IPO Market Performance and Multi-Dimensional Market Sentiment : Evidence from Malaysia’s Short-Run, Long-Run, and Regulatory Changes Perspectives

by

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ABSTRACT

This study constructs a multi-dimensional Malaysian IPO Market Sentiment Index based on aggregated sentiment proxies spanning firm-specific, market-level, and macroeconomic dimensions. It investigates how this sentiment index explains IPO market performance in Malaysia through 3 key lenses: short-run share performance, long-run share performance, and the impact of regulatory changes.

Using a dataset of 571 IPOs listed on Bursa Malaysia from January 2000 to December 2020, the study measures short-run share performance via initial returns, and long-run share performance using cumulative average abnormal returns, buy-and-hold abnormal returns, and wealth relatives. Multiple regression models, interaction effects, binary regression models, and marginal probability analysis are employed to examine the relationships between market sentiment, fundamental factors, and IPO outcomes. Findings reveal that IPOs are significantly underpriced in the short-run, with offer price, oversubscription ratio, board listing, and hot issue market conditions as key determinants. Market sentiment plays a limited role in short-run share performance of IPO but interacts with several issue- and market-specific variables, suggesting that market sentiment effects are conditional rather than dominant during initial trading. In contrast, market sentiment significantly influences IPO's long-run share performance. Behavioural factors, investor expectations, and market volatility become more relevant as firms transition into the post-listing phase. These results align with Shiller's (1990) fads theory, which explains how investor over-optimism leads to mispricing that is eventually corrected over time. Additionally, the study also analyses the role of market sentiment and price-earnings (PE) towards IPO underpricing during regulatory changes. Quantile regression results show that sentiment influences are significantly stronger at higher PE quantiles, indicating that high-PE IPOs are more exposed to overvaluation risk during periods of heightened optimism or volatility. Additionally, comparative analysis between the pre- and post-2009 periods reveals a shift from sentiment-driven IPO valuations to more fundamental-based pricing under the disclosure-based regulatory framework.

This study contributes to the IPO literature by introducing a multi-dimensional market sentiment index tailored to Malaysia's IPO context. It offers practical implications for investors seeking better timing strategies and for regulators aiming to distinguish between sentiment-driven and fundamental valuations. Overall, the study underscores the evolving role of market sentiment in IPO markets and its interaction with regulatory frameworks.

LIST OF PUBLICATIONS, AWARDS AND CONFERENCES

Publications:

1. Kong, E. Y. F., and Tang, K. B., (2024). Are Malaysian IPO Investors Influenced by Sentiment Factors or Fundamental Factors? *Capital Market Review*, 32 (1), 29-58. https://www.mfa.com.my/wp-content/uploads/2024/04/v32_i1_a2_pg29-58.pdf

2. Kong, E. Y. F., and Tang, K. B., (2025). Unveiling the Role of Market Sentiment In Explaining Malaysian IPO Aftermarket Share Performance. *Capital Market Review*, 33 (1), 41-73. https://www.mfa.com.my/wp-content/uploads/2025/04/v33_i1_a3_pg41-73.pdf

3. Kong, E. Y. F., and Tang, K. B., (2025). Price-earnings and market sentiment in IPO market during changes in Malaysia's capital market structure. Book chapter: In Behavioural economics and computational intelligence for sustainable decision making: Integrating Al and behavioural insights to drive economic efficiency and sustainability, *Springer Nature Switzerland AG* (To be published in 2025).

Awards:

1. Awarded the 'Malaysian Finance Association Best Paper Award 2023' in the 25th Malaysian Finance Association International Conference 2023 with a research paper title 'Are Malaysian IPO Investors Influenced By Sentiment Factors Or Fundamental Factors?'

2. Awarded the 'Malaysian Finance Association Best Paper Award 2024' in the 26th Malaysian Finance Association International Conference 2024 with a research paper title 'Unveiling the Role Of Market Sentiment In Explaining Malaysian IPO Aftermarket Share Performance'.

Participations at Nottingham University Events:

1. Participated in the 3rd Nottingham University Business School Tri-Campus Conference 2023 with a research paper title ‘Market Sentiment and IPO Markets: Short-Run IPO Underpricing and Its Determinants With Malaysian Evidence’.

2. Participated in the Nottingham Postgraduate Showcase 2023 with a poster title ‘Does Malaysian IPO Investors Practice: You Jump I Jump?’

3. Participated in the 4th Nottingham University Business School Tri-Campus Conference 2024 with a research paper title ‘The Impact on IPO Share Performance of Transformation in Malaysia’s Capital Market Structure’.

International Conferences:

1. Participated in the 25th Malaysian Finance Association International Conference 2023 with a research paper title ‘Are Malaysian IPO Investors Influenced By Sentiment Factors or Fundamental Factors?’

2. Participated in the 26th Malaysian Finance Association International Conference 2024 with a research paper title ‘Unveiling the Role of Market Sentiment in Explaining Malaysian IPO Aftermarket Share Performance’.

3. Participated in the 4th Arshad Ayub Graduate Business School International Conference on Business Management 2024 with a research paper title ‘Price-Earnings and Market Sentiment in IPO Market: During Changes in Malaysia’s Capital Market Structure’.

CHAPTER 1 :
INTRODUCTION

1.1 Background of this research

"Initial public offerings" (IPO), or "public offerings", or "going public" have been defined as a process in which an unlisted firm is going public and selling newly issued securities to the public for the first time. Potential unlisted firms are motivated to go public to raise funds to finance its expansion or to reduce its debts, instead of borrowings from financial institutions which incur finance costs. Primary market is a primary platform where financial institution offers new issuance of IPO shares to investors. Bodie et al. (2005) state after being listed on the stock market, the shares will be traded on a secondary market of the stock exchange. Zingales (1995) document that the main objective of IPOs is to raise funds by attracting more investors and capital. Going public is an initial milestone which marks the transition from a private entity to a public listed entity and typically is the largest issuance a firm offer once in a lifetime.

IPO is a common discussion topic among the market practitioners and academic researchers because there is no convincing theory in explaining the IPO underpricing and underperformance aftermarket share performance. Ritter and Welch (2002) state that IPO appeared to be underpriced in the short-run share performance and underperformed in the long-run share performance. The phenomenon of IPO underpricing and underperformed aftermarket share performance has been viewed as losses of money to the issuing firms and investors, directly or indirectly.

Loughran et al. (1994) highlight that institutional differences make IPO anomalies more pronounced for issuing firms and investors in developing countries as compared to developed countries. However, IPO underpricing and weak aftermarket performance persist globally. Several empirical studies examine factors influencing IPO initial returns, but variations in research design, variable selection, and model specifications challenge the comparability of findings and their statistical and economic significance (Butler et al., 2014).

Empirical studies have explored short-run IPO underpricing on both international and local scales. The majority of these studies have been conducted in developed countries such as the United States (US) and European markets. Researchers such as Ibbotson (1975), Ibbotson and Jaffe (1975), Beatty and Ritter (1986), Tinic (1988), and Ibbotson et al. (1994) have documented IPO underpricing in the US market ranging from 10.0% to 15.0%. The phenomenon of short-run IPO underpricing appears to be more pronounced in developing countries. Further, Levis (1993), and Khurshed et al. (2005) report that the IPO's average initial returns of 15% to 20% and up to -24% of IPO underperformance in the long-run in different part of European countries. The IPO pricing performances of 3 Latin American countries i.e., Brazil, Chile and Mexico report that IPO underpricing of 78.5%, 16.3% and 2.8%, respectively (Aggarwal et al., 1993).

The phenomenon of IPO underpricing in the short run and underperformance in the long-run aftermarket appears to be more pronounced in developing countries. Dawson (1987) studies the IPO's short-run share performance and long-run share performance from 1978 to 1983 in 3 Asian markets namely Malaysia, Hong Kong, and Singapore. It shows that Malaysia has reported the highest IPO underpricing of 166.5% with overperformance of 18.2% in the long-run share performance. Furthermore, Ritter (2003) finds that IPO's average initial returns in 33 countries ranged from 13.6% to 388% in developing countries, and 4.2% to 54.4% in developed countries. The results also report that IPO underpricing of 11 Asian countries with an average initial return of 256.9% in China, 74.3% in Korea, 22.7% in the Philippines, 15.1% in Indonesia, 28.4% in Japan, 31.4% in Singapore, 104.1% in Malaysia, 15.9% in Hong Kong, 31.1% in Taiwan, 35.3% in India, and 46.7% in Thailand.

In the past decade, investors' sentiment and their potential impact on share market performance has been growing topic among academia. De Long et al. (1990) state that market sentiment is the expectation of market participants on returns and future cash flows coupled with investment risk. The market dynamics were comprehended under the theoretical framework of the Efficient Market Hypothesis (EMH) and random walk theory by neoclassical finance theories, however, market sentiment was not considered an important aspect by them. The heterogeneous behaviour of investors in the capital market was not explained as well. Neoclassical financial theories failed to acknowledge the significance of market sentiment as a crucial factor in the capital market, which leads to frequent fluctuations in share price and creates ambiguity about the returns on investments in the future.

Behavioural finance theories offer an alternative model, claiming that economic phenomena can be better understood if it is accepted that investors are not entirely rational. In this context, asset pricing encompasses not only the risk-related anticipated rates but also the impact of investor expectations on returns. Behavioural finance explains the relationship between investment and the investor's psychology, and notes that the psychology of investors shapes market fluctuations, which then shape the market. Baker and Wurgler (2006) argue that market sentiment creates a tendency for investors to be optimistic or pessimistic when speculating on share prices, rather than considering fundamental factors.

Market sentiment is defined as the overall prevailing attitude of investors demonstrated through price movements of the shares in the market. It represents the overall trend of the stock market as it measures the entire stock market returns from IPO date and first trading day of IPO (Ritter, 1984; Kiymaz, 2000). High level of market sentiment indicates that there is high level of investors' expectation on the overall market performance which will lead to higher demand for IPOs. High demand from investors will lead to appreciation in IPO price and IPO underpricing on the day of listing, vice versa. Dimovski and Brooks (2004) find a positive relationship between short-run market performance and market sentiment.

