Large–Cap versus Small–Cap Stocks in International Markets, *Financial Analysts Journal 54*(2), 75–89.

Beer, F., & Hebein, F. (2008). An Assessment of the Stock Market and Exchange Rate Dynamics in Industrialized and Emerging Markets. *International Business & Economics Research Journal, 7*(8), 59-70.

Beirne, J., Caporale, G. M., Schulze-Ghattas, M., & Spagnolo, N. (2010). Global and Regional Spillovers in Emerging Stock Markets: A Multivariate GARCH-In-Mean Analysis. *Emerging Markets Review, 11*, 250 - 260.

Bekaert, G. & Harvey C.R. (1997). Emerging Equity Market Volatility, *Journal of Financial Economics, 43*, 29-77.

Bekaert, G., Wei, M., & Xing, Y. (2007). Uncovered Interest Rate Parity and the Term Structure, *Journal of International Money and Finance, 26*, 1038-1069.

Bekhet, H. A., & Mugableh, M. I. (2012). Investigating Equilibrium Relationship between Macroeconomic Variables and Malaysian Stock Market Index through Bounds Tests Approach. *International Journal of Economics and Finance, 4*(10), 69.

Beltratti, A., & Morana, C. (2006). Breaks and Persistency: Macroeconomic Causes of Stock Market Volatility. *Journal of Econometrics, 131*(1), 151-177.

Berman, G., Brooks, R., & Davidson, S., (2000). The Sydney Olympic Games Announcement and Australian Market Reaction. *Applied Economics Letters 7*(12), 781–784.

Bernanke, B. S., & Kuttner, K. N., (2005). What Explains the Stock Market's Reaction to Federal Reserve Policy? *Journal of Finance, 60*, 1221–1257.

Bernstein, W. J. (2001). Rolling Your Own: Three-Factor Analysis, *Efficient Frontier, Online Journal of Practical Asset Allocation*. Retrieved from http://www.efficientfrontier.com/ef/101/roll101.htm

Bhanu, S. P. (2013). Effect of Select Macro Economic Variables on Stock Returns in India. *International Journal of Marketing, Financial Services & Management Research, 2*(6), 197-209.

Bhar, R., & Nikolova, B. (2009). Return, Volatility Spillovers and Dynamic Correlation in the BRIC Equity Markets: An Analysis using a Bivariate EGARCH Framework. *Global Finance Journal, 19,* 203 - 218.

Bhattacharyya, A., and Chandra, A., (2016). The Cross-Section of Expected Returns on Penny Stocks: Are Low-Hanging Fruits Not-So Sweet? *Working Papers: 1610.01338, arXiv.org.* Retrieved from https://arxiv.org/pdf/1610.01338.pdf

Bhattacharyya, B. and Mukherjee, J. (2006). Indian Stock Price Movement and the Macroeconomic Context – A Time Series Analysis, *Journal of International Business and Economics, 5* (1), 167-181.

Bialkowski, J., Gottschalk, K. & Wisniewski, T.P. (2008). Stock Market Volatility Around National Elections. *Journal of Banking & Finance, 32*, 1941-1953

Bialkowski, J., Etebari, A., & Wisniewski, T. (2012). Fast Profits: Investor Sentiment and Stock Returns during Ramadan. *Journal of Banking & Finance, 36*(3), 835

Bilson, C. M., Brailsford, T. J., & Hooper, V. J. (2001). Selecting Macroeconomic Variables as Explanatory Factors of Emerging Stock Market Returns. *Pacific-Basin Finance Journal, 9*(4), 401-426.

Birz, G., & Lott Jr, J. R. (2011). The Effect of Macroeconomic News on Stock Returns: New Evidence from Newspaper Coverage. *Journal of Banking & Finance, 35*(11), 2791-2800.

Black, F. (1972). Capital Market Equilibrium with Restricted Borrowing. *The Journal of Business, 45*(3), 444-455.

Blanchard, O., Rhee, C., & Summers, L. (1993). The Stock Market, Profit and Investment. *The Quarterly Journal of Economics, 108*(1), 115-136.

Blitz, D., Hanauer, M., Vidojevic, M., & van Vliet, P. (2018). Five Concerns with the Five-Factor Model. *The Journal of Portfolio Management Quantitative (Special Issue 2018), 44* (4) 71-78. Retrieved from https://doi.org/10.3905/jpm.2018.44.4.071

Breeden, D. T., (1979), An Intertemporal Asset Pricing Model with Stochastic Consumption and Investment Opportunities, *Journal of Financial Economics, 7*, 265–296.

Brennan, M. J. & Subrahmanyam.A , (1996), Market Microstructure and Asset Pricing: On the Compensation for Illiquidity in Stock Returns, *Journal of Financial Economics, 41*, 441-464.

Brennan, M. J., Chordia.T, & Subrahmanyam.A, (1998), Alternative Factor Specifications, Security Characteristics and the Cross-Section of Expected Stock Returns, *Journal of Financial Economics, 49*, 345-373.

Brown, G. W., Cliff, M. T. (2005). Investor Sentiment and Asset Valuation. *Journal of Business, 78*, 405–440.

Brown, R., J. Durbin and J. Evans (1975), Techniques for Testing the Constancy of Regression Relations Over Time. *Journal of the Royal Statistical Society,37*, 149-163.

Brown, S. J., & Otsuki, T. (1993). Risk Premia in Pacific-Basin Capital Markets. *Pacific-Basin Finance Journal, 1*(3), 235-261.

Brown, S., Du, D. Y., Rhee, S. G. & Zhang, L. (2008). The Returns to Value and Momentum in Asian Markets. *Emerging Markets Review 9*(2), 79–88.

Brown, S., Rhee, S. G., & Zhang, L. (2008). The Return to Value in Asian Stock Markets. *Emerging Markets Review, 9*(3), 194-205.

Brüggemann, U., Kaul, A., Leuz, C., & Werner, I. M. (2016). The Twilight Zone: OTC Regulatory Regimes and Market Quality. *National Bureau of Economic Research. (No. w19358)*. Retrieved from SSRN http://www.ecgi.global/sites/default/files/working_papers/documents/SSRN-id2290492.pdf

Brys, G., Hubert, M. & Struyf, A. (2004). A Robustification of the Jarque-Bera Test of Normality. *COMPSTAT2004 Symposium, Physica-Verlag/Springer 2004*. Retrieved from https://wis.kuleuven.be/stat/robust/papers/2004/tailweightCOMPSTAT04.pdf

Böhme, R. & Holz, T., (2006). The Effect of Stock Spam on Financial Markets. *Workshop on the Economics of Information Security (WEIS), Univ. of Cambridge, UK, June 2006*. Retrieved from SSRN: https://ssrn.com/abstract=897431 or http://dx.doi.org/10.2139/ssrn.897431

Bollen, N. P., & Christie, W. G. (2009). Market microstructure of the Pink Sheets. *Journal of Banking & Finance, 33*(7), 1326-1339.

Bollerslev, T. & Wooldridge, J. (1992). Quasi-Maximum Likelihood Estimation and Inference in Dynamic Models with Time-Varying Covariances. *Econometric Reviews, 11*, 143-72.

Bomfim, A. N., (2003). Pre-Announcement Effects, News Effects and Volatility: Monetary Policy and the Stock Market. *Journal of Banking & Finance, 27*(1), 133–151.

Boone, A. L., & White, J. T. (2015). The Effect of Institutional Ownership on Firm Transparency and Information Production. *Journal of Financial Economics, 117*(3), 508-533.

Booth, J R & Booth, L C (1997), Economic Factors, Monetary Policy and Expected Returns on Stock and Bonds, *Economic Review of Federal Reserve Bank of San Francisco. Vol. 2,* 32-42.

Boutabba, M. A. (2014). The Impact of Financial Development, Income, Energy and Trade On Carbon Emissions: Evidence from The Indian Economy. *Economic Modelling, 40*(C), 33-41. Retrieved from https://www.sciencedirect.com/science/article/pii/S0264999314000911

Boyd, J. H., Hu, J., & Jagannathan. R, (2005). The Stock Market's Reaction to Unemployment News: Why Bad News is usually good for Stocks. *Journal of Finance 60*(2), 649–672. Retrieved from http://dx.doi.org/10.1111/j.1540-6261.2005.00742.x

Buckberg, E. (1995). Emerging Stock Markets and International Asset Pricing. *The World Bank Economic Review, 9*(1), 51-74.

Buffa, A. M., Vayanos, D., & Woolley, P. (2014). Asset Management Contracts and Equilibrium Prices. *National Bureau of Economic Research (No. w20480).* Retrieved from http://personal.lse.ac.uk/VAYANOS/WPapers/AMCEP.pdf

Bushee, B. J., & Leuz, C. (2005). Economic Consequences of SEC Disclosure Regulation: Evidence from the OTC Bulletin Board. *Journal of Accounting & Economics, 39*(2), 233-264.

Bulmash, S.B., Trivoli, G.W., (1991). Time-Lagged Interactions between Stock Prices and Selected Economic Variables. *Journal of Portfolio Management 17* (4), 61–67.

Bursa Malaysia Annual Report 2009. Retrieved at http://bursa.listedcompany.com/misc/ar2009.pdf

Bursa Malaysia Annual Report 2015. Retrieved at http://bursa.listedcompany.com/misc/ar2015.pdf

Campbell, J.Y., (1987). Stock Returns and the Term Structure. *Journal of Financial Economics, 18* (2), 373–399.

Campbell, J.Y. & Shiller, R.J., (1988), The Dividend-Price Ratio and Expectations of Future Dividends and Discount Factors. *Review of Financial Studies, 1*(3), 195-228.

Camphell, J. Y., Lo, A. W., & MacKinlay, A. C., (1997). *The Econometrics of Financial Markets.* New Jersey: Princeton University Press

Campbell, J. Y., Lettau, M., Malkiel, B. G., & Xu, Y., (2001*),* Have Individual Stocks Become More Volatile? An Empirical Exploration of Idiosyncratic Risk*, Journal of Finance, 56*(1), 1-43. Retrieved from https://www.jstor.org/stable/pdf/222462.pdf

Campbell, J. Y., & Vuolteenaho, T., (2004). Bad Beta, Good Beta, *American Economic Review, 94* (5):1249-1275. Retrieved from https://www.aeaweb.org/articles?id=10.1257/0002828043052240

Capaul, C., Rowley, I. & Sharpe, W. F. (1993), International Value and Growth Stock Returns. *Financial Analysts Journal 49*(1), 27–36.

Caproasia, (2015, Oct 26), *2015 Stock Exchange Market Capitalization*. Retrieved from http://www.caproasia.com/2015/10/26/2015-stock-exchange-market-capitalization/

Carhart, M. M., (1997), On Persistence in Mutual Fund Performance, *Journal of Finance, 52*, 57-82.

Carpenter, J. N., Lu, F., & Whitelaw, R. F. (2015). The Real Value of China's Stock Market *National Bureau of Economic Research. (Working Paper No.20957).* Retrieved from http://www.nber.org/papers/w20957

Chan, L. K. C., Hamao, Y. & Lakonishok, J. (1993). Can Fundamentals Predict Japanese Stock Returns? *Financial Analysts Journal 49*(4), 63–69.

Chan, H., Faff, R., (2005). Asset Pricing and Illiquidity Premium. *Financial Review, 40*, 429-458.

Chan, K., Hameed, A. & Tong, W. (2000), Profitability of Momentum Strategies in the International Equity Markets, *Journal of Financial and Quantitative Analysis, 35*, 153-72.

Chancharat, S., Valadkhani, A., & Havie, C. (2007). The Influence of International Stock Markets and Macroeconomics Variables on The Thai Stock Market. *Applied Econometrics and International Development, 7*(1), 221-238.

Chandra, P (2004). *Investment Analysis and Portfolio Management*. New Delhi. McGraw-Hill.

Chandra, A. and Thenmozhi, M., (2013). Investor Sentiment, Volatility and Stock Return Comovements. *India Finance Conference 2013, IIM Ahmedabad*. Retrieved from http://dx.doi.org/10.2139/ssrn.2353073

Chang, K. B. (2012) Foreign Ownership and the Informational Efficiency of Malaysian Stocks. *Unpublished Master Thesis, Universiti Malaysia Sabah*.

Chang, K. L. (2009). Do Macroeconomic Variables have Regime-Dependent Effects on Stock Return Dynamics? Evidence from the Markov Regime Switching Model. *Economic Modelling, 26*(6), 1283-1299.