Further, Baker and Wurgler (2006) state that market sentiment creates a tendency for individual investors to be optimistic or pessimistic. If the market sentiment is tend towards positive and optimistic then this is referred to as bull market, and a pessimistic market that expects prices to fall is referred to as a bear market. Ljungqvist and Wilhelm (2005) state that the offerings size will increase when more firms have incentives to access capital market via IPOs as the investors' optimism increases. Baker and Wurgler (2000) also evidence that issuing firms 'time' their IPOs to coincide with periods of excessive valuations.

Radical changes in the Malaysian financial environment, particularly changes in Malaysia's capital market structure in the past few decades, may have increased heterogeneity in the composition of participants and impacted investors' risk-taking behaviour. The study of market sentiment in developing economies with rapidly growing capital markets is still in its early age, and the impact of market sentiment on the IPO market has received less exploration compared to previous research, which primarily focused on the influence of market sentiment on investment returns. Given the structural changes in the Malaysian capital market concerning IPO listings, this research aims to examine IPO behaviour in both the short-run and long-run with regard to Malaysian IPO share performance. Subsequently, we will investigate the impact of these changes on Malaysian capital market structure and its influence on IPO share performance towards price-earnings (PE).

In the context of this research, the primary market refers to as ‘pre-IPO’, the secondary market refers to as ‘post-IPO’, the IPO underpricing refers to as ‘short-run share performance’, and the aftermarket share performance refers to as ‘long-run share performance’. These terms are used interchangeably throughout this research. Besides, the words ‘market sentiment’ and ‘investor sentiment’ are interchangeably used as investors are representatives of market participations, both shall apply the same meaning throughout the entire of this research.

1.2 Background of the Malaysian stock market and IPO markets

Malaysia stock market is known as Malaysian Stock Exchange prior to changing its name to Bursa Malaysia Securities Berhad (Bursa Malaysia) on 14 April 2004. At that time, the Malaysia stock market contains 3 listing boards namely Main Board, Second Board and Malaysian Exchange of Securities Dealing and Quotation Berhad (MESDAQ). Main Board is catered for larger sized firms, whereas for small and medium sized firms will seek to be listed on Second Board. For high revenue growth and technology firms that intend to raise funds from the stock market will be recommended to be listed on MESDAQ. In August 2009, Main Board and Second Board were merged and renamed as Main Market, and MESDAQ was renamed as ACE Market stands for “Access, Certainty, Efficiency”. ACE Market was established for firms that are technology based with high growth in revenue intend to raise funds via primary market. In December 2017, a new listing board has been introduced by Bursa Malaysia named Leading Entrepreneur Accelerator Platform Market (LEAP) Market. This market is mainly for small and medium firms to raise funds in the capital market which are unable to meet the listing criteria for Main Market and ACE Market (Yaakob and Halim, 2016). Such changes in board listing has affected IPO processes by the relevant authorities. Figure 1.1 shows the changes in Malaysia’s capital market structure from year 2000 up to current.

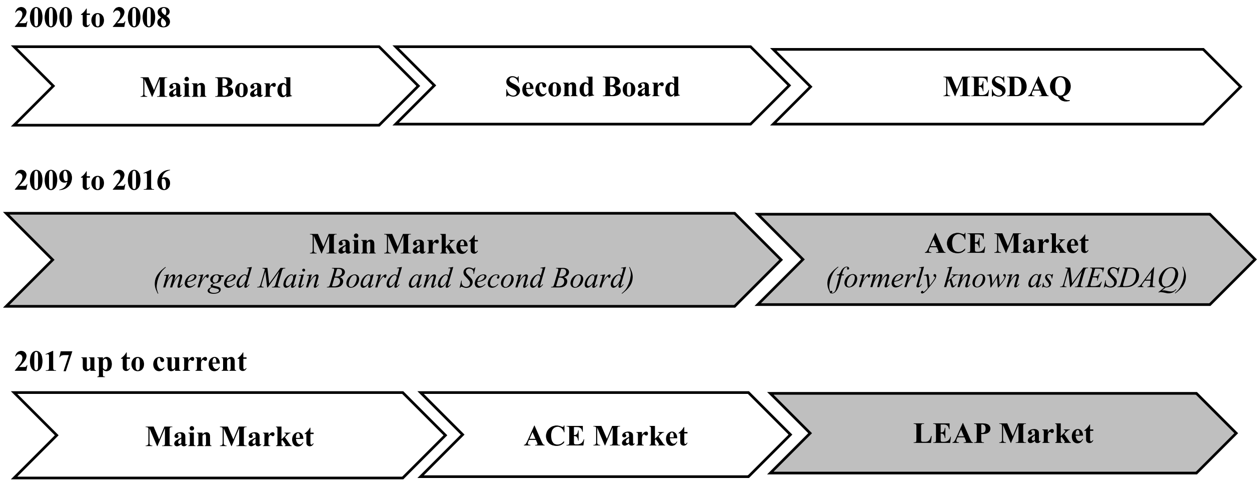

Figure 1.1 : Changes in Malaysia's capital market structure from year 2000 up to current

1.3 An overview of transformations in Malaysia's capital market structure

Based on Prime Minister of Malaysia Invest Malaysia 2008 Conference held on 25 March 2008, Malaysia government has announced that effective from 3 August 2009 Malaysia's capital market structure has undergone 3 main changes: (i) new board structures, (ii) new regulatory approaches, and (iii) new guidelines and listing rules for IPO market. Main Board and Second Board are merged into a unified board known as Main Market. And, MESDAQ is transformed into an alternative market known as ACE Market. Consequentially, there are new approaches to regulating listings and fundraisings in IPO market in Malaysia for both Main Market and ACE Market. Table 1.1 shows total number of 571 IPOs in changes board listing of Bursa Malaysia from January 2000 to December 2020.

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Total number of IPOs				
Year	Main Market	ACE Market	LEAP Market	Total IPOs
2020	2 (10.53%)	10 (52.3%)	7 (37.17%)	19 (100.00%)
2019	4 (13.33%)	11 (36.67%)	15 (50.00%)	30 (100.00%)
2018	2 (9.09%)	9 (40.91%)	11 (50.00%)	22 (100.00%)
2017	6 (42.86%)	6 (42.86%)	2 (14.28%)	14 (100.00%)
Year	Main Market		ACE Market	Total IPOs
2016	7 (58.33%)		5 (41.67%)	12 (100.00%)
2015	9 (69.23%)		4 (30.76%)	13 (100.00%)
2014	12 (80.00%)		3 (20.00%)	15 (100.00%)
2013	16 (94.12%)		1 (5.88%)	17 (100.00%)
2012	14 (82.35%)		3 (17.65%)	17 (100.00%)
2011	17 (60.71%)		11 (39.29%)	28 (100.00%)
2010	23 (79.31%)		6 (20.69%)	29 (100.00%)
2009	11 (78.57%)		3 (21.43%)	14 (100.00%)
Year	Main Board	Second Board	MESDAQ	Total IPOs
2008	7 (30.44%)	8 (34.78%)	8 (34.78%)	23 (100.00%)
2007	15 (57.69%)	8 (30.76%)	3 (11.55%)	26 (100.00%)
2006	10 (25.00%)	8 (20.00%)	22 (55.00%)	40 (100.00%)
2005	16 (20.25%)	17 (21.52%)	46 (58.23%)	79 (100.00%)
2004	15 (20.83%)	26 (36.11%)	31 (43.06%)	72 (100.00%)
2003	16 (27.59%)	22 (37.93%)	20 (34.48%)	58 (100.00%)
2002	22 (43.14%)	22 (43.14%)	7 (13.72%)	51 (100.00%)
2001	6 (30.00%)	14 (70.00%)	-	20 (100.00%)
2000	12 (31.58%)	26 (68.42%)	-	38 (100.00%)

Table 1.1 : Total number of 571 IPOs in changes board listing of Bursa Malaysia from January 2000 to December 2020

(Note: Table summarises total number of IPOs across different board listing reflecting structural changes in capital market)

There are 2 streams in this research topic relating to the changes in Malaysia's capital market structure since 2000. And, this is also the reason why this research study the IPO market in Malaysia which will be explained further in this section. The first stream regarding the changes in board listing which affect IPO processes by the relevant authorities, and the second stream concerns new guidelines and listing rules made to Malaysian IPO market. In view of such changes, this research will examine the impact towards IPO market in Malaysia.

Based on the joint press release dated 8 May 2009 announced by the Securities Commission and Bursa Malaysia, the rationale of regulatory changes is served as a fundamental shift to a market-based regulatory approach which is to ensure greater efficiency and competitiveness without compromising on investor protection. It aims to provide greater empowerment to the market with emphasis on market and self-discipline. It streamlined regulatory process for better efficiency by reducing regulatory cost and faster time to get listed. It allows efficient access to capital and investments for both issuers and investors. Additionally, the shift has made Malaysia's capital market become a more market-based disclosure with enhancement disclosure in IPO prospectus for transparency to investors. The details of 2 streams are explained below:

(i) Malaysian IPO process and pricing setting in connection with changes in listing board structure

The first stream regarding the changes in board listing which affect IPO processes by the relevant authorities. Prior to 1996, the Securities Commission to evaluate and fix IPO price using PE ratios set for each industry and taking into consideration the profit forecasts and dividends forecasts. In 1996, the Securities Commission has abolished the IPOs pricing valuation mechanism where the offer prices were based on PE ratios set by the Securities Commission. Issuing firms, underwriters and investors are to make informed decisions about IPO pricing and valuation instead of depending on the regulator to fix IPO price.

Based on Figure 1.2, the total companies which go public on Bursa Malaysia is at the decreasing trend after the 1997/98 Asian financial crisis. According to Abdul-Rahim and Yong (2008), this reduction was likely due to the Securities Commission's announcement made in 1996 to liberalise the IPO pricing mechanism and due to the various measurements taken by the Securities Commission and the Malaysian government to counteract the adverse effect of the

1997/98 Asian financial crisis. The 1997/98 Asian financial crisis helped the Malaysian capital market to develop a better regulatory framework and a stronger infrastructure. Several initiatives were created to facilitate Malaysia through the recovery process.