Chang, K.L., Chen, N.K., & Leung, C. K. Y. (2011). Monetary Policy, Term Structure and Asset Return: Comparing REIT, Housing and Stock. *The Journal of Real Estate Finance and Economics, 43*(1), 221-257. Retrieved from http://dx.doi.org/10.1007/s11146-010-9241-8

Chaudhuri, K., Smiles, S. (2004), Stock Market and Aggregate Economic Activity: Evidence from Australia, *Applied Financial Economics, 2*(14), 121-129. Retrieved from https://www.tandfonline.com/doi/abs/10.1080/0960310042000176399

Chen, D., & Bin, F. (2001). Effects of Legislation Events on US Gaming Stock Returns and Market Turnings. *Tourism Management, 22*(5), 539-549

Chen, J. (2017, Nov). Trading Strategy: Skewness Definition. *Investopedia*. Retrieved from http://www.investopedia.com/terms/s/skewness.asp

Chen, M. H. (2003), Risk and Return: CAPM and CCAPM, Quarterly *Review of Economics and Finance, 43*, 369-393.

Chen, M. H., Kim, W.G., & Kim, H. J. (2005), Macro and Non-Macro Explanatory Factors of Chinese Hotel Stock Returns, *International Journal of Hospitality Management, 24*, 243-258.

Chen, N. F., (1991), Financial Investment Opportunities and the Macroeconomy, *Journal of Finance, 46,* 529–554.

Chen, S. J., Roll, F. & Ross, S. A., (1986), Economic Forces and the Stock Market. *Journal of Business, 59*(3), 505-523.

Chen, S.S. (2007). Does Monetary Policy Have Asymmetric Effects on Stock Returns? *Journal of Money, Credit and Banking, 39*(2-3), 667-688. Retrieved from http://dx.doi.org/10.1111/j.0022-2879.2007.00040.x

Cheng, Ming-Chang., Tzeng, Zuwei-Ching., & Kang, Wei-Ling. (2011). The Impact of Non-Macroeconomic Events on Taiwan Electronic Industry Stock Index Returns. *Global Economy and Finance Journal, 4*(1), 80-101.

Chia, R. C. J., & Lim, S. Y. (2015). Malaysian Stock Price and Macroeconomic Variables: Autoregressive Distributed Lag (ARDL) Bounds Test. *Kajian Malaysia, Vol.33, Supp.1*, 85-103. Retrieved from http://web.usm.my/km/33(Supp.1)2015/Art.6%20(85-103).pdf

Chiang, T.C. & Doong, S.C., (2001), Empirical Analysis of Stock Returns and Volatility: Evidence From Seven Asian Stock Markets Based On TAR-GARCH Model. *Review of Quantitative Finance and Accounting, 17*, 301-318.

Chinzara, Z. (2010). Macroeconomic uncertainty and Emerging Market Stock Market Volatility: The Case for South Africa. *Economic Research Southern Africa (No.187).* Retrieved from https://core.ac.uk/download/pdf/6370443.pdf

Choi, J.J., Hauser, S., & Kopekcy, K.J., (1999), Does the Stock Market Predict Real Activity? Times Series Evidence from the G-7 Countries. *Journal of Banking and Finance, 23*(12), 1771–1792.

Chordia, T., Subrahmanyam. A., & Anshuman. V., (2001), Trading Activity and Expected Stock Returns, *Journal of Financial Economics, 59*, 3–32.

Chua, C. T., Goh, J., & Zhang, Z. (2006). Idiosyncratic Volatility Matters for the Cross-Section of Returns-In More Ways Than One. *Unpublished Working Paper, Singapore Management University.* Retrieved from http://cicfconf.org/past/cicf2006/cicf2006paper/20060126132108.pdf

Chui, A. C., & Wei, K. J. (1998). Book-To-Market, Firm Size, and the Turn-Of-The-Year Effect: Evidence From Pacific-Basin Emerging Markets. *Pacific-Basin finance journal*, *6*(3-4), 275-293.

Chui, A.C.W., Titman, S., & Wei, K.C.J. (2010). Individualism and Momentum Around the World. *Journal of Finance, 18*(2), 129-156

Chung, S., & Wei, P., (2005), The Relationship Between Bid–Ask Spreads and Holding Periods: The Case of Chinese A and B Shares. *Global Finance Journal 15*, 239–249

Claessens. S, Dasgupta, S & Glen, J. D.,(1995), The Cross-Section of Stock Returns: Evidence from Emerging Markets, *World Bank Policy Research Working Paper No. 1505*. Available at SSRN: http://ssrn.com/abstract=604986

Cochrane, J. H. (2005). *Asset Pricing* (2nd edition). Princeton University Press.

Cohen, J., Cohen, P., West, S.G., and Aiken, L.S. (2003). *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences* (3rd edition). Mahwah, NJ: Lawrence Earlbaum Associates.

CollegeStock. (2017), *Differences between the Pink Sheets and OTC/BB*. Streetdirectory.com Retrieved from http://www.streetdirectory.com/travel_guide/36618/investment/differences_between_the_pink_sheets_and_otcbb.html

Connolly, R. & Stivers, C. (2003), Momentum and Reversals in Equity-Index Returns During Periods of Abnormal Turnover and Return Dispersion, *Journal of Finance, Vol. 58*, 1521-55.

Conrad, J., & Kaul, G. (1998). An anatomy of trading strategies. *The Review of Financial Studies, 11*(3), 489-519. Retrieved from https://www.jstor.org/stable/pdf/2646008.pdf

Corhay, A. & Rad. T.A.. (1994). Statistical Properties of Daily Stock Returns: Evidence From European Stock Markets. *Journal of Business Finance and Accounting, 21*(2), 271-282.

Crane, A. D., Michenaud, S., & Weston, J. P. (2016). The Effect of Institutional Ownership on Payout Policy: Evidence from Index Thresholds. *The Review of Financial Studies, 29*(6), 1377-1408.

Cussen, M. P. (2018, June 4). Income, Value, and Growth Stocks, *Investopedia*. Retrieved from https://www.investopedia.com/articles/investing/080113/income-value-and-growth-stocks.asp

Czaja, M.G., & Scholz, H. (2007). Sensitivity of Stock Returns to Changes in the Term Structure of Interest Rates – Evidence from the German Market. *Operation Research Proceedings, 2006*, 305-310.

Daniel. J. B., John W. C.Jr., Steven D. D., & Bradford. D. J., (2006), Penny Stock IPOs, *Financial Management, 35*(1), 5-30

Daniel, K. & Titman, S. (1997). Evidence on the Characteristics of Cross-Sectional Variation in Stock Returns, *Journal of Finance, 52*, 1-33.

Datar, V. T., Narayan Y. N, & Radcliffe. R, (1998), Liquidity and Asset Returns: An Alternative Test, *Journal of Financial Markets, 1*, 203-219.

Davis, R. L.,Van Ness, B. F., & Van Ness, R. A. (2016). Information and Liquidity in the Modern OTC Marketplace. Available at SSRN: https://ssrn.com/abstract=2873853

De Bondt, W. & Thaler. R. (1985). Does the Stock Market Overreact? *Journal of Finance, 40*, 793-805.

Definition of Penny Stocks. (n.d.). *The Economic Times*. Retrieved from https://economictimes.indiatimes.com/definition/penny-stock

DeLong, J. B, Shleifer, A., Summers, L. H., & Waldmann. R. J. (1990). Noise Trader Risk in Financial Markets. *Journal of Political Economy, 98*(4): 703–38.

Dennis, P., Perfect, S., Snow, K., Wiles, K. (1995). The Effects of Rebalancing on Size and Book-to-Market Ratio Portfolio Returns, *Financial Analysts Journal, 51*(3), 47-57.

Dhakal, D., Kandil, M., & Sharma, S. C. (1993). Causality between the Money Supply and Share Prices: A VAR Investigation. *Quarterly Journal of Business and Economics*, 52-74. Retrieved from https://www.jstor.org/stable/pdf/40473092.pdf

Dimson, E. (1979), Risk Measurement When Shares are subject to Infrequent Trading, *Journal of Financial Economics. 7*(2). 197-226. Retrieved from https://s3.amazonaws.com/academia.edu.documents/

Ding, D. K., Chua, J. L. & Fetherston, T. A. (2005). The Performance of Value and Growth Portfolios in East Asia before The Asian Financial Crisis. *Pacific Basin Finance Journal, 13*(2), 185–199.

Do, G. Q., & Sriboonchitta, S. (2010). Cointegration and causality among international gold and ASEAN emerging stock markets. *Available at SSRN 1533919*. Retrieved from https://ssrn.com/abstract=1533919

Dos Santos, A. S., Neto, A. R., de Araujo, E. C., De Oliveira, L., & Abrita, M. B. (2013). Interaction between Macroeconomics Variables and IBOVESPA, Brazilian Stock Market Index. *Transnational Corporations Review, 5*(4), 81-95.

Drew.M.E.,& Veeraraghavan.M, (2003), Firm size, book-to-market equity and security returns: Evidence from Shanghai Stock Exchange, *Australian Journal of Management, 28*(2), 119-139

Drew.M.E, Veeraraghavan .M, & Min Ye, (2007), Do Momentum Strategies Work? Australian Evidence, *Managerial Finance, Vol. 33*(10), 772-787

Durham, J. B. (2003). Monetary Policy and Stock Price Returns. *Financial Analysts Journal, 59*(4), 26-35. Retrieved from http://dx.doi.org/10.2469/faj.v59.n4.2543

El-Nader, H. M., & Alraimony, A. D. (2012). The Impact of Macroeconomic Factors on Amman Stock Market Returns. *International Journal of Economics and Finance, 4*(12), 202.

Elbannan, M. A., (2015). The Capital Asset Pricing Model: An Overview of the Theory, *International Journal of Economics and Finance, 7*(1), 216-228

Eleswarapu, Venkat. R., & Marc R. Reinganum, (1993), The seasonal behavior of the liquidity premium in asset pricing, *Journal of Financial Economics, 34*, 373-386.

Elfakhani,S, Lockwood.L.J, & Zaher.T.S, (1998), Small firms and value effect in the Canadian Stock Market, *Journal of Financial Research, 21*(3), 277-291

Elly, D., & Oriwo, E. A. (2013). The Relationship Between Macro Economic Variables and Stock Market Performance in Kenya. *DBA Africa Management Review, 3*(1).

Erdinç, Y. (2017). Comparison of CAPM, Three-Factor Fama-French Model and Five-Factor Fama-French Model for the Turkish Stock Market. In *Financial Management from an Emerging Market Perspective*. IntechOpen. Retrieved from file:///C:/Users/user/AppData/Local/Microsoft/Windows/INetCache/IE/CKXA2EZS/57075.pdf or http://dx.doi.org/10.5772/intechopen.70867

Erdogan, E. & Ozlale, U. (2005). Effects of Macroeconomic Dynamics on Stock Returns: The Case of the Turkish Stock Exchange Market, *Journal of Economic Cooperation 26*(2), 69-90

Eraker, B., & Ready, M. (2015). Do investors overpay for stocks with lottery-like payoffs? An examination of the returns of OTC stocks. *Journal of Financial Economics, 115*(3), 486-504.

Erdem, C., Arslan, C. K., & Sema Erdem, M. (2005). Effects of Macroeconomic Variables on Istanbul Stock Exchange Indexes. *Applied Financial Economics, 15*(14), 987-994.

Eston E. C, (2016), Effect of Micro and Macro-Economic Factors on Financial Performance of Commercial Banks in Malawi. *Unpublished PhD Thesis in Business Administration, Jomo Kenyatta University of Agriculture and Technology, Kenya.* Retrieved from http://ir.jkuat.ac.ke/handle/123456789/2460

Eun, C.S., Shim, S., (1989). International transmission of stock market movements. *Journal of Financial and Quantitative Analysis, 24*, 241–256.

Fahmi, S., Geetha, C., & Mohidin, R. (2017), The Effect of Systematic Risk Factors on the Performance of the Malaysia Stock Market, *Proceedings of International*

Conference on Economics 2017, 57-68. Retrieved from http://www.ums.edu.my/fpep/files/Shameer.pdf

Falkenstein, E.G. (1996), Preferences for stock characteristics as revealed by mutual fund portfolio holdings*, Journal of Finance, 51*, 111-135

Fama, E F (1981), Stock Returns, Real Activity, Inflation and Money, *The American Economic Review, 71*, 115-46.