The Securities Commission was established on 1 March 1993 with the objectives to regulate and develop Malaysia's capital market. In January 1996, the Securities Commission liberalised a new method of IPO shares issued based on a market-based pricing mechanism where issuing firms and advisers have to be responsible for setting IPO price. However, issuing firms intended to be listed on Main Market still has to obtain the Securities Commission's final approval to ensure suitability and appropriateness of issuing firms, whereas the issuing firms intended to be listed on ACE Market and LEAP Market are required to obtain the final approval from Bursa Malaysia (How et al., 2007; Abdul-Rahim and Yong, 2010).

With effect from 3 August 2009, the MESDAQ are revamped to allow relatively smaller companies to access equity market at an earlier stage of their lifecycle. For the revamped MESDAQ, the listing of emerging companies are sponsor driven. The ACE Market was introduced as an alternative market. The ACE Market is on sponsorship driven, the sponsors are typically the investment bankers or principal adviser who will decide the IPO's offer price in terms of pricing fixing process. The role of sponsor involves the ability to assess the suitability of IPO firms seeking listing on the ACE Market. In contrast to the Main Board and Second Board to establish a Unified Board called Main Market which is designed for all companies that meet the profit tracked records as stipulated in IPO Listing Requirements and does not target any particular types of companies. The Unified Board has uniform listing requirements, and comprehensive disclosure-based regulation with easy entry and fast delisting process.

Under the fixed-price mechanism, potential investors are required to make advance payment via bank draft for application of IPO shares that they intend to apply for. In the event such new issuance is oversubscribed, the allocation is made on a pro-rata basis. Under such mechanism, issuing firms have no authority to influence on subscription's demand. The entire IPO listing process (from the appointment of adviser or sponsor until the day of listing) will take approximately 10 to 12 months, however, it depends on the complexity of listing structure and scheme. After obtaining the relevant approval from the regulators, issuing firms are given 6 months to complete the IPO exercise.

At the initial stage, issuing firm that intends to go for IPO listing need to appoint adviser or sponsor, typically it will be an investment banker. The adviser or sponsor will then work with issuing firms to draw up the proposed listing timetable and scheme. A pre-consultation with the Securities Commission or Bursa Malaysia on the IPO structure or issues may be required by an issuing firm and its adviser or sponsor. Subsequently, a due diligence working group comprising lawyers, advisers or sponsors, reporting accountants, market researchers, company secretary, issuing house and share registrar will be formed to commence due diligence of an issuing firm for verification of information in the IPO prospectus.

After the submission of the IPO prospectus together with other supporting documents and application to the Securities Commission (for Main Market) or Bursa Malaysia (for ACE Market), it will take approximately 3 to 4 months from the date of submission for the regulatory approval. The Securities Commission will publicise the prospectus on its website for 15 to 30 market days for public to comment. At the same time, the Securities Commission or Bursa Malaysia will raise queries on the submissions made and subsequently request for a site visit to the issuing firm’s principal premises.

At the post-approval stage, it will take 2 to 4 months to register and launch the IPO prospectus. After obtaining the relevant approval from the relevant authorities, the issuing firm may arrange to appoint an investor relationship manager to manage the event of listing at the pre-marketing securities stage. The underwriting will be signed prior to the registration and lodgement of the IPO prospectus. The adviser or sponsor together with the investor relationship will organise roadshows and book building exercises for offering the securities to public and private investors. Once the prospectus is launched, the shares have been allocated to successful subscribers, and the shares will be listed and quoted on Bursa Malaysia.

(ii) Changes in guidelines and listing rules towards IPO markets in Malaysia

The second stream relates to new guidelines and listing rules for IPO markets with enhanced disclosure for transparency. There are 2 distinct markets, namely Main Market and ACE Market which are different in a number of aspects, with the main difference being size. With such changes, the regulatory requirements for the ACE Market is less stringent as disclosed in Table 1.2 below. The leniency for the ACE Market listing imply that the shares carry more ex-ante uncertainties compared to the Main Market counterparts. Further, most of the ACE Market shares are from young, small, and growth-driven firms, that are often associated with higher ex-ante risks. Another key reform to the ACE Market is, apart from it now being sponsor-driven and open to companies of all sizes and from all sectors, there will be no prescribed minimum operating history or profit track record requirements for entry to the alternative market, as the sponsors will be empowered to assess the suitability of listing applicants, thus sponsors to ensure sufficient information disclosures to investors.

The main objective of the ACE Market is to provide greater certainty and efficiency in the listing process and to make it easier for issuers to tap into capital market. On the other hand, the Main Market have uniform listing requirements (combining Main Board and Second Board) with comprehensive disclosure-based regulation. Hence, it is expected that the IPOs listed in the 2 markets will portray different short-run and long-run investors behaviours. This research is conducted to determine whether IPOs behave differently when listed in markets with distinct characteristics. The basic regulatory requirements are summarised below:

	Main Market	ACE Market
Approving authority	Securities Commission	Bursa Malaysia
Mode of listing profit test	• Aggregate group profits of RM20 million over 3 to 5 years. At least RM6 million for the latest year.	• No minimum requirement.
Market capitalisation test	• Total market capitalisation of at least RM500 million upon listing.	• No minimum requirement.
Infrastructure project company test	• Have rights to build and operate an infrastructure project in or outside Malaysia with project cost at least RM500 million. • Concession awarded by a government/state agency with at least 15 years remaining.	• Not applicable
Public shareholder spread	25%	25%
Moratorium on promoters	• Must maintain entire shareholding for the first six months after listing.	• Must maintain entire shareholding for the first 6 months after listing. • Must maintain at least 45% shareholding for the next 6 months. • Promoters can dispose of the remaining shareholding up to a maximum of 1/3rd per annum.

Table 1.2 : Comparison revised basic regulatory requirements for Main Market and ACE Market

(Note: Table presents key regulatory requirements differences between the Main Market and ACE Market including approval, financial criteria, and shareholding rules)

Leuz and Wysocki (2008) state the literature on regulatory of capital market emphasise on developed countries, and less focusing on regulatory changes made in developing countries. As noted by Price et. al., (2011), the question whether or not such changes in regulation requirements can be affected to improve investor protection in an economy with fundamentally weak legal institutions still remains an unanswered question.

For the Malaysian IPO market, the regulatory changes is especially interesting to analyse and it justifies the reasons supporting why this research focuses on the IPO market in Malaysia, an emerging or developing market. As shown in Table 1.1, there is no more than 600 public companies listed on Bursa Malaysia up to year 2020 (post-millennium era for the past 21 years). Consequently, it is always the intention of Bursa Malaysia to stimulate market activity and increase the number of IPOs in Malaysia. This may mean that a close study of a number of key issues related to the Malaysian IPOs is particularly interesting. This statement is supported by the joint media release announced by the Securities Commission and Bursa Malaysia on the streamlining of listing process and regulatory framework for the IPO market which is part of its initiatives under the 5-year Capital Market Masterplan 3 to enhance fundraising efficiency for Malaysian corporations at various stages of growth.

Figure 1.2 summarises the key milestones of the changes in capital market structure coupled with new guidelines and listing rules made to IPO market resultant from the revamp of board listing. It also shows the total number of IPOs, delisted, acquired and suspended cases in the past 30 years from 1990 to 2020 which gives an indication of the trend on how different IPOs waves are clustered over time.

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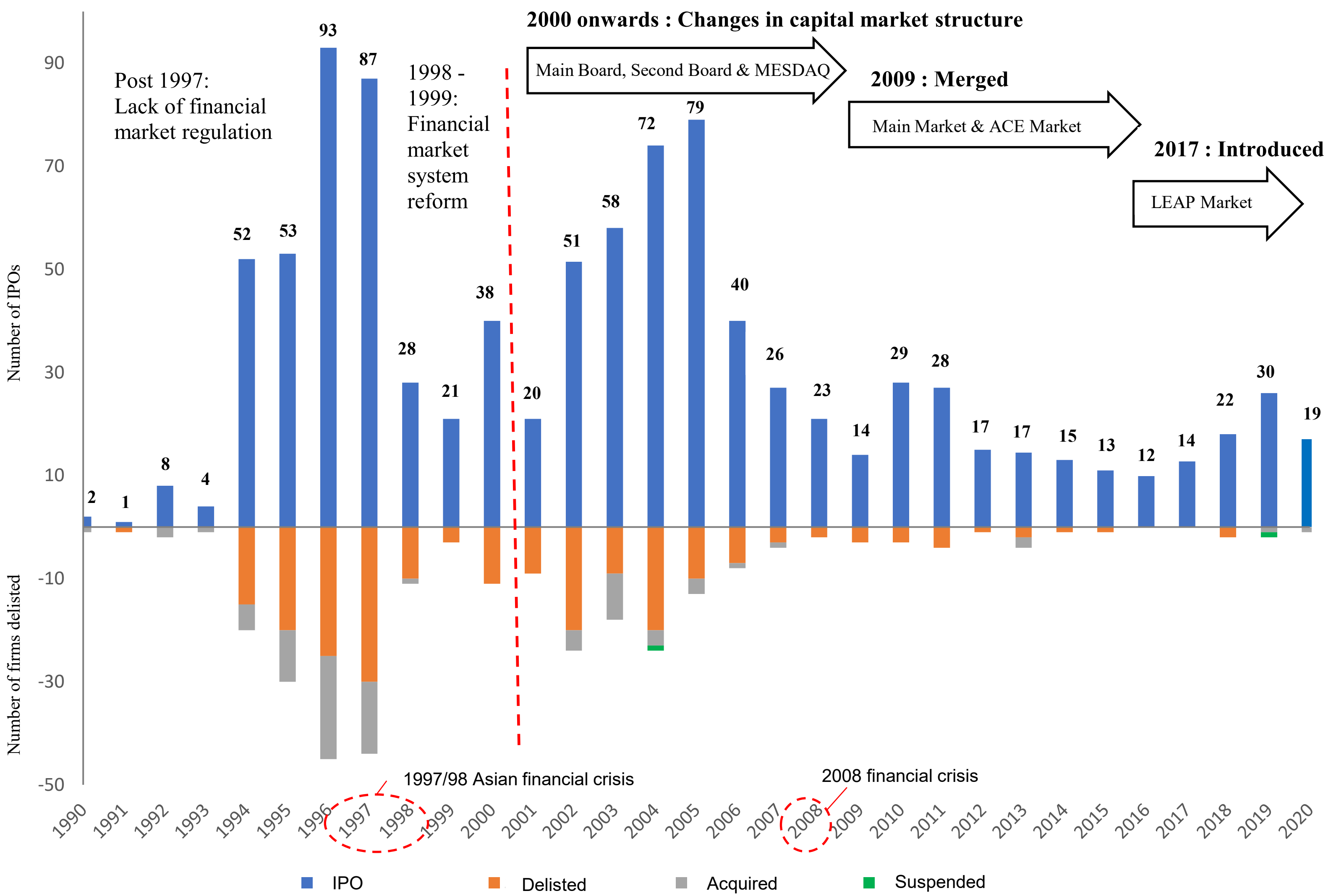

Figure 1.2: 30-year total number of IPOs, delisted, acquired and suspended cases

1.4 Problem statements

The empirical literature on IPO financial anomalies is primarily based on the assumptions of market efficiency and rational investor behaviour. However, starting in the early 2000s, a shift towards behavioural approaches began to emerge. Ritter and Welch (2002) review IPO theories, with a focus on IPO underpricing and aftermarket performance, and argue that neoclassical finance theories, primarily those based on asymmetric information, are insufficient to explain IPO market performance. Instead, they suggest that future research should incorporate behavioural insights. Following the above discussions, the below are problems statements to be discussed in this research.

(i) Behavioural finance versus neoclassical finance on IPOs

Malaysia's evolving financial landscape, particularly changes in its capital market structure over recent decades have introduced greater heterogeneity among market participants and influenced investors' risk-taking behaviour. Research on market sentiment in developing economies with rapidly expanding capital markets remains limited, and its impact on the IPO market is relatively underexplored. According to the Bursa Malaysia Research and Data Centre, between 1991 and 2003, individual traders who are typically less informed accounted for an average of 91.35% of investors. These traders often relied on diverse and informal information sources, contributing to a significant relationship between IPO underpricing and trading volume behaviour (Chong, 2009).

Malaysia's IPO pricing predominantly follows a fixed-price mechanism, which restricts issuing firms and underwriters from effectively gauging market demand, leading to valuation uncertainty and heightened divergence in investor opinions (Low and Yong, 2011). Since investors cannot fully express their beliefs under this pricing model, differences in expectations remain pronounced. Given these behavioural dynamics, this study concurrently examines both sentiment and fundamental factors influencing IPO underpricing in Malaysia.

While prior research, such as Albada and Yong (2017), focuses on fundamental finance factors including information asymmetry, underwriter reputation, ownership structure, share lock-up periods, pricing mechanisms, and institutional investor involvement, this study extends their work by incorporating market sentiment as a key determinant of IPO underpricing. By integrating insights from behavioural finance theories, it offers a more comprehensive understanding of the factors shaping IPO performance in Malaysia.

(ii) Anomalies aftermarket share performance for IPOs

Empirically, Ritter (1984) shows that IPO cluster in hot issue markets with higher initial returns observed during these periods. Ritter (1991) associates IPO volume with the window of opportunity theory, suggests a positive relationship between hot issue market IPOs and initial returns. Lerner (1994) corroborates this, noting that higher IPO offer prices are set during periods of high IPO volume. Hoechle and Schmid (2009) further indicate that firms listing during hot issue markets tend to underperform in the long run.

Based on IPO volume, the stock markets are divided into hot and cold issue markets. This study adopts the definition of Jaskiewicz et al. (2005), which identifies hot issue markets as periods with above-average initial returns. Figure 1.3 illustrates the IPO activity on Bursa Malaysia from January 2000 to December 2020, and shows that 60% of the period can be classified as a cold issue market, with market adjusted initial returns (MAIR) averaging below 28.48%. Nevertheless, IPO underpricing persists which is contrary to Ritter (1991) and Lerner (1994).

In 2009, the changes in Malaysia's capital market structure led to greater uncertainty and ex-ante risks. An upward trend in trading volume and the FTSE Bursa Malaysia KLCI (Figure 1.4) reflects the optimistic market sentiment. Investors' willingness to pay higher IPO prices leads to underpricing, consistent with the winner's curse theory, although longer-term underperformance is consistent with the fads theory (supporting the theory of Aggarwal and Rivoli, 1990). However, the aftermarket share performance of Malaysian IPOs remains inconclusive.

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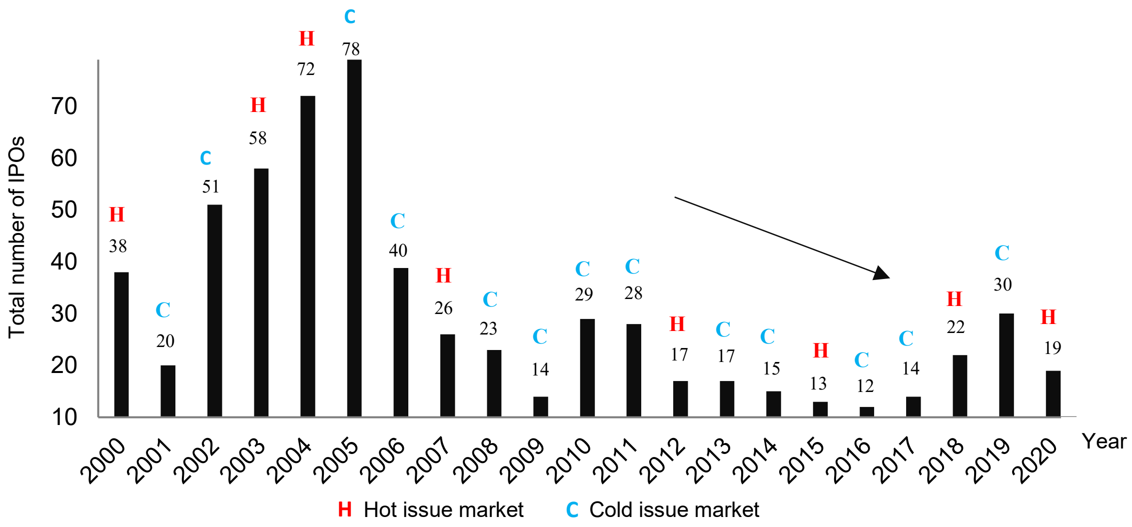

Figure 1.3: Total number of IPOs listed on Bursa Malaysia from January 2000 to December 2020

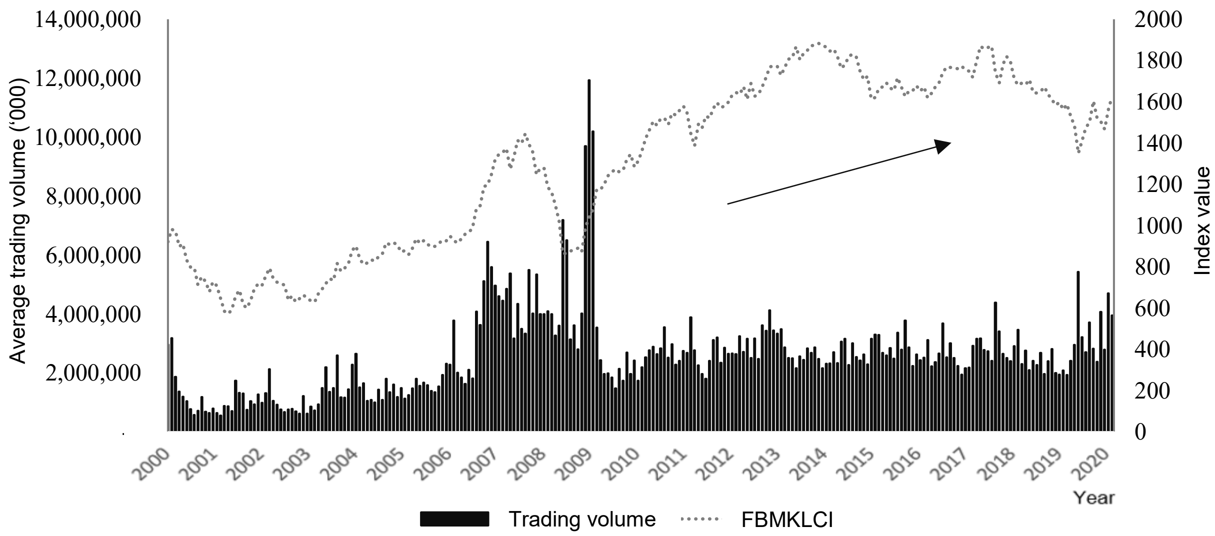

Figure 1.4: FTSE Bursa Malaysia KLCI and average trading volume from January 2000 to December 2020

Tong and Ahmad (2015) emphasise the need for more research on the performance of the Malaysian post-2009 IPO market, particularly to assess whether firm characteristics such as underwriter reputation continue to exert similar influences after the merger of the Main and Second Boards. This study fills this gap by examining the key determinants of long-run share performance from both sentiment and fundamental perspectives, focusing on the impact of market sentiment while incorporating fundamental factors for a comprehensive analysis.

(iii) Impact of regulatory changes on Malaysian IPO market

In the past 20 years, the Malaysian Government has made tremendous changes to the IPO requirements and processes of Bursa Malaysia concerning changes of Malaysia's capital market structure. These changes are expected to benefit investors and issuers besides improving IPO market performances. Considering the significant transformations in Malaysia's capital market structure over the past 20 years in which the changes in capital market structure could have resulted in change of investors' investment decision and risk appetite (Loughran and Ritter, 2004), there is merit in examining the market's reactions towards such changes.

Figure 1.5 shows the average yearly market returns of Malaysia stock market from January 2000 to December 2020. It indicates a distinct disparity in market returns between two delineated periods: pre-changes period from January 2000 to March 2008 (date of announcement by Malaysian Government), and post-changes period from 3 August 2009 (effective date of implementation) to 31 December 2020. This unusual phenomenon of changes in market returns has encouraged researchers to investigate further. This research contributes to the broader literature on the opportunities arising from the changes made in Malaysia's capital market structure for IPO market.