Fama, E F (1986), Term Premiums and Default Premiums in Money Markets, *Journal of Financial Economics, 17*(1), 175-96. Retrieved from http://dx.doi.org/10.1016/0304-405X(86)90010-3

Fama, E F., (1998), Market Efficiency, Long-Term Returns and Behavioral Finance, *Journal of Financial Economics, 49*, 283-306.

Fama, E. F., & French. K.R, (1988), Permanent and Temporary Components of Stock Prices, *Journal of Political Economy, 96*(2), 246-73. Retrieved from http://links.jstor.org/sici?sici=0022-3808%28198804%2996%3A2%3C246%3APATCOS%3E2.0.CO%3B2-B

Fama, E. F., & French. K.R, (1992), The Cross-Section of Expected Stock Returns, *Journal of Finance, 47*, 427-465.

Fama, E. F., & French. K.R, (1993), Common *Risk Factors in the returns on Stocks and Bonds, Journal of Financial Economics, 33*, 3-56.

Fama, E. F., & French. K.R, (1996), Multifactor Explanations of Asset Pricing Anomalies, *Journal of Finance, 51*, 55-84.

Fama, E., & French, K. (1997). Industry Costs of Equity. *Journal of Financial Economics, 43*, 153–193. Retrieved from http://dx.doi.org/10.2469/dig.v27.n4.158

Fama, E. F. & French, K. R. (1998), Value versus Growth: The International Evidence. *The Journal of Finance 53*(6), 1975–1999.

Fama, E. F., & French. K.R, (2004). The Capital Asset Pricing Model: Theory and Evidence. *Journal of Economic Perspectives, 18*(3), 25-46. Retrieved from http://www-personal.umich.edu/~kathrynd/JEP.FamaandFrench.pdf

Fama, E. F., & French. K.R, (2006). Profitability, Investment and Average Returns. *Journal of Financial Economics, 82*, 491–518.

Fama, E. F., & French. K.R, (2008). Dissecting Anomalies. *The Journal of Finance, 63*, 1653-1678.

Fama, E. F., & French. K.R, (2012). Size, Value and Momentum in International Stock Returns. *Journal of Financial Economics, 105*, 457-472.

Fama, E. F., & French. K.R, (2015). A Five-Factor Asset Pricing Model. *Journal of Financial Economics, 116*, 1-22.

Fama, E. F., & French, K. R. (2016). Dissecting Anomalies with a Five-Factor Model. *The Review of Financial Studies, 29*(1), 69-103.

Fama, E. F., & MacBeth. J. D, (1973), Risk, Return and Equilibrium: Empirical Tests, *Journal of Political Economy, 81*, 607-636.

Fayyad.A, & Daly.K, (2010), The Volatility of Market Returns: A Comparative Study of Emerging versus Mature Markets, *International Journal of Business and Management 5*(7), 24-36

Fedorova, E. A., & Pankratov, K. A. (2010). Influence of macroeconomic factors on the Russian stock market. *Studies on Russian Economic Development, 21*(2), 165-168. Retrieved from http://dx.doi.org/10.1134/S1075700710020061

Ferson, W. E., & Harvey, C. R. (1991). The Variation of Economic Risk Premiums. *Journal of Political Economy, 99*(2), 385-415.

Flannery, M.J., Protopapadakis, & Aris A., (2002*).* Macroeconomic Factors Do Influence Aggregate Stock Returns. *Review of Financial Studies, 15*(3), 751–782. Retrieved from https://www.jstor.org/stable/pdf/2696720.pdf?

Floros, C. (2008). The Influence of the Political Elections on the course of the Athens Stocks Exchange. *Managerial Finance 34*(7):479–488

Foong, Swee-Sim & Lim, Kian-Ping. (2016). Stock Market Liberalization and Cost of Equity: Firm-Level Evidence from Malaysia. *Asian Academy of Management Journal of Accounting and Finance (AAMJAF), 12*(1), 19-42. Retrieved from http://web.usm.my/journal/aamjaf/vol%2012-s-2016/aamjaf120s16_02.pdf

Fox, James Harold. (1958). Criteria of Good Research. *The Phi Delta Kappan, 39*(6). *What Research Says about Teaching and Learning (Mar., 1958)*. 284-286. Retrieved from http://www.jstor.org/stable/20342074

French, K.R., Schwert, G.W. & Stambaugh, R.F. (1987). Expected Stock Returns and Volatility. *Journal of Financial Economics, 19*, 3-29.

Frieder, L., & Zittrain, J. (2007). Spam works: Evidence from Stock Touts and Corresponding Market Activity. *Berkman Center Research Publiction No.2006-11(2007), Hastings Communications & Entertainment Law Journal, 30*, 479. Retrieved from http://nrs.harvard.edu/urn-3:HUL.InstRepos:4455162

Fu, Fangjian, (2005*),* Idiosyncratic Risk and the Cross-Section of Expected Stock Returns, *William E. Simon Graduate School of Business Administration working paper,*

Fu, F. (2009*),* Idiosyncratic Risk and the Cross-Section of Expected Stock Returns, *Journal of Financial Economics,91,* 24-37. Retrieved from https://pdfs.semanticscholar.org/ea4b/4b0e2f9328d93480a4dd12a5fcf27810ac19.pdf

Gan, C., Lee, M., Yong, H. H. A., & Zhang, J. (2006). Macroeconomic Variables and Stock Market Interactions: New Zealand Evidence. *Investment Management and Financial Innovations, 3*(4), 89-101.

Gannon, G., (2005), Simultaneous Volatility Transmissions and Spillover Effects: US and Hong Kong Stock and Futures Markets. *International Review of Financial-Analysis, 14* (3), 326–336.

Gathogo, P. M., Mungatu, J.K., & Mulyungi, P. (2017). Effect of Macro Economic Variables on Market Capiatlization of Firms Listed in Nairobi Stock Exchange. *European Journal of Business and Social Sciences, 6*(06), 182-194. Retrieved from https://www.researchgate.net/publication/321081795

Geetha, C., Mohidin, R., Chandran, V. V., & Chong, V. (2011). The Relationship between Inflation and Stock Market: Evidence from Malaysia, United States and China. *International Journal of Economics and Management Sciences, 1*(2), 1-16.

Gibbons, M. R., Ross, S. A., & Shanken, J. (1989). A Test of the Efficiency of a Given Portfolio. *Econometrica, 57*(5), 1121-1152. Retrieved from http://schwert.ssb.rochester.edu/f532/econ89_grs.pdf

Girish, G. P., & Vijayalakshmi, S. (2016). Is Stock Prices and Economic Activity in India Co-Integrated?. *Theoretical Economics Letters, 6*(02), 269.

Global Competitiveness Report 2015 : Malaysia, (2016). *Published by World Economic Forum*. Retrieved from http://reports.weforum.org/global-competitiveness-report-2015-2016/economies/#economy=MYS

Glosten, L., Jagannathan, R.& Runkle, D. (1993), Relationship between the Expected Value and the Volatility of the Nominal Excess Return on Stocks. *Journal of Finance, 48*, 1779-801.

Goyal. A, & Pedro Santa-Clara, (2003), Idiosyncratic Volatility Matters! *Journal of Finance 58*, 975-1007.

Gregorio, A., Kontonikas, A., MacDonald, R., & Montagnoli, A. (2009). Monetary policy shocks and stock returns: evidence from the British market. *Financial Markets and Portfolio Management, 23*(4), 401-410. Retrieved from http://dx.doi.org/10.1007/s11408-009-0113-2

Guo, Hui & Robert. S, (2006), Idiosyncratic Volatility, Stock Market Volatility and Expected Stock Returns*, Journal of Business and Economic Statistics 24*, 43-56.

Guo, Hui,(2004). Stock Prices, Firm Size, and changes in the Federal Funds Rate Target. *Q. Rev. Econ. Finance 44*, 487–507.

Gurgul, H., & Wójtowicz, T. (2014). The Impact Of US Macroeconomic News on the Polish Stock Market. *Central European Journal of Operations Research, 22*(4), 795-817.

Guru-Gharan, K. K., Rahman, M., & Parayitam, S. (2009). Influences of Selected Macroeconomic Variables on US Stock Market Returns and their Predictability Over Varying Time Horizons. *Academy of Accounting & Financial Studies Journal, 13*(1).

Habibullah, M., and A. Baharumshah, (1996). Money, Output, Stock Prices in Malaysia: An Application of Cointegration Tests. *International Economic Journal*, 121–130.

Habibullah, M. S. (1998). Money, Output and Stock Prices in Malaysia: Further Evidence. *Borneo review, 9*(2), 135.

Haldea, P. (2010, June). *Abridged Investors' Guide to the Capital Market*, Under the aegis of Investor Education and Protection Fund, National Stock Exchange of India Ltd., and Ministry of Corporate Affairs, Government of India. Retrieved from https://www.nseindia.com/invest/resources/download/prs_guide_english.pdf

Hameed, A. & Kusnadi, Y. (2002*).* Momentum Strategies: Evidence from Pacific Basin Stock Markets, *Journal of Finance Research, 25*, 383-97.

Hanke, M., & Hauser, F. (2008). On the Effects of Stock Spam E-Mails. *Journal of Financial Markets, 11*(1), 57-83.

Harris, J. H., Panchapagesan, V., & Werner, I. M. (2008). Off but not gone: A Study of Nasdaq Delistings. *Working Paper, Ohio State University*.

Harris, L. (1999). Trading in Pennies: A Survey of the Issues. *Unpublished working paper, University of Southern California,* 1-13.

Haroon, M. A., & Jabeen, H. (2013). Impact of Macro-Economic Variables on Share Price Behavior of Karachi Stock Exchange. *Pakistan Journal of Commerce and Social Sciences, 7*(3), 493-504.

Hasanzadeh, A., & Kianvand, M. (2012). The Impact of Macroeconomic Variables on Stock Prices: The Case of Tehran Stock Exchange. *Money and Economy, 6*(2).

Hasbrouck, J., (2006), Trading Costs and Returns for US Equities: Estimating Effective Costs from Daily Data*, Working paper, University of New York*

Haugen, R. A. & Baker, N. L. (1996), Commonality in the Determinants of Expected Stock Returns. *Journal of Financial Economics 41*(3), 401–439.

Herriott J. (2001), Financial Development and Growth in Switzerland. *Duke Journal of Economics, Vol. 13, Spring 2001.* (Duke University, Durham, NC thesis)

Herve, D. B. G. H., Chanmalai, B., & Shen, Y. (2011). The Study of Causal Relationship between Stock Market Indices and Macroeconomic Variables in Cote d'Ivoire: Evidence from Error-Correction Models and Granger Causality Test. *International Journal of Business and Management, 6*(12), 146.

Hess, M. (2003). Sector Specific Impacts of Macroeconomic Fundamentals on the Swiss Stock Market. *Financial Markets and Portfolio Management, 17*(2), 234-245. Retrieved from http://ciep.itam.mx/~mhess/downloadresearch/textfmpm.pdf

Ho, C., & Hung, C., (2009), Investor Sentiment as Conditioning Information in Asset Pricing. *Journal of Banking and Finance 33*, 892–903

Hondroyiannis, G., Lolos, S., & Papapetrou, E. (2005). Financial Markets and Economic Growth in Greece, 1986–1999. *Journal of International Financial Markets, Institutions and Money, 15*(2), 173-188.

Hooker, M. A. (2004). Macroeconomic Factors and Emerging Market Equity Returns: A Bayesian Model Selection Approach. *Emerging Markets Review, 5*(4), 379-387.

Hosseini, S. M., Ahmad, Z., & Lai, Y. W. (2011). *The Role oOf Macroeconomic Variables on Stock Market Index in China and India*. International Journal of *Economics and Finance, 3*(6), 233.

How GST affecting our Share Investment? (2015, March 30). Retrieved from https://financemalaysia.blogspot.com/2015/03/how-gst-affecting-our-share-investment.html

How Penny Stocks Shares Trading Create Millionaires Every Day. (2013, June 30). Retrieved from https://news.malaysianreview.com/3132/how-penny-stocks-shares-trading-create-millionaires-every-day/

Hsing, Y. (2011a). Effects of Macroeconomic Variables on the Stock Market: The Case of the Czech Republic. *Theoretical and Applied Economics, 7*(7), 53.

Hsing, Y. (2011b). The Stock Market and Macroeconomic Variables in a BRICS Country and Policy Implications. *International Journal of Economics & Financial Issues, 1*(1), 12.

Huang, W., Liu, Q., Rhee, S. G., & Zhang, L. (2009). Return Reversals, Idiosyncratic Risk, and Expected Returns. *The Review of Financial Studies, 23*(1), 147-168.

Huang, Z. (2016). Are Profitability and Investment Good Proxies for Risk Factors? The Analysis on Fama and French's Five-Factor Model. In *3rd International Conference on Management Science and Management Innovation (MSMI 2016, August)*. Atlantis Press. 200-203. Retrieved from

Hu, J. W., Chen, M. Y., Fok, R. C., & Huang, B. N. (1997). Causality in Volatility and Volatility Spillover Effects between US, Japan And Four Equity Markets In The South China Growth Triangular. *Journal of International Financial Markets, Instituition and Money , 7*, 351 - 367.

Humpe, A., & Macmillan, P. (2009). Can Macroeconomic Variables Explain Long-Term Stock Market Movements? A Comparison of the US and Japan. *Applied Financial Economics, 19*(2), 111-119.

Hunjra, A. I., Chani, M. I., Ijaz, M. S., Farooq, M., & Khan, K. (2014). The Impact of Macroeconomic Variables on Stock Prices in Pakistan. *Munich Personal RePEc Archive Paper No. 60791.* Retrieved from http://mpra.ub.uni-muenchen.de/60791/

Husni, T. (2006). Momentum strategies and Trading Volume Turnover in Malaysian Stock Exchange. *Jurnal Widya Manajemen & Akuntansi, 6*(1), 42-51

Hussain, M. M., Aamir, M., Rasool, N., Fayyaz, M., & Mumtaz, M. (2012). The Impact of Macroeconomic Variables on Stock Prices: An Empirical Analysis of Karachi Stock Exchange. *Mediterranean Journal of Social Sciences, 3*(3), 295-312.

Hussin, M. Y. M., Muhammad, F., Abu, M. F., & Awang, S. A. (2012). Macroeconomic variables and Malaysian Islamic Stock Market: A Time Series Analysis. *Journal of Business Studies Quarterly, 3*(4), 1.

Hwang, Chuan-Yang & Qian, Xiaolin, (2010). Information Risk and Momentum Anomalies, Retrieved from SSRN http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1688206

Ibrahim, F. W., & Abdul Rahman, R. (2003). Speculative Influences in Stock Market: A Case Study of Kuala Lumpur Stock exchange. *In MFA 5th Annual Symposium* 620-638.

Ibrahim, M. (1999). Macroeconomic Variables and Stock Prices in Malaysia: An Empirical Analysis. *Asian Economic Journal, 13*(2), 219-231.

Ibrahim, M. (2003). Macroeconomic Forces and Capital Market Integration: A VAR Analysis For Malaysia. *Journal of the Asia Pacific Economy, 8*(1), 19-40.

Ibrahim, M. H. (2000). Cointegration and Granger Causality Tests of Stock Price and Exchange Rate Interactions in Malaysia. *ASEAN Economic Bulletin 17*(1), 36-47

Ibrahim, M. H. (2002). Volatility Interactions between Stock Returns and Macroeconomic Variables: Malaysian Evidence. *Savings and Development, 26*(2), 183-195. Retrieved from http://www.jstor.org/stable/25830793

Ibrahim, M. (2003). Macroeconomic Forces and Capital Market Integration: A VAR Analysis for Malaysia. *Journal of The Asia Pacific Economy, 8*(1), 19-40.

Ibrahim, M. H. (2011). Stock Market Development and Macroeconomic Performance in Thailand. *Engineering Economics, 22*(3), 230-240.

Ibrahim, M, & Musah, A. (2014). An Econometric Analysis of the Impact of Macroeconomic Fundamentals on Stock Market Returns in Ghana. *Research in Applied Economics, 6*(2), 47.

Ibrahim, M. H., & Wan-Yusoff, W. S. (2001). Macroeconomic Variables, Exchange Rate and Stock Price: A Malaysian Perspective, *International Journal of Economics, Management and Accounting, 9*(2). Retrieved from http://journals.iium.edu.my/enmjournal/index.php/enmj/article/view/70

Ibrahim, M. H., & Aziz, H. (2003). Macroeconomic Variables and The Malaysian Equity Market: A View Through Rolling Subsamples. *Journal of Economic Studies, 30*(1), 6-27. Retrieved from https://doi.org/10.1108/01443580310455241

Ibrahim, T. M., & Agbaje, O. M. (2013). The Relationship between Stock Return and Inflation in Nigeria. *European Scientific Journal, ESJ, 9*(4), 146-157. Retrieved from https://eujournal.org/index.php/esj/article/viewFile/772/806

Ilyas, M., Ahmad, H.K., Afzal, M., & Mahmood, T., (2010). Determinants of Manufacturing Value Added in Pakistan: An Application of Bounds Testing Approach to Cointegration. *Pakistan Economic and Social Review, 48*(2) (Winter 2010), 209-223

Important Information on Penny Stocks. (2011). Retrieved from https://www.sec.gov/investor/schedule15g.htm

Indonesia Stock Exchange, Available at www.idx.co.id

Iqbal, N., Khattak, S. R., & Khattak, M. A. (2013). Relationship between Macroeconomic Variables and KSE-100 Index: Evidence from Pakistan. *Knowledge Horizons. Economics, 5*(4), 10-105. Retrieved from http://www.orizonturi.ucdc.ro/arhiva/2013_khe_4_pdf/khe_vol_5_iss_4_101to105.pdf

Ismail, R., Pervaz, A., Ahmed, A., & Iqbal, R. (2016). Macroeconomic Factors and the Pakistani Equity Market: A Relationship Analysis. *International Journal of Innovation and Applied Studies, 15*(1), 122-129.

Issahaku, H., Ustarz, Y., & Domanban, P. B. (2013). Macro-economic Variables and Stock Market Returns in Ghana: Any Causal Link. *Asian Econ. Finance Rev, 3*(8), 1044-1062.

Izedonmi, P. F., & Abdullahi, I. B. (2011). The Effects of Macroeconomic Factors on the Nigerian Stock Returns: A Sectoral Approach. *Global Journal of Management and Business Research, 11*(7), 25-29.

Jacoby, G., Fowler, D.J., & Gottesman, A.A., (2000). The Capital Asset Pricing Model and the Liquidity Effect: A Theoretical Approach. *Journal of Financial Markets 3*, 69–81.

Jain, Archana and Jain, Chinmay, (2017, July 10). Is Short Selling in OTC Stocks Informative? *SSRN Electronic copy.* Retrieved from: http://dx.doi.org/10.2139/ssrn.2776311

Jankowitsch, R., Nashikkar, A., & Subrahmanyam, M.G., (2011). Price Dispersion in OTC Markets: A New Measure of Liquidity. *Journal of Banking and Finance 35*, 343–357.

Janor, H., Halid, N., & Abdul Rahman, A. (2005). Stock Market and Economic Activity in Malaysia. *Investment Management and Financial Innovations, 2*(4), 116-123.

Jareño, F., & Negrut, L. (2016). US Stock Market and Macroeconomic Factors. *Journal of Applied Business Research, 32*(1), 325.

Jarque, C.M. & Bera, A.K. (1980) Efficient Tests for Normality, Homoscedasticity and Serial Independence of Regression Residuals. *Economics Letters 6(*3), 255–259.

Jegadeesh,N & Titman.S, (1993), Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency, *Journal of Finance, 48*, 65-91.

Jegadeesh,N & Titman.S, (2001), Profitability of Momentum Strategies: An Evaluation of Alternative Explanations, *Journal of Finance, 56*, 699-720.

Jegadeesh,N.,(1990), Evidence of Predictable Behavior of Security Returns, *Journal of Finance, 45*, 881-898.

Jensen, G.R., Mercer, J.M., & Johnson, R.R., (1996). *Business Conditions, Monetary Policy, and Expected Security Returns*. *Journal of Financial Economics, 40*(2), 213–237.

Jensen, G.R. & Theodore M., (2010), Inter-Temporal Variation in the Liquidity Premium*, Journal of Financial Economics, 98*, 338-358.

Jiang, George J., Tong Yao & Tong Yu, (2007), Do Mutual Funds Time the Market? Evidence from Portfolio Holdings, *Journal of Financial Economics, 86*, 724-758.

Jiang, John (Xuefeng) and Petroni, Kathy R. and Wang, Isabel Yanyan. (2014). Private Intermediary Innovation and Market Liquidity: Evidence from the Pink Sheets Tiers of the OTC Market. *SSRN Electronic copy.* Retrieved from: http://dx.doi.org/10.2139/ssrn.1927295

Jiang, X., & Lee, B. S. (2006). On The Dynamic Relation Between Returns and Idiosyncratic Volatility, *Financial Management*, *35*(2), 43-65.

Johansen, S., Juselius, K., (1990). Maximum Likelihood Estimation and Inference on Cointegration – With Applications to The Demand for Money. *Oxford Bulletin of Economics and Statistics, 52*, 169–210.

Johansson, A. C., & Ljungwall, C. (2009). Spillover Effects among the Greater China Stock Markets. *World Development, 37*(4), 839 - 851.

Jorg, D & Christian, P. (2006). Politics and the stock market: Evidence from Germany. European Journal of Political Economy, 22, 925-943.

Joseph, N. L., & Vezos, P. (2006). The Sensitivity of US Banks' Stock Returns to Interest Rate and Exchange Rate Changes. *Managerial Finance, 32*(2), 182-199. Retrieved from http://dx.doi.org/10.1108/03074350610641937

Kadir, S. U. S. A., & Tunggal, N. Z. (2015). The Impact of Macroeconomic Variables Toward Agricultural Productivity in Malaysia. *South East Asia Journal of Contemporary Business, Economic and Law, 8*(3), 21-27

Kalra, R. (2012). Impact of Macroeconomic Variables on Indian Stock Market. *IUP Journal of Financial Risk Management, 9*(1), 43. Retrieved from SSRN: https://ssrn.com/abstract=2153681

Kalra. V., & Celis. C. (2016). Introducing Profitability: A Systematic Equity Strategy Factor. *MSCI Research Insight, (June 2016)*, 1-8. Retrieved from https://www.msci.com/documents/10199/2ef5bba7-8448-44da-bdb3-0a102374c8d3

Kalyanaraman, L., & Al Tuwajri, B. (2014). Macroeconomic Forces and Stock Prices: Some Empirical Evidence from Saudi Arabia. *International Journal of Financial Research, 5*(1), 81.

Kan, Y. Y., & Lim, G. C. (2015). Structural Break and Cointegration in Malaysian Stock Market. *International Proceedings of Economics Development and Research (IPEDR), 84,* 25-43

Karacaer, S., & Kapusuzoglu, A. (2010). Investigating Causal Relations among Stock Market and Macroeconomic Variables: Evidence from Turkey. *International Journal of Economic Perspectives, 4*(3), 501.

Karolyi, G. A., & Sanders, A. B. (1998). The Variation of Economic Risk Premiums in Real Estate Returns. *The Journal of Real Estate Finance and Economics, 17*(3), 245-262.

Karpoff, J. M. (1987). The Relation between Price Changes and Trading Volume: A Survey. *Journal of Financial and quantitative Analysis*, *22*(1), 109-126.

Kasimati, E. & Dawson, P. (2009). Assessing the Impact of the 2004 Olympic Games on the Greek Economy: A Small Macro-Econometric Model. Economic Modeling, 26, 139-146.

Kaul, G., (1987). Stock Returns and Inflation: The Role of the Monetary Sector. *Journal of Financial Economics 18*(2), 253–276.

Keene, M., Peterson, D.,(2007), The Important of Liquidity as a Factor in Asset Pricing. *Journal of Financial Research, 30*, 91–109.

Keim, D.,& Stambaugh, R. F., (1986). Predicting Returns in the Stock and the Bond Markets, *Journal of Financial Economics, 17*, 357–390.

Kenton, W. (2017, Nov). Financial Analysis: Kurtosis. *Investopedia*. Retrieved from https://www.investopedia.com/terms/k/kurtosis.asp

Keynote Address at Invest Malaysia 2015. (2015, April 23). Retrieved from https://www.najibrazak.com/bm/speeches/keynote-address-at-invest-malaysia-2015/

Khan, A. (2014). How Does Stock Prices Respond to Various Macroeconomic Factors? A Case Study of Pakistan. *Journal of Management Info, 4*(1), 75-95.