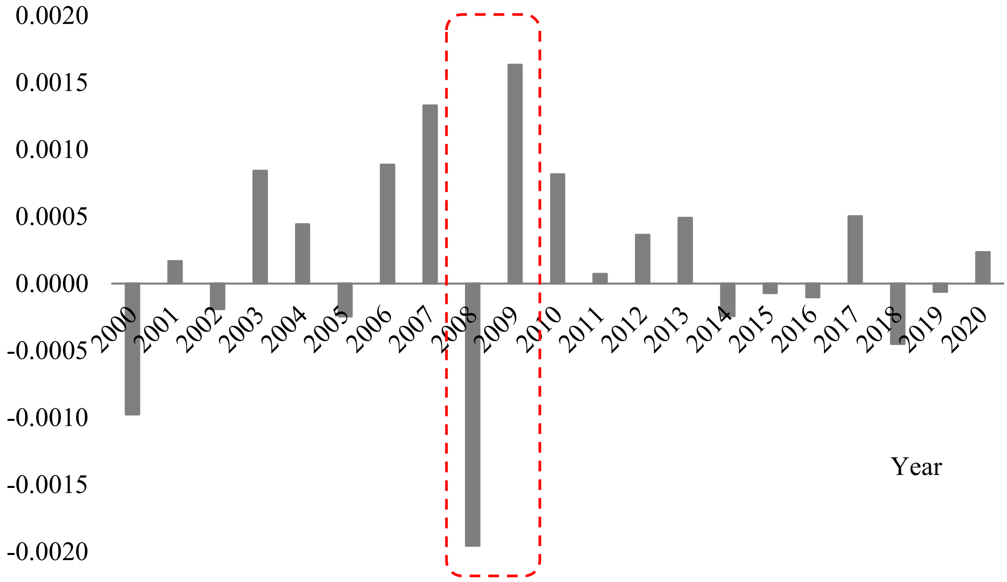

Figure 1.5: Average yearly market returns of Malaysia stock market from January 2000 to December 2020

Further, this research has computed the cumulative average abnormal returns (CAARs) between 2 delineated periods: Pre-Changes period from January 2000 to March 2008 (month of announcement), and Post-Changes period from August 2009 (month of implementation) to December 2020. As shown in Figure 1.6, at the announcement stage it shows negative CAARs indicate a decline in share value, leading investors to short-sell and subsequently repurchase shares at lower prices. However, at implementation stage it shows positive CAARs suggest an appreciation in share value, prompting investors to buy and hold shares longer. These patterns reflect market inefficiencies and investor behaviour influenced by irrational decisions. Brown et al.'s (1988) uncertain information hypothesis supports these findings, indicating that returns increase as uncertainty is resolved. Specifically, the announcement stage reveals investor reactions to capital market changes, while the implementation stage shows adjusted investor behaviour once uncertainty is resolved, leading to a preference for longer-term holdings.

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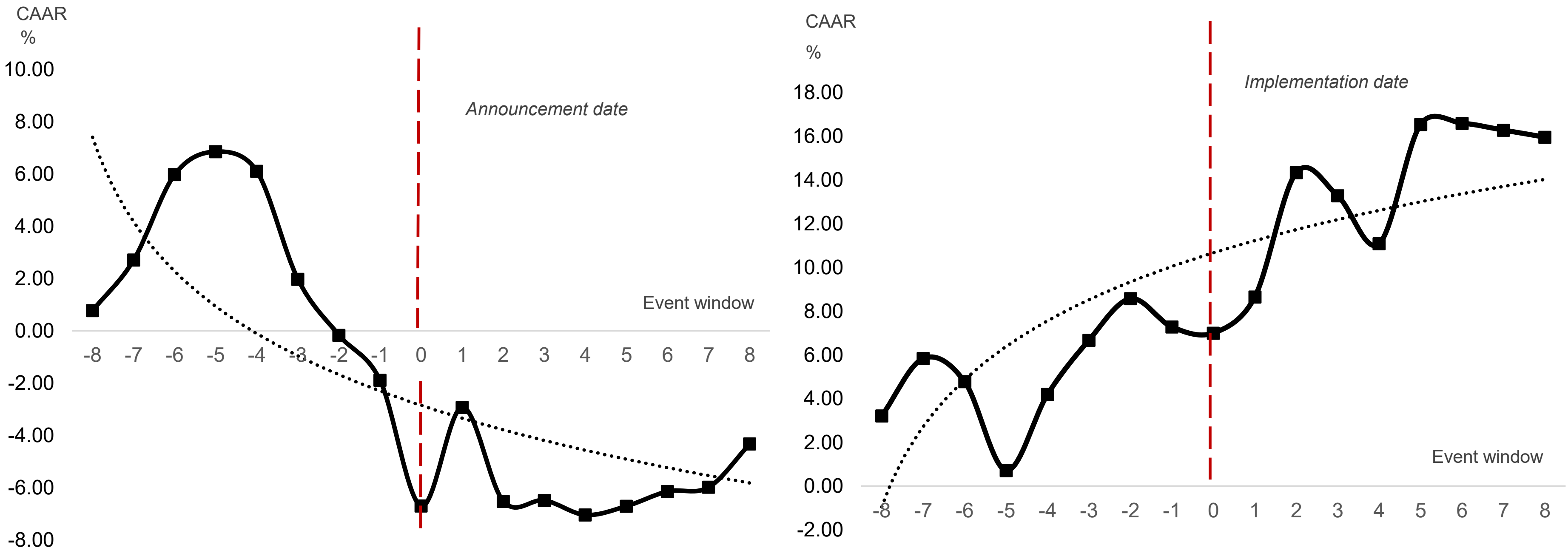

Figure 1.6: The cumulative average abnormal returns for announcement date and implementation date using market adjusted return (-8, +8) window period

Here, the motivations of this research objective are two-fold. First, previous literature primarily focuses on the fundamental factors of PE and is dominated by studies concentrating on developed countries such as the United States market (Beaver and Morse, 1978; Cho, 1994; Kane et al., 1996; Park, 2000; White, 2000), less in emerging or developing countries. In the context of Malaysia, there is very less research about the PE of IPO market (Ong et al., 2023) because there is no considerable awareness of the determinants and valuation of Malaysian IPO for PE noting that it has not received sufficient attention despite the regulation of IPO pricing that has existed for many years. Additionally, several studies have confirmed that share price changes, particularly in times of extreme events and when shares are subjectively valued, can be explained by sentiment-driven demand shocks (Baker and Wurgler, 2006; Baker et al., 2012a). Nevertheless, the role of market sentiment in explaining the time-series behavioural of PE remains largely unexplored (Boonlert, 2017). Therefore, this research fills this gap by focusing on the determinants of PE from both sentiment and fundamental factors. By examining these determinants, this research aims to offer a comprehensive understanding of how PE are shaped in the Malaysian IPO market. In this research, we are also using quantile regression model to robust check PE regression model whether the existence of 'fads' phenomenon in valuing IPO according to Shiller's (1990a) fads theory.

Second, radical changes in the Malaysian financial environment, particularly changes in Malaysia's capital market structure in the past few decades, may have increased heterogeneity in the composition of participants and affected investors' risk-taking behaviour. Under the new regime 2009, the bankers or underwriters (principal advisers) are given responsibility to ensure suitability of IPO firms including setting offer price which is fair and reasonable justifications, and more disclosure-based regime for transparency. Loughran and Ritter (2004) introduced the changing risk composition hypothesis, assumes that riskier IPOs will be underpriced by more than less-risky IPOs. This prediction follows from models where IPO underpricing arises as an equilibrium condition to induce investors to participate in the IPO market.

Despite extensive research, the determinants of IPO underpricing remain a subject of debate, particularly in emerging or developing countries like Malaysia, where unique market dynamics and investor behaviour may influence the extent of IPO underpricing. Furthermore, this research investigates how the PE, as a critical valuation metric, influences IPO underpricing in the Malaysian IPO market. Given that the PE reflects market expectations about a firm's future earnings potential, its impact on IPO pricing decisions is crucial. In the Malaysian market, characterised by a combination of institutional and retail investors, understanding the relationship between PE and IPO underpricing can provide valuable insights for issuers, underwriters, and policymakers.

Previous studies have explored IPO underpricing and PE, but there is limited research on how market sentiment and regulatory changes in the Malaysian IPO market influence these factors. The Malaysian IPO market has experienced significant fluctuations in IPO underpricing and PE, which are influenced by market sentiment and regulatory changes. However, the specific impacts of these factors remain underexplored. This research aims to fill this gap by examining how market sentiment and regulatory changes affect IPO underpricing and PE in the Malaysian IPO market.

1.5 Research objectives

This is the first study to develop and apply a comprehensive sentiment index tailored to the Malaysian IPO market. Most prior Malaysian IPO studies have relied on single-variable sentiment proxies such as Google Search Volume Score, and Google Search Volume Index to capture investor mood and behaviour. However, these proxies reflect only one behavioural signal at a time and may oversimplify the broader sentiment environment. Given the multi-layered nature of investor behaviour which is typically shaped by firm-specific factors, market trends, and macroeconomic signals, this study adopts a multi-dimensional approach. A composite sentiment index, namely the Malaysian IPO Market Sentiment Index (MIMSI), is constructed by aggregating sentiment indicators across firm, market, and macroeconomic levels. This integrated framework enables a more consistent and comprehensive assessment of how market sentiment influences IPO pricing and performance. By moving beyond fragmented proxies, the study is able to better capture the complexity of behavioural forces operating in the Malaysian IPO market.

Understanding market sentiment is crucial in IPO research because IPOs are highly sensitive to investor expectations, optimism, and behavioural biases, especially in emerging markets like Malaysia where information asymmetry and retail investor dominance are pronounced. Sentiment can drive valuation beyond fundamentals, leading to phenomena such as underpricing, aftermarket volatility, and long-run mispricing. Despite this, market sentiment has been underexplored in Malaysian IPO literature, which has traditionally focused on neoclassical factors. This study addresses this gap by examining how market sentiment shapes IPO pricing and performance in short-run and long-run, as well as market efficiency across different regulatory regimes.