Khan, A., Ahmad, H., & Abbas, Z. (2011). Impact of Macro-Economic Factors on Stock Prices. *Interdisciplinary Journal of Contemporary Research in Business, 3*(1), 472-483.

Khan, M. N., Tantisantiwong, N., Fifield, S. G., & Power, D. M. (2015). The Relationship Between South Asian Stock Returns and Macroeconomic Variables. *Applied Economics, 47*(13), 1298-1313. Retrieved from https://doi.org/10.1080/00036846.2014.995360

Khan, W. A., Javed, M. A., Shahzad, N., Sheikh, Q., Saddique, S., Riaz, M., & Batool, S. (2014). Impact of Macroeconomics Variable on the Stock Market Index; A Study from Pakistan. *International Journal of Accounting and Financial Reporting, 4*(2), 258.

Kibria, U., Mehmood, Y., Kamran, M., Arshad, M. U., Perveen, R., & Sajid, M. (2014). The Impact of Macroeconomic Variables on Stock Market Returns: A Case of

Pakistan. *Research Journal of Management Sciences, 3*(8). Retrieved from https://www.researchgate.net/publication/321319039_The_Impact_of_Macroeconomic_Variables_on_Stock_Market_Returns_A_Case_of_Pakistan

Kilian, L., & Park, C. (2009). The Impact of Oil Price Shocks on the U.S. Stock Market. *International Economics Review, 50*(4), 1267-1287. Retrieved from http://dx.doi.org/10.1111/j.1468-2354.2009.00568.x

Kim, K. A., & Nofsinger, J. R. (2008). Behavioral Finance in Asia. *Pacific-Basin Finance Journal, 16*(1), 1–7. Retrieved from https://doi.org/10.1016/j.pacfin.2007.04.001

King, B. F. (1966). Market and Industry Factors in Stock Price Behavior. *The Journal of Business, 39*(1), 139-190. Retrieved from http://www.jstor.org/stable/pdf/2351742.pdf?refreqid=excelsior:ab7eaabc1e1ea71a2de00717852e14d6

King, M. R. (2009). The Cost of Equity for Global Banks: A CAPM Perspective from 1990 To 2009. *BIS Quarterly Review, 9*, 59–73.

Kolluri, B., & Wahab, M. (2008). Stock returns and expected inflation: evidence from an asymmetric test specification. *Review of Quantitative Finance and Accounting, 30*(4), 371-395. Retrieved from http://dx.doi.org/10.1007/s11156-007-0060-9

Korea Stock Exchange http://eng.krx.co.kr/m7/m7_1/m7_1_1/JHPENG07001_01.jsp

Krueger, T.M., & Kennedy, W.F., (1990). An Examination of the Super Bowl Stock Market Predictor. *Journal of Finance, 45*(2), 691–697.

Kumar, R. (2013). The Effect of Macroeconomic Factors on Indian Stock Market Performance: A Factor Analysis Approach. *IOSR Journal of Economics and Finance (IOSR-JER), 1*(4), 14-21.

Kurov, A. (2010). Investor Sentiment and the Stock Market's Reaction to Monetary Policy. *Journal of Banking & Finance, 34*(1), 139–149. Retrieved from https://doi.org/10.1016/j.jbankfin.2009.07.010

Kuwornu, J. K. (2012). Effect of Macroeconomic Variables on the Ghanaian Stock Market Returns: A Co-Integration Analysis. *Agris on-line Papers in Economics and Informatics, 4*(2), 1-12.

Kwon, C. S., Shin, T. S., & Bacon, F. W. (1997). The Effect of Macroeconomic Variables on Stock Market Returns in developing markets. *Multinational Business Review, 5*(2), 63

Kyereboah-Coleman, A., & Agyire-Tettey, K. F. (2008). Impact of Macroeconomic Indicators on Stock Market Performance: The case of the Ghana Stock Exchange. *The Journal of Risk Finance, 9*(4), 365-378.

Kyle, A.S., (1985), Continuous Auctions and Insider Trading, *Econometrica 53*, 1315–1335.

L'Her, J., Masmoudi, T., & Suret, J., (2004). Evidence to Support the Four-Factor Pricing Model from the Canadian Stock Market. *Journal of International Financial Markets, Institutions and Money, 14*, 313–328.

Lagoarde-Segot, T., (2009). Financial Reforms and Time-Varying Microstructures in Emerging Equity Markets. *Journal of Banking and Finance, 33*, 1755–1769

Lai, Ming-Ming., Chong Lee-Lee., & Tan, Siow-Hooi. (2010). *Behavioral Finance in Malaysia In Handbook of Behavioral Finance* (Edited by Brian Bruce), Chap.21, UK:Edward Elgar Publishing Ltd. Retrieved from https://doi.org/10.4337/9781849809108

Lakonishok, J. & Shapiro, A. (1984). Stock Returns, Beta, Variance and Size: An Empirical Analysis. *Financial Analysts Journal, 40,* 36-41.

Lakonishok, J. & Shapiro, A. (1986). Systematic Risk, Total Risk and Size as Determinants of Stock Market Returns, *Journal of Banking and Finance, 10*, 115-132

Lamoureux, C.G. & Lastrapes, W.D. (1994), Endogenous Trading Volume and Momentum in Stock-Return Volatility, *Journal of Business and Economics, 12*, 253-261.

Leeds, P. (2011). *Invest in Penny Stocks: A Guide to Profitable Trading,* Hoboken, NJ : John Wiley & Sons, Inc.

Leeds, P. (2016). *Penny Stocks For Dummies* (2nd.ed), Hoboken, NJ : John Wiley & Sons, Inc.

Lee, C.M.C. & Swaminathan, B. (2000), Price Momentum and Trading Volume, *Journal of Finance, 55*, 2017-2069

Lehmann, Bruce, (1990a). Residual Risk Revisited, *Journal of Econometrics, 45*, 71-97.

Lehmann, Bruce, (1990b). Fads, Martingales and Market Efficiency, *Quarterly Journal of Economics, 105*, 1-28.

Lemmon, M., Portniaguina, E. (2006). Consumer Confidence and Asset Prices: Some Empirical Evidence. *Review of Financial Studies, 19*, 1499–1529.

Leong, Choon Chiang & Hui, Tak Kee. (2009, June). Macro-Economic and Non-Macroeconomic Variables Link to Singapore Hotel Stock Returns. *In 2009 Oxford Business & Economics Conference Program, Oxford University,* 1-12.

Leong, Choon-Chiang & Hui, Tak-Kee. (2014). *Macroeconomic and Non-Macroeconomic Variables Linking to Singapore Hotel Stock Returns*. Advances in Hospitality and Leisure (pp. 21-36). Emerald Group Publishing Limited.

Leuz, C., Triantis, A., & Wang, T. Y. (2008). Why Do Firms Go Dark? Causes and Economic Consequences of Voluntary SEC Deregistrations. *Journal of Accounting and Economics, 45*(2), 181-208.

Li, Q., Yang, J., Hsiao, C. & Chang, Y.J. (2004). *The Relationship between Stock Returns and Volatility in International Stock Markets.* (Unpublished Dissertation). Texas A&M University, USA.

Li, Q., Wang, T., Li, P., Liu, L., Gong, Q., & Chen, Y. (2014). The Effect of News and Public Mood on Stock Movements. *Information Sciences, 278*, 826-840. Retrieved from https://doi.org/10.1016/j.ins.2014.03.096

Li, Y. D., İşcan, T. B., & Xu, K. (2010). The Impact of Monetary Policy Shocks on Stock Prices: Evidence from Canada and the United States. *Journal of International Money and Finance, 29*(5), 876-896. Retrieved from http://dx.doi.org/10.1016/j.jimonfin.2010.03.008

Liew, V. K. S., & Rowland, R. (2016). The Effect of Malaysia General Election on Stock Market Returns. *SpringerPlus, 5(*1), 1975.

Limkriangkrai, M., Durand, R., & Watson, I., (2008). Is Liquidity the Missing Link? *Accounting and Finance, 48*, 829–845.

Lintner, John, (1965), The Valuation of Risky Assets and the Selection of Risky Investment in Stock Portfolio and Capital Budgets, *Review of Economics & Statistics, 47*, 13-37.

Lipinsky, F., & Ong, L. L. (2014). Asia's Stock Markets: Are there Crouching Tigers and Hidden Dragons?. *IMF Working Paper No. 14/37.* Available at SSRN: https://ssrn.com/abstract=2411585

Litvak, Kate, (2009, May 3). Summary Disclosure and the Efficiency of the OTC Market: Evidence from the Recent Pink Sheets Experiment. Retrieved from SSRN: http://dx.doi.org/10.2139/ssrn.1443595

Liu, W. (2006), A Liquidity Augmented Capital Asset Pricing Model, *Journal of Financial Economics, 82*(3), 631-71.

Liu, Qianqiu, Rhee, S. Ghon and Zhang, Liang, (2011). On the Trading Profitability of Penny Stocks, *24th Australasian Finance and Banking Conference 2011 Paper*. Retrieved from SSRN: http://dx.doi.org/10.2139/ssrn.1917300

Liu, Qianqiu, Rhee, S. Ghon and Zhang, Liang, (2013), Too Good to Ignore? A Primer on Listed Penny Stocks, Retrieved from SSRN: http://ssrn.com/abstract=196867

Liu, Qianqiu and Rhee, S. Ghon and Zhang, Liang, (2015, February 13). Limits-to-Arbitrage in US Penny Stocks: An Overlooked Segment of US Equity Markets. *Asian Finance Association (AsianFA) 2015 Conference Paper.* Retrieved from SSRN: http://dx.doi.org/10.2139/ssrn.2564798

London Stock Exchange, Available at www.londonstockexchange.com

Loughran, T. & Ritter. J., (2002), Why Don't Issuers Get Upset About Leaving Money on the Table in IPOs?, *Review of Financial Studies, 15*, 413-443.

Low, Chee Keong, 2004, A framework for the delisting of penny stocks in Hong Kong, *North Carolina Journal of International Law and Commercial Regulation,* 30, 76-120.

Lucas, R. E., Jr., (1978), Asset Pricing in an Exchange Economy, *Econometrica, 46,* 1429–1445.

Luft, C., Levine, L. M., & Larson, S. (2001). Over The Counter Bulletin Board Exchange: Market Structure, Risk and Return. *The Journal of Alternative Investments, 4*(2), 33-42

Luft, C., & Levine, L. M. (2004). Over The Counter Bulletin Board Exchange: The Impact of Liquidity and Size to Return, Volatility and Bid/Ask Spread. *The Journal of Alternative Investments, 7*(3), 95-106.

Macey, J., O'Hara, M., & Pompilio, D. (2008). Down and Out in the Stock Market: The Law and Economics of the Delisting Process. *The Journal of Law and Economics, 51*(4), 683-713. Retrieved from DOI: https://doi.org/10.3905/jai.2004.461461

Maghayereh, A. (2002). Causal Relations among Stock Prices and Macroeconomic Variables in the Small. *Open Economy of Jordan.[Online]*.

Mahmood, W & Dinniah, N. (2009). Stock Returns and Macroeconomics Variables: Evidence from the Six Asian-Pacific Countries. *International Research Journal of Finance and Economics, 30,* 154-162.

Majid, M., & Yusof, R. M. (2009). Long-run relationship between Islamic stock returns and macroeconomic variables: An application of the autoregressive distributed lag model. *Humanomics, 25*(2), 127-141.

Maku, O. E., & Atanda, A. A. (2010). Determinants of Stock Market Performance in Nigeria: Long-run Analysis. *Journal of Management and Organizational Behaviour. 1(3),* (November). MPRA Paper No. 35838. Retrieved from http://mpra.ub.uni-muenchen.de/35838/

Malaysia : Liberalization Measures – A Fine Balancing Act. (2009, June 30). *Economy AMB 2009/0031*. Retrieved from http://www.ambmutual.com.my/publications/economic%20reports/2009/June/Malaysia%20-%20New%20Liberalization%20Measures.pdf

Malaysia : Stock market capitalization in dollars, (Measure : US Billion Dollars; Source : The World Bank). (n.d). Retrieved from http://www.theglobaleconomy.com/Malaysia/stock_market_capitalization_dollars/

Malaysia : Stock market capitalization percent of GDP, (Measure : percent; Source : The World Bank). (n.d). Retrieved from http://www.theglobaleconomy.com/Malaysia/Stock_market_capitalization/

Malaysian Capital Market, (2015). Securities Commission Malaysia 2015 Annual Report. Retrieved from https://www.sc.com.my/wp-content/uploads/eng/html/resources/annual/ar2015_eng/part5.pdf

Malkiel, Burton G., & Yexiao Xu,(2002*),* Idiosyncratic Risk and Security Returns, *Working paper, University of Texas at Dallas.*

Markowitz, H. (1952). Portfolio Selection. *The Journal of Finance, 7*(1), 77-91.