The main objective for this research is to examine market sentiment in the context of Malaysian IPOs. Figure 1.7 presents the theoretical framework of this research.

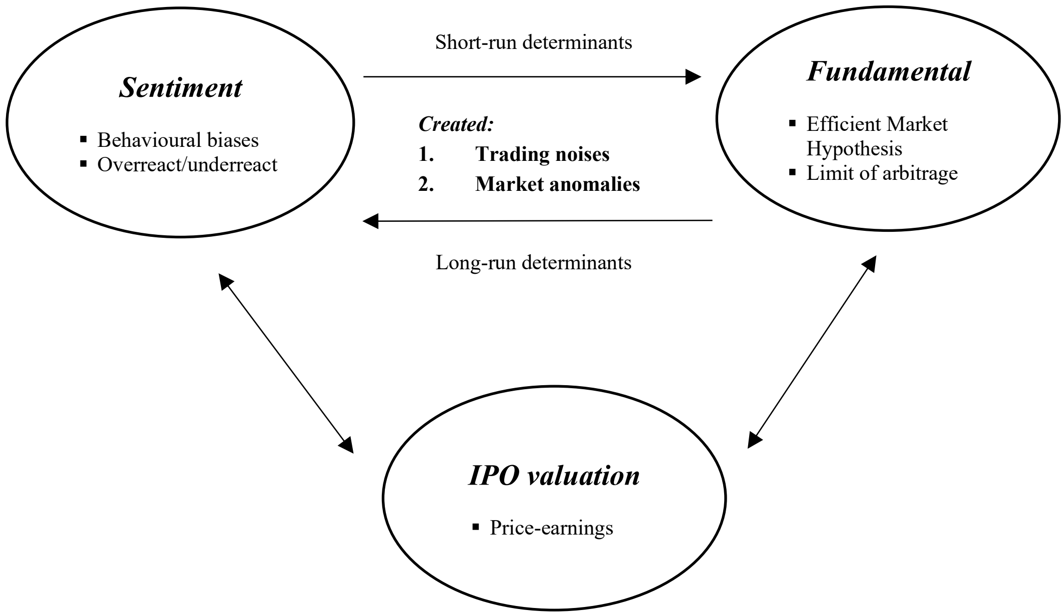

Figure 1.7 : Theoretical framework of the study

This study is structured with 3 interrelated research objectives that build progressively to capture the evolving influence of market sentiment in the Malaysian IPO landscape. The first research objective (RO1) examines both the short-run underpricing and long-run aftermarket performance of Malaysian IPOs, providing a comprehensive view of IPO performance over time. The second research objective (RO2) aims to identify the key sentiment and fundamental factors that drive both short-run and long-run IPO performance. This offers deeper insight into how market sentiment, alongside issue-, firm-, and market- characteristics, influences IPO outcomes beyond traditional valuation models. The third research objective (RO3) analyses the impact of regulatory changes in Malaysia's capital market structure on IPO share performance, with particular emphasis on how PE and market sentiment shape IPO pricing in an evolving regulatory landscape. Together, these objectives present a structured framework that integrates market performance, behavioural influences, and regulatory changes in understanding IPO dynamics.

1.6 Contribution of the study

This study provides a nuanced perspective on the role of market sentiment by identifying specific conditions under which market sentiment exerts meaningful influence. Notably, market sentiment is found to be more pronounced in the long-run share performance of IPOs, particularly under volatile market conditions and among high-PE IPOs. These contexts reflect behavioural overreactions or speculative pressures, supporting key insights from behavioural finance. In contrast, the study also highlights periods where market sentiment has limited or no effect, especially in the short-run share performance of IPOs or post-2009 regulatory reforms, where enhanced disclosure has mitigated behavioural bias in IPO pricing. These findings are particularly relevant for emerging markets like Malaysia, where the transition towards a more disclosure-based regime mirrors the maturing dynamics seen in developed capital markets. Acknowledging both the presence and absence of market sentiment effects advances existing literature by contextualising behavioural influences within the context of Malaysia's transitioning capital market structure.

While past studies have examined sentiment effects or regulatory reform in isolation, this study is the first study to demonstrate that regulatory changes in Malaysia systematically dampened sentiment-driven pricing distortions. This supports the view that emerging markets can evolve towards valuation discipline, a transition has not documented with empirical evidence using market sentiment constructs like MIMSI. Additionally, the study advances the literature by empirically demonstrating a shift in IPO pricing mechanisms before and after regulatory reform, providing a rare longitudinal view of sentiment suppression through institutional strengthening.

The contribution of the study consists of 3 perspectives: (i) academic value, contributing to the market sentiment and IPO literature with new findings; (ii) industry value, benefiting key IPO players in the Malaysian financial market; and (iii) regulatory value, supporting enhancements to Malaysia's financial framework. The explanations are as below:

From an academic perspective, this study makes significant methodological contributions. Specifically, it applies (1) Baker and Wurgler's (2007) Principal Component Analysis (PCA) method; (2) Jiang et al.'s (2022) Scaled Principal Component Analysis (sPCA) method; and (3) Huang et al.'s (2015) Partial Least Squares (PLS) method in constructing of the MIMSI. No prior Malaysian IPO study has employed these techniques for sentiment index construction, highlighting a key gap addressed by this research. While international studies extensively explores the impact of investor sentiment on asset prices and returns, empirical work on IPO sentiment is particularly scarce in Malaysia. By incorporating PCA, sPCA and PLS methods into the MIMSI framework, this study overcomes the limitations of fragmented single-variable proxies and establishes a more robust multi-dimensional market sentiment measure. Additionally, the constructed index is also decomposed into short-run and long-run sentiment components to reflect temporal behavioural patterns. Another important contribution lies in the use of hand-collected data. Prior Malaysian studies have been constrained by limited access, confidentiality, and legal restrictions. This study overcomes those challenges and provide a valuable dataset, enhancing the reliability and depth of analysis. Furthermore, it contributes to the underdeveloped field of behavioural finance in Malaysia by integrating both behavioural and neoclassical finance theories to explain IPO performance, an approach not commonly adopted in existing local research.

From a market practitioner perspective, this research contributes practical insights into the factors influencing Malaysian IPO share performance, particularly during changes in the Malaysia's capital market structure. It offers a deeper understanding of how market sentiment impact IPO underpricing and aftermarket share performance. Unlike prior studies that primarily focus on market trends or valuation techniques, this research emphasizes the integration of sentiment-driven behavioural factors, filling a critical gap in understanding IPO dynamics. Such information can help issuing firms planning for listing better understand the impact of market sentiment and investor behaviour on IPO underpricing and aftermarket share performance. By aligning their strategies with investor expectations and market conditions, issuing firms can optimise their valuation and ensure a more successful IPO launch. Underwriters can leverage these insights to enhance pricing strategies, design more effective offering structures, and better manage oversubscription risks, ultimately fostering improved market outcomes for all stakeholders.

From a policymaker perspective, this research provides valuable insights to promote IPO activities in Malaysia. The findings reveal that while neoclassical factors are key to predicting IPO share performance, sentiment factors are equally significant. This highlights the need to integrate behavioural finance into policy frameworks. Policymakers can develop strategies to enhance transparency, streamline information dissemination, and ensure fair valuation practices, thereby reducing information asymmetry and minimising IPO underpricing. Over time, these measures can improve aftermarket share performance, foster aftermarket overperformance, and enhance market liquidity by addressing the psychological and emotional drivers of investor behaviour. Policymakers can achieve this by (i) developing reliable, real-time sentiment indicators specifically tailored to the Malaysian IPO market, enabling stakeholders to gain deeper insights into investor behaviour and market dynamics; (ii) promoting investor education programs can help retail investors better understand the risks associated with speculative investing these programs aim to reduce biases such as overconfidence and herd behaviour, encouraging more rational and informed decision-making; (iii) enhancing IPO disclosure standards ensures transparency by providing comprehensive information on IPO valuations. This includes detailed disclosures on how the offer price is determined, along with underlying assumptions, increasing market confidence in fair valuations and empower investors to make more informed decisions; (iv) implement subscription limits by setting a maximum cap on the number of shares an investor is allowed to subscribe to, curbing speculative bidding behaviour thereby mitigating the risks associated with IPOs driven by oversubscription; (v) introduce market volatility-based circuit breakers in the first 30 to 90 days after listing that suspend trading when price fluctuations exceed specified thresholds to allow investors to reassess information and prevent irrational trading behaviour; and (vi) refine IPO pricing mechanisms by promoting dynamic book-building mechanism and requiring volatility-adjusted models to be disclosed in the IPO prospectus. Such disclosures will align offer prices with fundamental valuations, taking into account historical volatility, macroeconomic indicators, and sector-specific risks, thereby reducing underpricing in IPOs. By addressing these critical factors, policymakers can stimulate increased IPO activities in Malaysia, contributing to the overall growth and competitiveness of the Malaysian capital market.

1.7 Scope of the study

This research was conducted to enhance the understanding of market sentiment and IPO markets in the context of Malaysia. Empirical studies focused on neoclassical finance theories, the present study extends to investigate the impact of market sentiment on Malaysian IPO markets. Through the incorporation of behavioural finance theories, this research aims to offer a more comprehensive understanding of the factors shaping IPO behaviour in Malaysia. Due to the different behaviour of IPOs performance in the short-run and in the long-run, this research examines IPO's short-run and long-run share performance separately from both sentiment and fundamental perspectives concurrently. The quantitative method of the secondary data was utilised in this research, and employ ordinary least square regression model, and binary regression model including logit regression model and robust check with probit regression model. An interaction analysis was conducted for short-run and long-run share performance of IPOs.

From the behavioural finance theories, the key is to measure IPO market sentiment to find out the proxy indicators which can express market sentiment accurately. It is better that these proxies are observable and quantifiable, and can objectively and comprehensively reflect the views of IPO investors on the Malaysian IPO market. The adoption of methodology is crucial in deriving a more accurate results for the measurement of IPO market sentiment. Figure 1.8 illustrates the difference between the neoclassical finance theories and the behavioural finance theories and summarises the different behavioural research streams and concepts into 3 categories namely, (i) behavioural biases, (ii) investor sentiment, and (iii) market anomalies. From the behavioural finance theories perspective, this research employs using PCA, sPCA, and PLS methods in constructing MIMSI.