Massoud, N., Ullah, S., & Scholnick, B. (2016). Does it help Firms to Secretly Pay for Stock Promoters?. *Journal of Financial Stability, 26*, 45-61.

Masuduzzaman, M. (2012). Impact of the Macroeconomic Variables on the Stock Market Returns: The Case of Germany and the United Kingdom, *Global Journal of Management and Business Research, 12*(6), 23-34

Mat Nor, F., Ibrahim, I., & Rashid, M. (2013). Exposure to Investor Sentiment in Malaysia: Services versus Manufacturing Stocks. *Global Business Economics Anthology, 1*, 239-248.

Mat Nor, F., Rashid, M., Ibrahim, I., & Yunyi, B. (2014). Investor Sentiment and Bank Deposits in Malaysia: Do Bank Managers Time the Market while Pricing Deposits?. *Journal of Finance and Financial Services, 1*(1), 71-84.

Maysami, R. C., Howe, L. C., & Rahmat, M. A. (2005). Relationship between Macroeconomic Variables and Stock Market Indices: Cointegration Evidence from Stock Exchange of Singapore's All-S Sector Indices. *Jurnal Pengurusan (UKM Journal of Management)*, 24.

McQueen, G., & Roley, V.V., (1993). Stock Prices, News and Business Conditions. *Review of Financial Studies, 92*, 307–328

Merton, R. C., (1973*), An Intertemporal Capital Asset Pricing Model*, *Econometrica: Journal of the Econometric Society, 41,* 867-887.

Merton, R.C., (1987), Presidential Address: A Simple Model Of Capital Market

Mohammad, S. D., Hussain, A., Ali, A., & Jalil, M. A. (2009). Impact of Macroeconomics Variables on Stock Prices: Emperical Evidance in Case of Kse (Karachi Stock Exchange). *European Journal of Scientific Research, 38*(1), 96-103

Mohanamani, P., & Sivagnanasithi, T. (2014). Indian Stock Market and Aggregates Macroeconomic Variables: Time Series Analysis. *IOSR Journal of Economics & Finance, 3*(6), 68-74.

Mollick, A. V., & Assefa, T. A. (2013). US Stock Returns and Oil Prices: The Tale from daily data and the 2008–2009 Financial Crisis. *Energy Economics, 36,* 1-18.

Moyer, R. C., McGuigan, J. R., & Kretlow, W. J. (2001). *Contemporary Financial Management* (8th ed.). Ohio: South-Western, Cincinnati.

Mukherjee, K., N., & Mishra, R.K. (2006), Information Leadership and Volatility Spillover Across the Countries: A Case of Indian and Other Asian Equity Markets. *Indian Institute of Capital Markets 9th Capital Markets Conference Paper, 2006*

Mukherjee, P.; S. Bose; & D. Coondoo (2002), Foreign Institutional Investment in the Indian Equity Market: An Analysis of Daily Flows During January 1999–May 2002, *Money and Finance, 2*, Nos. 9–10 (April–September): 21–51.

Mukherjee. P, & Bose . S, (2008), Does the Stock Market in India Move with Asia? A Multivariate Cointegration–Vector Autoregression Approach, *Emerging Markets Finance & Trade , 44* (5), 5–22.

Mukherjee. P, & Coondoo. D, (2004),. Components of Volatility and Their Empirical Measures: A Note, *Applied Financial Economics 14*(18), 1313–1318.

Mullins, D., 1982. Does the Capital Asset Pricing Model Work? *Harvard Business Review. [online].* Retrieved from: https://hbr.org/1982/01/does-the-capital-asset-pricing-model-work

Muradoglu, G., Taskin, F., & Bigan, I. (2000). Causality between Stock Returns and Macroeconomic Variables in Emerging Markets. *Russian & East European Finance and Trade, 36*(6), 33-53.

Murthy, U., Anthony, P., & Vighnesvaran, R. (2016). Factors Affecting Kuala Lumpur Composite Index (KLCI) Stock Market Return in Malaysia. *International Journal of Business and Management, 12*(1), 122.

Mutuku, C., & Ng'eny, K. L. (2014). Macroeconomic Variables and the Kenyan Equity Market: A Time Series Analysis. *Business and Economic Research, 5*(1), 1-10.

Naifar, N., & Al Dohaiman, M. S. (2013). Nonlinear Analysis among Crude Oil Prices, Stock Markets' Return and Macroeconomic Variables. *International Review of Economics & Finance, 27,* 416-431.

Naik, P. K. (2013). Does Stock Market Respond to Economic Fundamentals? Time-series Analysis from Indian Data. *Journal of Applied Economics & Business Research, 3*(1).

Naik, P. K., & Padhi, P. (2012*).* Interaction of Macroeconomic Factors and Stock Market Index: Empirical Evidence from Indian Data. *MPRA Paper No.38980.* Retrieved from https://mpra.ub.uni-muenchen.de/38980/2/MPRA_paper_38980.pdf

Naseri, M., & Masih, M. (2013). Causality between Malaysian Islamic Stock Market and Macroeconomic Variables. *Munich Personal RePEc Archive Paper No. 60247.* Retrived from http://mpra.ub.uni-muenchen.de/60247/

Nelson, K. K., Price, R. A., & Rountree, B. R. (2013). Are Individual Investors Influenced by the Optimism and Credibility of Stock Spam Recommendations? *Journal of Business Finance & Accounting, 40*(9-10), 1155-1183.

Newey, Whitney K., and Kenneth D. West, 1987, A Simple Positive-Definite Heteroskedasticity and Autocorrelation Consistent Covariance Matrix, *Econometrica 55*, 703-708.

Ng, V.K., Chang, R.P.& Chou, R. (1991). An Examination of The Behavior Of International Stock Market Volatility, in *Rhee, S.G. and Chang, R.P. (eds.), Pacific-Basin Capital Market Research, 2* (North-Holland, Amsterdam), 245-60.

Nguyen, D., Mishra, S., Prakash, A., & Ghosh, D., (2007*).* Liquidity and Asset Pricing Under the Three-Moment CAPM Paradigm. *Journal of Financial Research, 30,* 379–398.

Nickolas, S. (2018, Nov). Asset Allocation: The Difference Between the Expected Return and the Standard Deviation of a Portfolio. *Investopedia*. Retrieved from https://www.investopedia.com/ask/answers/042815/what-difference-between-expected-return-and-standard-deviation-portfolio.asp

Nieuwerburgh, S.V., Buelens, F., & Cuyvers, L. (2006). Stock Market Development and Economic Growth in Belgium. *Explorations in Economic History, 43*(1), 13-38.

Nikkinen, J., Omran, M., Sahlstrom, P., and Aijo, J. (2008). The Effects of US Macroeconomic News Announcements on Emerging Stock Markets in the Asian-Pacific Region. *Asia Journal of Economics, 12*(1)

Nisha, N. (2015a). *Sensitivity Analysis of Macroeconomic Variables and Stock Returns: A Cross-Country Comparison between Bangladesh and India.* LAP LAMBERT Academic Publishing, Germany. ISBN: 978-3-659-81252-1

Nisha, N. (2015b). Impact of Macroeconomic Variables on Stock Returns: Evidence from Bombay Stock Exchange (BSE). *Journal of Investment and Management, 4*(5), 162-170.

Nisha, N. (2016a). Macroeconomic Determinants of the Behavior of Dhaka Stock Exchange (DSE). *International Journal of Asian Business and Information Management (IJABIM), 7*(1), 1-17

Nisha, N. (2016b). Stock Market and Macroeconomic Behavior: Evidence from Karachi Stock Exchange (KSE). *International Journal of Applied Behavioral Economics (IJABE), 5*(2), 12-30.

Nkechukwu, G., Onyeagba, J., & Okoh, J. (2013). Macroeconomic Variables and Stock Market Prices in Nigeria: A Cointegration and Vector Error Correction Model Tests. *International Journal of Science and Research, 4*(6), 717-724.

Nkoro, E., & Uko, A. K. (2013). A Generalized Autoregressive Conditional Heteroskedasticity Model of the Impact of Macroeconomic Factors on Stock Returns: Empirical Evidence from the Nigerian Stock Market. *International Journal of Financial Research, 4*(4), 38.

Nofsinger, J. R., & Varma, A. (2014). Pound Wise and Penny Foolish? OTC Stock Investor Behavior. *Review of Behavioral Finance, 6*(1), 2-25. Retrieved from http://www.emeraldinsight.com/doi/full/10.1108/RBF-12-04-02

Noy, I. (2009). The Macroeconomic Consequences of Disasters. *Journal of Development Economics, 88,* 221-231

Ologunde, A. O., Elumilade, D. O., & Asaolu, T. O. (2007). Stock Market Capitalization and Interest Rate in Nigeria: A Time Series Analysis. *Economic and Policy Review, 13*(2).

Ong, P.B., Hanifa, M.H., & Isa, M. M. (2018), Do Firm Size and Value Affect Shareholder Returns in Malaysia? Captial Markets Review, 26(2), 53-69

Osamwonyi, I. O., & Evbayiro-Osagie, E. I. (2012). The Relationship between Macroeconomic Variables and Stock Market Index in Nigeria. *Journal of Economics, 3*(1), 55-63.

Oseni, I. O., & Nwosa, P. I. (2011). Stock Market Volatility and Macroeconomic Variables Volatility in Nigeria: An Exponential GARCH Approach. *Journal of Economics and Sustainable Development, 2*(10), 28-42.

Osisanwo, B. G., & Atanda, A. A. (2012*)*. Determinants of Stock Market Returns in Nigeria: A Time Series Analysis. *African Journal of Scientific Research, 9*(1).

OTCBB Frequently Asked Questions, (2017). Retrieved from http://www.finra.org/industry/faq-otcbb-frequently-asked-questions

OTCQX U.S. Disclosure Guidelines (v 10.3), (2014, June 6). Retrieved from http://www.otcmarkets.com/content/doc/OTCQXGuidelines.pdf

Over-the-Counter Market, (2013, Sept. 5). Retrieved from https://www.sec.gov/divisions/marketreg/mrotc.shtml

Padhan, P.C. (2007), The Nexus Between Stock Market and Economic Activity: An Empirical Analysis for India, *International Journal of Social Economics, 34*(10), 741-753.

Pagano, M. (1989). Trading Volume and Asset Liquidity. *The Quarterly Journal of Economics, 104*(2), 255-274.

Pal, K., & Mittal, R. (2011). Impact of macroeconomic indicators on Indian capital markets. *The Journal of Risk Finance, 12*(2), 84-97. Retrieved from http://dx.doi.org/10.1108/15265941111112811

Park, J., & Choi, B. P. (2011). Interest Rate Sensitivity of US Property/Liability Insurer Stock Returns. *Managerial Finance, 37*(2), 134-150. Retrieved from http://dx.doi.org/10.1108/03074351111103677

Park, K., & Ratti, R. A. (2000). *Real Activity, Inflation, Stock Returns and Monetary Policy. Financial Review, 35*(2), 59-78.

Parmar, C. (2013). Empirical relationship among various macroeconomics variables on Indian stock market. *International Journal of Advance Research in Computer Science and Management Studies (IJARCSMS), 1*(6), 190-197

Pastor, L, & Stambaugh R.F, (2003), *Liquidity Risk and Expected Stock Returns*, *Journal of Political Economy, 111,* 642-685.

Paudyal, K.,& Saldanha, L.,(1997), Stock Returns and Volatility in Two Regime Markets: International Evidence. *International Review of Financial Analysis, 6*(3), 209-228

Pavabutr, P., & Sirodom, K. (2010). *Stock Splits in a Retail Dominant Order Driven Market. Pacific-Basin Finance Journal, 18*(5), 427-441.

Pavabutr, P., Rhee, G., Sirodom, K., & Tian, G. (2014). *Asian Pennies Are Not Like US Pennies. DBJ Discussion Paper Series, No.1402*. Retrieved from http://www.dbj.jp.gslb.idc.jp/ricf/pdf/research/DBJ_DP_1402.pdf

Pearce, D.K., & Roley, V.V., (1985). Stock Prices and Economic News. *Journal of Business 58*, 49–67.

Peiró, A. (2016). Stock Prices and Macroeconomic Factors: Some European Evidence. *International Review of Economics & Finance, 41*, 287-294.

Penny Stock Rules. (2013, May 9). Retrieved from https://www.sec.gov/fast-answers/answerspennyhtm.html

Pesaran, M. H., & Pesaran, B. (1997). *Working With Microfit 4.0: Interactive Econometric Analysis; [Windows Version].* Oxford University Press.

Pesaran, M. H., & Shin, Y., (1998). An Autoregressive Distributed-Lag Modelling Approach to Cointegration Analysis. *Econometric Society Monographs,31*, 371-413.

Pesaran, H.M., Shin, Y., (1999). *Autoregressive Distributed Lag Modelling Approach to Cointegration Analysis. In: Storm, S. (Ed.), Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium*. Cambridge University Press, Cambridge.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds Testing Approaches to The Analysis of Level Relationships. *Journal of Applied Econometrics, 16*(3), 289-326.

Peterson, M., & Fialkowski, D., (1994). Posted Versus Effective Spreads: Good Prices or Bad Quotes? *Journal of Financial Economics, 35*, 269–292

Pethe, A., & Karnik, A. (2000). Do Indian Stock Markets Matter? Stock Market Indices and Macro-Economic Variables. *Economic and Political Weekly*, 349-356.

Petros, J. (2012). An Empirical Investigation of the Capital Asset Pricing Model: Studying Stocks on the Zimbabwe Stock Exchange. *Journal of Finance and Accountancy, 9*, 1-17. Retrieved from https://pdfs.semanticscholar.org/ea6b/23f690f585956ca34011780a97d8080013ce.pdf

PM Speech at Invest Malaysia. (2015, April 23). Retrieved from https://www.thestar.com.my/business/business-news/2015/04/23/pm-speech-at-invest-malaysia/#HQY8bFMlkl65QQtD.99

Poon, Wai Ching., (2015), *Malaysian Economy*, 3rd.ed. ST Learning , KL

Public Offering Market , (Oct 2003), *Journal of Law and Economics, Vol. XLVI*

Pyeman, J., & Ahmad, I. (2009). Dynamic Relationship between Sector-Specific Indices and Macroeconomic Fundamentals. *Malaysian Accounting Review, 8*(1), 81-100.

Qiao, Z., Chiang, T. C., & Wong, W. K. (2008). Long-Run Equilibrium, Short Term Adjustment and Spillover Effects Across Chinese Segmented Stock Markets and the Hong Kong Stock Market. *International Financial Markets, Instituitional and Money, 18*, 425-437.

Rad, A. A. (2011). Macroeconomic Variables and Stock Market: Evidence from Iran. *International Journal of Economics and Finance Studies, 3*(1), 1-10.

Rafique, A., Amara, Naseem, M.A., & Sultana, N. (2013). Impact of Macroeconomic Variables on Stock Market Index (A Case of Pakistan). *Elixir Finance Management, 57*, 14099-14104.

Rahman, A. A., Sidek, N. Z. M., & Tafri, F. H. (2009). *Macroeconomic Determinants of Malaysian Stock Market*. *African Journal of Business Management, 3*(3), 95.

Randolph. B & Padma. K (2003), Impact of The Penny Stock Reform Act Of 1990 On The Initial Public Offering Market, *Journal of Law and Economics, 48*(2), 517-541

Rashid, A. (2008). Macroeconomic Variables and Stock Market Performance: Testing for Dynamic Linkages with a known Structural Break. *Savings and Development*, 77-102.

Rashid, M., Hassan, M. K., & Yein, N. Y. (2014). Macroeconomics, Investor Sentiment, and Islamic Stock Price Index in Malaysia. *Journal of Economic Cooperation & Development, 35*(4), 221-236.

Rasiah, V., & Ratneswary, R. (2010). *Macroeconomic Activity and the Malaysian Stock Market: Empirical Evidence of Dynamic Relations.*

Ratanapakorn, O., & Sharma, S. C. (2007). Dynamic Analysis between the US Stock Returns and the Macroeconomic Variables. *Applied Financial Economics, 17*(5), 369-377.

Ray, H., & Sarkar, J. (2014). Macroeconomic Link to Indian Capital Market: A Post-Liberalization Evidence. *Modern Economy, 5*(04), 272.

Renault, Thomas, (2017, August 1,). Market Manipulation and Suspicious Stock Recommendations on Social Media. Retrieved at SSRN: https://ssrn.com/abstract=3010850

Rezazadeh, A. (2016). The Impact of Macroeconomic Variables on Tehran Stock Market Returns Volatility: GARCH-X Approach. *Quarterly Journal of Applied Theories of Economics, 3*(2), 121-136.

Rhee, S. G., & Wu, F. (2012). Anything Wrong with Breaking a Buck? An Empirical Evaluation of NASDAQ's $1 Minimum Bid Price Maintenance Criterion. *Journal of Financial Markets, 15*(2), 258-285. Retrieved from http://www.sciencedirect.com/science/article/pii/S1386418111000462?via%3Dihub

Right Time To Buy Undervalued Stocks, advises PIVB. (2016, June 30). Retrieved from http://www.freemalaysiatoday.com/category/nation/2016/06/30/right-time-to-buy-undervalued-stocks-advises-pivb/

Rosenberg, B., Reid, K., & Lanstein, R. (1985). Persuasive Evidence of Market Inefficiency. *The Journal of Portfolio Management, 11*(3), 9-16.

Rossi, P. R., (2015), A Five-Factor Asset Pricing Model (Digest Summary). *CFA Digest, 45*(4). Retrieved from https://doi.org/10.2469/dig.v45.n4.1

Rouwenhorst.K.G, (1999), Local Returns Factors and Turnover in Emerging Market, *Journal of Finance, 54*(4), 1439-1464

Rozeff, M.S., (1984). Dividend Yields are Equity Risk Premiums. *Journal of Portfolio Management 11*(1), 68–75.

Rudolph, J. A. (1972). Money Supply and Common Stock Prices. *Financial Analysts Journal, 28*(2), 19-25. Retrieved from http://www.jstor.org/stable/4470899

Samontaray, D. P., Nugali, S., & Sasidhar, B., (2014). A Study of the Effect of Macroeconomic Variables on Stock Market: Saudi Perspective. *International Journal of Financial Research, 5*(4), 120.

San Diego (2000) *The effects of Macroeconomic Variables on The Southeast Asian Stock Markets: Indonesia, Malaysia, The Philippines, and Thailand*. A Dissertation Presented to the Graduate Faculty of the College of Business Administration United States International University: 2000

Santos, A. S. D., Neto, A. R., de Araujo, E. C., De Oliveira, L., & Abrita, M. B. (2013). Interaction between Macroeconomics Variables and IBOVESPA, the Brazilian Stock Market's Index. *Transnational Corporations Review, 5*(4), 81-95.

Sariannidis, N., Giannarakis, G., Litinas, N., & Konteos, G. (2010). A GARCH Examination of Macroeconomic Effects on US Stock Market: A Distinction Between the Total Market Index and the Sustainability Index. *European Research Studies Journal, 13*(2), 129-142.

Schmeling, M. (2007). Institutional and Individual Sentiment: Smart Money and Noise Trader Risk?. *International Journal of Forecasting, 23*(1), 127-145.

Schmeling, M. (2009). Investor Sentiment and Stock Returns: Some International Evidence. *Journal of Empirical Finance, 16*(3), 394-408.

Scholes, M., & Williams, J. (1977). Estimating Betas from Nonsynchronous Data. *Journal of Financial Economics, 5*(3), 309-327.

Schwert, G.W., (1990). Stock Returns and Real Activity: A Century of Evidence. *Journal of Finance 45*(4), 1237–1257.

Scott, J., Stumpp, M. & Xu, P. (2003). News, Not Trading Volume, Builds Momentum, *Financial Analysts Journal, 59*, 45-54.

Seguin. P. J. & Smoller .M. M., (1997), Share Price and Mortality: An Empirical Evaluation of Newly Listed Nasdaq Stocks, *Journal Financial Economics, 333*, 45-75

Securities Commission Malaysia 2015 Annual Report. Retrieved at https://www.sc.com.my/post_archive/2015-annual-report/

Securities Commission Malaysia 2016 Annual Report. Retrieved at https://www.sc.com.my/post_archive/2017-annual-report/

Shabri, A. M. M., & Yusof, R. M., (2009). Long-Run Relationship between Islamic Stock Returns and Macroeconomic Variables: An Application of the Autoregressive Distributed Lag Model. *Humanomics, 25*(2), 127-141.

Shah, A. A., Aamir, M., & Saba, I. (2012). Empirical Analysis of Long and Short Run Relationship among Macroeconomic Variables and Karachi Stock Market: An Auto Regressive Distributive Lag (ARDL) Approach. *Pakistan Journal of Social Sciences (PJSS), 32*(2), 323-338.

Shahbaz, M., (2007). Stock Returns and Inflation: An ARDL Econometric Investigation Utilizing Pakistani Data. *Pakistan Economic and Social Review, 45*(1), 89-105

Shahbaz, M., Ur Rehman, I., & Zainudin, R., (2013). Macroeconomic Determinants of Stock Market Capitalization in Pakistan: Fresh Evidence from Cointegration with unknown Structural breaks. *Munich Personal RePEc Archive (MPRA) Paper No.52490. University Library of Munich, Germany.* Retrieved from https://mpra.ub.uni-muenchen.de/52490/1/MPRA_paper_52490.pdf

Shangquan. G. (2000), *Economic Globalization: Trends, Risks and Risk Prevention*, Committee for Development Policy (CDP) Background Paper No.1, ST/ESA/2000/CDP/1. United Nations, Development Policy and Analysis Division (DPAD), Department of Economic and Social Affairs, New York, USA. Retrieved at http://www.un.org/en/development/desa/policy/cdp/cdp_background_papers/bp2000_1.pdf

Sharma, G. D., & Mahendru, M. (2010). Impact of Macro-Economic Variables on Stock Prices in India. *Global Journal of Management and Business Research, 10*(7), 19-26.

Sharpe, W. F., (1964), Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk, *Journal of Finance, 19*(3), 425–442.

Sharpe, W. F. (1991). Capital Asset Prices With and Without Negative Holdings. *The Journal of Finance, 46*(2), 489-509.

Shiller, R. J., Fischer. S., & Friedman. B. M., (1984). Stock Prices and Social Dynamics. *Brookings Papers on Economic Activity, 15*(2), 457-510.

Shleifer, A. & Vishny, R. W. (1997). A Survey of Corporate Governance. *The Journal of Finance 52*(2), 737–783.

Should regulators intervene in the stock market?. (2011, Nov 19). Retrieved from https://www.thestar.com.my/business/business-news/2011/11/19/should-regulators-intervene-in-the-stock-market/#WTK4buTVejZXWsSQ.99

Sikalao-Lekobane, O. L., & Lekobane, K. R. (2014). Do Macroeconomic Variables Influence Domestic Stock Market Price Behaviour in Emerging Markets? A Johansen Cointegration Approach to the Botswana Stock Market. *Journal of Economics and Behavioral Studies, 6*(5), 363.

Singh, D. (2010). Causal Relationship between Macro-Economic Variables and Stock Market: A Case Study for India. *Pakistan Journal of Social Sciences (PJSS), 30*(2), 263-274.

Singh, T., Mehta, S., & Varsha, M. S. (2011). Macroeconomic Factors and Stock Returns: Evidence from Taiwan. *Journal of Economics and International Finance, 3*(4), 217.

Sirucek, M. (2012). Macroeconomic Variables and Stock Market: US Review. *MPRA Paper No. 39094*. *International Journal of Computer and Management Studies (Online)*. Retrieved from http://mpra.ub.uni-muenchen.de/39094/

Smith, Aaron. (2011, May 11). *Pink Sheets vs. OTCBB – Similarities and Differences*. StockBrokers.com. Retrieved from https://www.stockbrokers.com/news/pink-sheets-vs-otcbb/

Snedecor, G.W. & Cochran, W.G. (1989). *Statistical Methods*. Eighth Edition, Iowa State University Press.