As a measure of IPO market sentiment the data from a combination of market-based and survey-based measures as sentiment proxies are used in this research. From the behavioural finance theories perspective, the study aims to examine whether IPO market sentiment proxy has any significant impact on Malaysian IPOs over other characteristics such as issue, firm, and market characteristics. Survey-based sentiment measurements are commonly used in combination with market-based measurements (Naik and Padhi, 2016). In this research, we have selected 2 additional common IPO sentiment variables are based on survey-based sentiment i.e., consumer confidence index (CCI), and business confidence index (BCI) both are provided by Malaysian Institute of Economic Research (MIER)'s reports.

On the other hand, changes in Malaysia's capital market structure may have influenced investors' decision-making processes and risk appetites on IPO valuation, which could potentially be leading to different investment behaviours. Here, this research also focuses on how sentiment and fundamental factors drive variations in PE, and evaluates the role of PE in IPO underpricing across different sub-periods during the regulatory changes. Here, ordinary least square regression model, quantile regression model, and ANOVA test are employed. From the behavioural finance theories, the market sentiment was analysed by comparing the single-variable sentiment proxies following the study done by Lutfur and Shamsuddin (2019), with MIMSI constructed using PCA, sPCA and PLS methods.

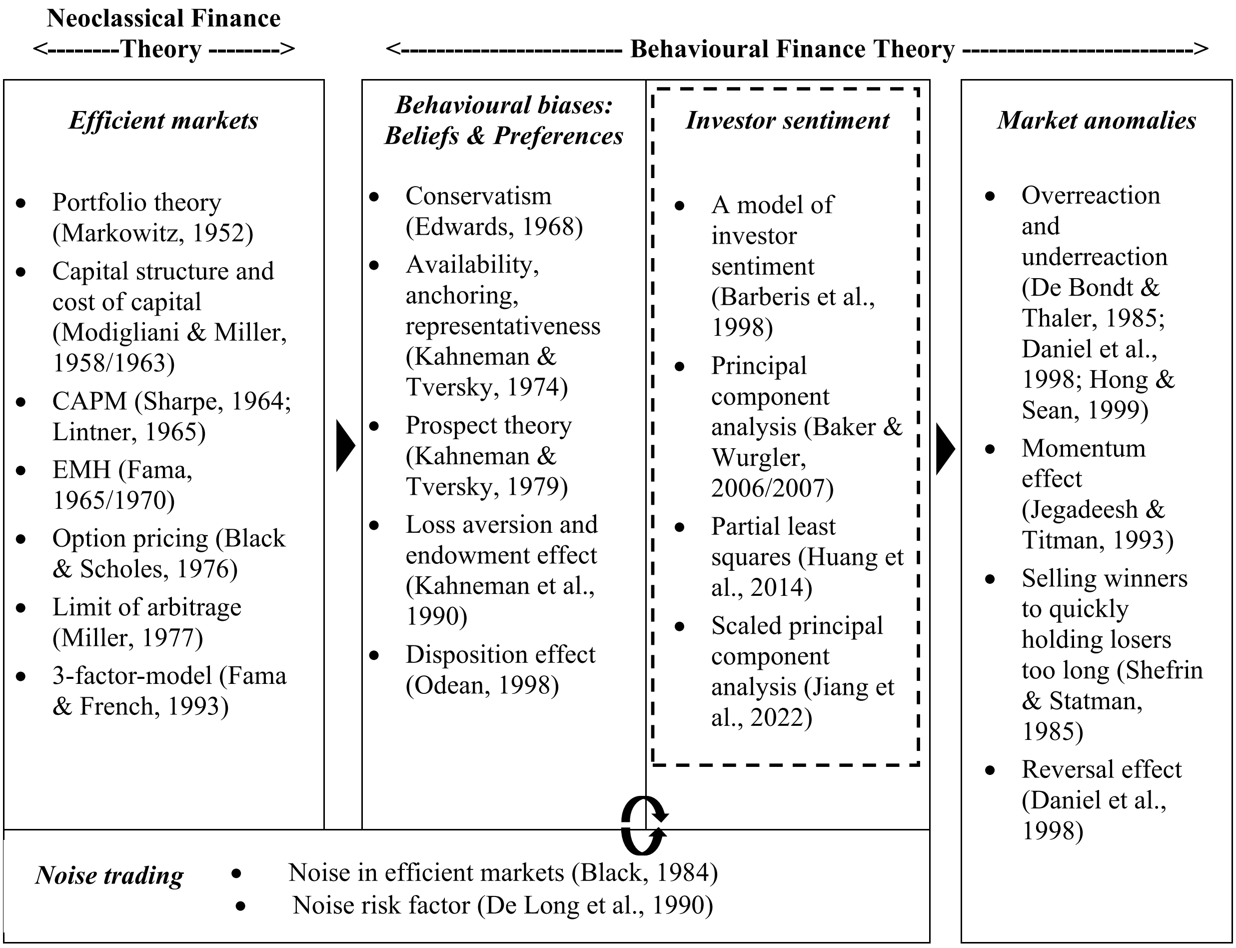

Figure 1.8 : Overview of theoretical components of behavioural finance theories

Note:

denotes the focus of this research.

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1.8 Thesis structure

The remainder of this research is laid out in the following manner, with Chapter 2 outlines a breakdown of both the theoretical and empirical literature regarding the IPO underpricing and aftermarket share performance along with the market sentiment; background of changes in capital market structure in Malaysia; and related theories on IPO valuation particularly, PE with market sentiment, regulatory changes and IPO underpricing. Chapter 3 explains the methodology and hypothesis development. It shows the presentation of the data and variables description, and explains the data collection process, and introduces the methodology approach of this research, as well as the methods deployed to address the research objectives. Chapter 4 explains results and discussions. It presents and describes the raw results of analysis by using tables and graphs together with some explanations. The data analysis results are presented and analysed with interpretation of the findings in relation to the research objectives, and concluded with summary of the research key findings. Chapter 5 concludes this research by providing research implications, and makes some suggestions for further research. It also discuss the limitations of the study. Figure 1.9 provides an outline of this research.

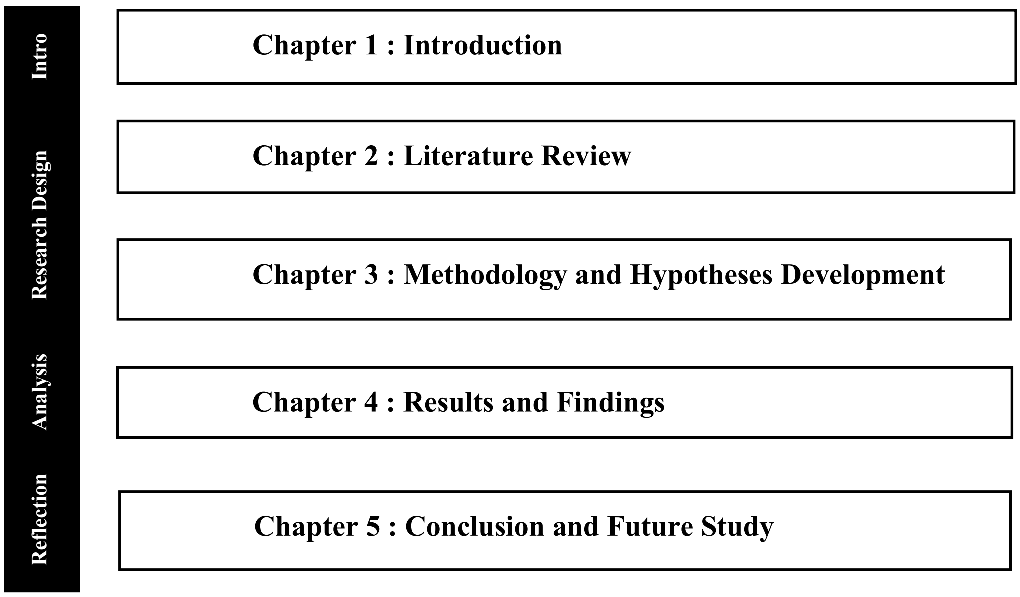

Figure 1.9 : Outline of the study

1.9 Summary

This chapter has established the foundations for the thesis. It presents the research background, the motivation of research, problem statements, and research methodology as well as the research contribution and significance. It also provides an overview of the structure of the thesis. This research focuses on the market sentiment as it is critical in order to better understand the patterns in the Malaysian IPO market, and of practical value in forming investment decisions. Overall, this research provides knowledge on the importance of IPO market's financial policy in regard to the market movements, and IPO cycles in Malaysia may then be analysed. This research benefits the investors, underwriters participating in IPO activity and the Malaysian regulators. It intends to provide good understanding on market sentiment and Malaysian IPO market.

CHAPTER 2 : LITERATURE REVIEW

2.1 Introduction

IPOs often present a unique setting for examining market inefficiencies and anomalies due to their complex pricing mechanisms and the inherent uncertainties faced by investors. Behavioural finance theories, particularly those cantered on investor sentiment, offer critical frameworks for understanding these anomalies. Unlike the traditional assumptions of efficient markets under neoclassical finance, behavioural finance acknowledges the impact of psychological biases, heterogeneous beliefs, and investor sentiment on asset pricing. These factors are particularly pronounced in the IPO market, where speculative behaviour, information asymmetry, and shifting market dynamics frequently lead to pricing deviations.

The pioneering studies of Shiller (1984) and Barberis et al. (1998) have established investor sentiment as a significant driver of price anomalies, highlighting its relevance in explaining the IPO underpricing and aftermarket share performance. These theories suggest that investor optimism and market euphoria during IPO listings often lead to IPO offer price distortions, while subsequent adjustments reflect more rational assessments of fundamental values. This is especially relevant in Malaysia's capital market, where changes in capital market structure and regulations have heightened the influence of market sentiment on IPO performance.

This chapter reviews the relevant literature to contextualise how behavioural finance theories and sentiment-driven frameworks relate to IPO pricing and performance. It also focuses on exploring how market sentiment, price-earnings (PE) and regulatory changes interact to address the research objectives. By connecting this research to the behavioural finance literature, this section explains the key finance theories behind the study and identifies the gaps it aims to fill.