Sohail, N., & Hussain, Z. (2009). Long-Run and Short-Run Relationship between Macroeconomic Variables and Stock Prices in Pakistan: The Case of Lahore Stock Exchange. *Pakistan Economic and Social Review*, 183-198.

Sohail, N., & Hussain, Z. (2012). Macroeconomic Policies and Stock Returns in Pakistan: A Comparative Analysis of Three Stock Exchanges. *Interdisciplinary Journal of Contemporary Research in Business, 3*(10), 905-918.

Spiegel, Matthew I. & Wang, Xiaotong, (2005), Cross-sectional Variation in Stock Returns: Liquidity and Idiosyncratic Risk, *Yale ICF Working Paper No. 05-13; EFA 2005 Moscow Meetings Paper.* Retrieved from SSRN: http://ssrn.com/abstract=709781

Sprinkel, Beryl W. (1964). *Money and Stock Prices*. Richard D. Irwin, Inc., 1964).

Srinivasan, P. (2011). Causal Nexus between Stock Market Return and selected Macroeconomic Variables in India: Evidence from The National Stock Exchange (NSE). *The IUP Journal of Financial Risk Management,8*(4), 7-24.

Subburayan, B., & Srinivasan, V. D. (2014). The Effects of Macroeconomic Variables on CNX Bankex Returns: Evidence from Indian Stock Market. *International Journal of Management & Business Studies, 4*(2), 67-71.

Sukruoglu, D., & Nalin, H. T. (2014). The Macroeconomic Determinants of Stock Market Development in Selected European Countries: Dynamic Panel Data Analysis. *International Journal of Economics and Finance, 6*(3), 64.

Suleman, M. T., Hamid, K., Ali Shah, S. Z., Akkash, I., &Shahid, R. (2010). Testing The Weak Form of Efficient Market Hypothesis: Empirical Evidence from Asia-Pacific Markets. *International Research Journal of Finance and Economics*, Issue 58, 121-133

Thangavelu, S. and Ang, J. (2004). Financial Development and Economic Growth in Australia: An Empirical Analysis. *Empirical Economics, 29*, 247-260.

The 22 Most Exciting Emerging Markets In The World, (2014, Jan 29). Retrieved from http://www.businessinsider.com/the-22-most-exciting-emerging-markets-2014-1/?IR=T

The Editor. (2010, Sept.23). Malaysia promoted to advanced emerging market status in FTSE Global Equity Index Series. Article from The Edge. Retrieved from http://www.theedgemarkets.com/article/malaysia-promoted-advanced-emerging-market-status-ftse-global-equity-index-series

The Forbes. (2011, Oct 24). The Rise of Penny Stock. Retrieved from http://www.forbes.com/sites/peterleeds/2011/10/24/the-rise-of-penny-stocks/

The Markets: OTCQB-The Venture Market, (2017). Retrieved from http://www.otcmarkets.com/marketplaces/otcqb

The Markets: Pink-The Open Market, (2017). Retrieved from https://www.otcmarkets.com/marketplaces/otc-pink

Thedossiou, P. & Lee, U. (1993). Mean and Volatility Spillovers Across Major National Stock Markets: Further Empirical Evidence. *Journal of Financial Research, 16* (4), 337-50.

Theodossiou, P. & Lee, U. (1995). Relationship Between Volatility and Expected Returns Across International Stock Markets. *Journal of Business Finance and Accounting, 22*(2), 289-300.

Tinic, Seha M., & Richard R.West, (1986), Risk, Return and Equilibrium: A Revisit. *Journal of Political Economy, 94*, 126-147.

Toya, H. & Skidmore, M. (2007). Economic Development and The Impacts of Natural Disasters. *Applied Economics Letters, 94*, 20-25.

Treynor, J. L. (1993). In Defense of the CAPM. *Financial Analysts Journal, 49*(3), 11-13.

Tudor, C. (2010). Firm-Specific Factors as Predictors of Future Returns for Romanian Common Stocks: Empirical Evidence. *Recent Researches in Business Administration, Finance and Product Management. Proceed. ICFA, 10.* Retrieved from http://wseas.us/e-library/conferences/2010/Vouliagmeni/FINANCE/FINANCE-12.pdf

Tuyon, J., & Ahmad, Z. (2016). Behavioural Finance Perspectives on Malaysian Stock Market Efficiency. *Borsa Istanbul Review, 16*(1), 43-61.

Urbański, S., Jawor, P., & Urbański, K. (2015). The Impact of Penny Stocks on the Pricing of Companies Listed on the Warsaw Stock Exchange in light of the CAPM. *Folia Oeconomica Stetinensia, 14*(2), 163-178.

US SEC, SEC web page, http://www.sec.gov/answers/penny.htm

Vani, V., & Ray, P. (2003). *Indian Stock Prices and Macroeconomic Influence: An Empirical Investigation using Artificial Neural Network*. Operational Research and its Appications, 460.

Veraros, N., Kasimati, E. & Dawson, P. (2004). The 2004 Olympic Games Announcement and its effect on the Athens and Milan Stock Exchanges. *Applied Economics Letters, 11*, 749-753.

Vlastelica, Ryan. (2017, Sept. 27), Passive Investing is changing the Stock Market in ways Investors don't realize. *Marketwatch.* Retrieved from https://www.marketwatch.com/story/passive-investing-is-changing-the-stock-market-in-ways-investors-dont-realize-2017-09-25

Vogel, J. (2017a), Do Portfolio Factors or Characteristics Drive Expected Returns?, *Alpha Architect, Oct 31,2017*. Retrieved from https://alphaarchitect.com/2017/10/31/focus-on-portfolio-characteristics-not-factors/

Vogel, J. (2017b), Factor Investors Beware: Positive SMB May Not Mean You Own Small-Caps, *Alpha Architect, Nov 10,2017*. Retrieved from https://alphaarchitect.com/2017/11/10/factor-investors-beware-positive-smb-may-not-mean-you-own-small-caps/

Wahal, S. (2017). The Profitability and Investment Premium: Pre-1963 Evidence. *Journal of Financial Economics, 131*(2), 362-377.

Wang, J. (1994), A Model Of Competitive Stock Trading Volume, *Journal of Political Economy, 102*, 127-168.

Wang, X. (2010). The Relationship Between Stock Market Volatility and Macroeconomic Volatility: Evidence from China. *International Research Journal of Finance and Economics, 49*(2), 149-160.

Wang, P., & Wang, P. (2010*).* Price and Volatility Spillovers between the Greater China Markets and the Developed Markets of US and Japan. *Global Finance Journal, 21*, 304 - 317.

Wang, Y., Gunasekarage, A., & Power, D.M., (2005). Return and volatility spillovers from developed to emerging capital markets: The case of South Asia. *Contemporary Studies in Economic and Financial Analysis, 86,* 139–166.

Wasserfallen, W., (1989). Macroeconomic News and The Stock Market. *Journal of Banking and Finance, 13*(4/5), 613–626.

Warning Over Penny Stock Plays. (2012, June 28). Retrieved from http://mymall.netbuilder.com.my/index.php?doit=showclass&cid=465&domain=remisiers

WEF (World Economic Forum). (2016). *Global Competitiveness Report 2015 : Malaysia*, World Economic Forum. Retrieved from http://reports.weforum.org/global-competitiveness-report-2015-2016/economies/#economy=MYS

WFE (World Federation of Exchanges). (2016, Feb.1). *Market Highlights Report 2015*, World Federation of Exchanges. Retrieved from http://www.world-exchanges.org/home/index.php/news/world-exchange-news/wfe-full-year-statistics-show-2015-global-equity-trading-volumes-rise-55-as-volatility-boosts-activity

Wei, J. K., Liu, Y. J., Yang, C. C., & Chaung, G. S. (1995). Volatility and Price Change Spillover Effects Across The Developed And Emerging Markets. *Pacific-Basin Finance Journal, 3*, 113-136.

Weintraub, E. R. (2007). *Neoclassical Economics*. The Concise Encyclopedia of Economics. Retrieved from http://www.econlib.org/library/Enc1/NeoclassicalEconomics.html

What are Penny Shares?. (2014). Retrieved from http://www.pennystocksshares.co.uk/guide/what-are-penny-shares.html

What's Cooking in Penny Stocks. (2017, Mar 25). Retrieved from https://www.pressreader.com/malaysia/the-star-malaysia-starbiz/20170325/281539405784925

White, J. T., (2016), Outcomes of Investing in OTC Stocks. *U.S. Securities & Exchange Commission, Division of Economic and Risk Analysis (DERA) White Paper, 2016.* Retrieved from SSRN: http://dx.doi.org/10.2139/ssrn.2889360 or https://www.mediashares.com/OTC_investing.pdf

Why Invest In Stocks?, (2018). Retrieved from http://www.bursamalaysia.com/market/securities/education/investing-basics/why-invest-in-stocks/

Why Malaysian Equities, (n.d). Retrieved from http://www.capitalmarketsmalaysia.com/equities/

Wong, W. K & Michael, M. (2009). Mapping the Presidential Election Cycle in US stock markets. *Mathematics and Computers in Simulation, 79*, 3267-3277

Wongbampo, P. and Sharma, S.C. (2002). Stock Market and Macroeconomic Fundamental Dynamic Interactions: ASEAN-5 Countries. *Journal of Asian Economics, 13*, 27-51.

Worthington, A.C. (2006). Political Cycles in the Australian Stock Market Since Federation. *University of Wollongong, School of Accounting and Finance, Working paper series No. 06/13.* Retrieved from http://ro.uow.edu.au/commpapers/184

Xu, Y. (2011). The Relationship between Stock Prices and Exchange Rates in Sweden. *Unpublished Bachelor Thesis in Economics, Jönköping International Business School Jönköping University*. Retrieved from http://www.diva-portal.org/smash/get/diva2:423389/FULLTEXT01.pdf

Yang, J., & Bessler, D.A., (2004). The International Price Transmission in Stock Index Futures Markets*, Economic Inquiry, 42* (3), 370–386.

Yang, Y. Y., & Yi, M. H. (2008). Does Financial Development Cause Economic Growth? Implication for Policy in Korea. *Journal of Policy Modeling, 30*(5), 827-840.

Yeoh, B. K., Hooy, C. W., & Arsad, Z. (2010). Time-Varying World Integration of the Malaysian Stock Market: A Kalman Filter Approach. *Asian Academy of Management Journal of Accounting and Finance (AAMJAF), 6*(2), 1-17.

Yong, O. (2016). Cheap IPO: Does It Matter?. *The Journal of Developing Areas, 50*(5), 453-460.

Yu, T. Y. (2002). An Application of VAR, GARCH and Grey Relational Analysis on the Relationship between American and Taiwan Stock Markets. *Unpublished Master's Dissertation, National Taiwan University of Science and Technology, Taiwan.*

Yunus, M. M., Mahyideen, J. M., & Saidon, R. (2014). Influences of Macroeconomic Variables on Stock Prices in Malaysia. In *International Conference on Postgraduate Research, 98*, 399-416.

Yusof, R. M., & Majid, M. S. A. (2006). Who Moves the Malaysian Stock Market—the US or Japan?: Empirical Evidence from the Pre-, During, and Post-1997 Asian Financial Crisis. *Gadjah Mada International Journal of Business, 8*(3), 367-406.

Yusof, R. M., Majid, M. S. A., & Razali, A. N. (2006, October). Macroeconomic Variables and Stock Returns in the Post 1997 Financial Crisis: An Application of The ARDL Model. In *GUTMAN Conference Centre, 6th.Global Conference on Business & Economics*. ISBN : 0-9742114-6-X. Retrieved from http://www.gcbe.us/6th_GCBE/data/Macroeconomic%20Variables%20&%20Stock%20Returns.pdf

Yusof, R. M., & Majid, M. S. A. (2007). Macroeconomic Variables and Stock Returns in Malaysia: An Application of The ARDL Bound Testing Approach. *Savings and Development*, *31*(4), 449-469.

Zakaria, Z., & Shamsuddin, S. (2012). Empirical Evidence on the Relationship between Stock Market Volatility and Macroeconomics Volatility in Malaysia. *Journal of Business Studies Quarterly, 4*(2), 61-71.

Zaki, M., Diaz, D., & Theodoulidis, B. (2012). Financial Market Service Architectures: A" Pump and Dump" Case Study. In *SRII Global Conference (SRII), 2012 Annual*, 554-563. IEEE.