2.2 Introduction to the IPO market

The IPO market represents a critical component of financial markets, providing firms with access to capital while offering investors the opportunity to participate in the early growth stages of promising firms. An IPO occurs when a firm issues shares to the public for the first time, transitioning from a privately held entity to a publicly traded one on stock exchange. This process is often seen as a milestone for a firm, signalling its growth and maturity.

The IPO literature has consistently shown that underwriters and issuers often underprice IPOs due to several factors. These include significant information asymmetries (Beatty and Ritter, 1986; Rock, 1986), the practice of rewarding institutional investors for providing private information during roadshows (Aggarwal et al., 2002; Benveniste and Spindt, 1989), and signalling firms' quality to investors (Allen and Faulhaber, 1989; Welch, 1989). One of the key factor contributing to deliberate IPO underpricing is the discount applied to IPO PE multiples (Kim and Ritter, 1999).

Firms intending to list through IPOs want to be valued prior to going public. Underwriters are given incentives to use valuation methods in predicting the actual (intrinsic) values which serve as the ex-ante estimate of firms' market values (Roosenboom, 2007). Therefore, the firms' intrinsic values are used as a guide in establishing the IPO offer prices of the firms, which will be offered to the public. Theoretically, IPOs are considered as fair-priced if firms' IPO offer prices are similar to first-day IPO share prices. However, IPO mispricing is one of the major issues in IPO valuation given the sentiment of investors will invariably affect the aftermarket prices on the first trading day. When the aftermarket share prices on the first trading day are deliberately higher (lower) than the IPO offer price, IPO underpricing (IPO overpricing) is identified (Chen et al., 2002).

One of the factors that could help to explain the IPO mispricing issue is the pricing mechanism itself. In developed countries such as the United States (US), most IPOs are priced based on the book-building mechanism where institutional investors provide private information to underwriters during the roadshows. To encourage the aftermarket shares subscription among investors and to ensure a steady increase in share prices, the pricing of IPOs should reflect its intrinsic values. In the US market, Aggarwal and Rivoli (1990) find IPO overvaluation typically arisen in the initial aftermarket trading due to the optimism of investors resulting in over-reactions or under-reactions during the first trading month of IPO shares.

2.3 Pricing mechanism used in Malaysian IPO market

In Malaysia, pre-IPO intrinsic value estimates and information related to comparable firms that are presented by underwriters are rarely found in IPO prospectuses. This situation is different from the scenario in unlike European countries, where the pre-IPO intrinsic values are available in IPO prospectuses and information can be easily obtained by investors for valuation and share subscription decisions (Deloof et al., 2009; Roosenboom, 2007).

Since January 1996, the Securities Commission has liberalised the method to issue new shares on the Malaysian IPO market, which is based on a market-based pricing mechanism, also known as fixed-price mechanism. Under the fixed-price mechanism, underwriters are given responsibilities to determine the IPO offer prices and decide the share allocation discretion. IPO offer prices are determined based on the information provided by the underwriters without seeking information from investors. The IPO offer prices are set by underwriters and issuers prior to the listing of the firms (Abdul-Rahim and Yong, 2010).

In 2002, Malaysia introduced a hybrid book-building mechanism, combining features of both fixed-price and book-building approaches. Retail investors are allocated shares using the fixed-price mechanism, while institutional investors participate in the book-building process. Under this system, the underwriter and issuer set an IPO offer prices range, and institutional investors place bids during the pre-market period. The final IPO offer price, referred to as the 'institutional price', is determined based on demand exceeding supply. However, this price and the allocation criteria for institutional investors are not disclosed in IPO prospectuses.

Compared to developed markets, the Malaysian market is considered an emerging market having less liquidity and greater uncertainty (Eldomiaty, 2008). Given the IPO offer price is priced under the fixed-price mechanism, underwriters and issuers establish the IPO offer price without soliciting investors' opinions (Tajuddin et al., 2015). In such cases, potential investors will meet difficulties when valuing IPOs. This means that the IPO offer prices often do not fully reflect the true values of the IPOs. As a result, conservative pricing is frequently employed, leading to IPO underpricing to secure successful subscriptions. While institutional investors participate in book-building, the final IPO offer price or 'institutional price' is determined without transparency in allocation criteria. This lack of disclosure can lead to inefficiencies and IPO underpricing because issuers might focus more on ensuring demand rather than maximising the funds raised.

2.4 Empirical evidence on neoclassical finance and behavioural finance theories for Malaysian IPOs

Fundamental factors are derived from neoclassical finance theories on the assumption that investors follow basic financial rules and design investment strategies purely based on risk-return consideration (Baker et al., 1977). Behavioural finance assess that investors are ordinary people influenced by sentiment and psychological prejudices that markets are inefficient (Statman, 2014). Behavioural factors better explain the observation of stock markets that many investors make decisions following good or bad news, or other factors such as herding, and loss aversion. These ‘noise’ traders make stock markets informationally inefficient, and this leaves arbitrage pricing theory (the cornerstone of neoclassical finance) with a limited role to play (De Long et al., 1990; Shleifer and Summers, 1990). Therefore, sentiment and fundamental values are the 2 main driving forces of share price movements. Table 2.1 summarises the empirical studies which have analysed Malaysian IPOs using neoclassical finance and behavioural finance theories.

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Authors (year)	Variables	Period	Methodology	Sign	Results
Neoclassical finance theories					
Yong (1996)	Firm size and oversubscription rate	1990-1994	Mean, t-test	+	Significant relationship between firm size and oversubscription ratio, with initial return
Jelic et al. (2001)	Underwriter's reputation and management earnings forecasts	1980-1995	Multiple regression	+	Extremely high and statistically significant initial premiums and positive and statistically significant long-term returns up to 3 years after listing
Yong et al. (2002)	Offering size and oversubscription rate	1991-1995	Multiple regression	+/-	Only offer for sale exhibit significant positive correlation between oversubscription and initial return and not offering size
Yong and Isa (2003)	Oversubscription rate and offer price	1990-1998	Step-wise regression	+/-	Only oversubscription ratio contributes significantly to the initial return and not offer price
Abdullah and Taufil (2004)	Firm's age and substantial shareholders' ownership	1992-1998	Multiple regression	+	Larger companies are associated with higher initial returns. Participation of Bumiputra has reduced IPO underpricing, however, such intervention have contributed to the losses on substantial shareholders
Wan-Hussin (2005)	Owners' participation and lockup provision	1996-2000	Multiple regression	-	Owners' participation ratio is negatively related to IPO underpricing, and the fraction of directors' shares subject to liquidity restrictions is positively associated with it
Prasad et al. (2006)	Government public policy and regulatory intervention	1968-1992	Multiple regression	+	Underpriced more in the short run as compared to the long run for both the pre-policy period and the post-policy period
Yong (2007b)	Size effect and oversubscription rate	1999-2003	Multiple regression	+/-	Only oversubscription ratio contributes significantly to the initial return and not size effect

(cont'd)

Authors (year)	Variables	Period	Methodology	Sign	Results
Neoclassical finance theories (cont'd)					
How et al. (2007)	Allocation of Bumiputra investors' IPO shares	1989-2000	OLS regression	+	IPOs with a higher share allocation to retail Bumiputera investors perform better in both short-run and long-run
Abdul-Rahim and Yong (2008)	Shariah-compliant	1999-2007	Multiple regression	n.r.	Insignificant effect toward initial return
Ahmad-Zaluki et al. (2007)	Earnings management	1990-2000	Multiple regression	-	Earnings management and post-IPO performance showed that aggressive earnings management IPO companies performed significantly less well than their more conservative counterparts
Yatim (2011)	Board structure	1999-2008	Multiple regression	+	Dual leadership structure and board reputation are positively associated with IPO underpricing
Yong (2011)	Initial returns	2001-2009	OLS regression	+	The presence of a large number of informed investors in IPO, as compared to uninformed investors, brings with it an increased interest, or the bandwagon effect, in particular stock, which results in higher initial return
Ramlee and Ali (2012)	Market liquidity	1998-2008	Multiple regression	+	Government shareholdings in IPO shares positively moderate the relation between liquidity and long-term return
Sapian et al. (2013)	Aftermarket liquidity	2003-2008	Multiple regression	+	Significant relationship between initial return and IPO liquidity in long-run
Mohammed and Nurwati (2016)	Underwriters' effect and management earnings forecasts	2002-2012	Multiple regression	+	IPO with high market share and charge low underwriting spread lead to higher underpricing. High earnings forecasts lead to low asymmetric information and less underpricing

(cont'd)

Authors (year)	Variables	Period	Methodology	Sign	Results
Neoclassical finance theories (cont'd)					
Che Yahya et al. (2017)	Institutional investors' participation as moderating effect	2000-2013	Multiple regression	+	Significant relationship between institutional investors' participation and initial return; however, the quality of IPO firms weakens this relationship
Wong et al. (2017)	IPO size, market volatility, underwriter status, and reciprocal of IPO price (risk)	1998-2008	OLS regression	+	Fads hypothesis applied. Significant negative relationship between MAIR (short-run) and underperformance (long-run) over a 36-month period after listing
Bazeet and Ahmad-Zaluki (2018)	Firm size, Altman Z-score (measure of pre-IPO performance), and auditors' firm	2005-2015	OLS regression	+	Ex-ante uncertainty variables, such as company size, the Altman Z-score measure of pre-IPO performance, and audit quality have a significant relationship with the initial returns of IPO
Rasidah et al. (2014)	Regulatory changes on lockup period	2000-2012	Multiple regression	+	The higher lock-up ratio is likely to increase the initial returns
Ong et al. (2020)	IPO proceeds, underwriter reputation, net tangible asset, retained ownership, oversubscription ratio	2009-2017	Multiple regression	+	Significant relationship between growth opportunity and IPO pricing
Al-Masawa et al. (2020)	Post-IPO market liquidity	2002-2017	OLS regression	-	Good signal of market efficiency lead to higher market liquidity in long-run
Dwaikat et al. (2020)	Board governance (Independence board and board size)	2002-2013	Logistic regression	+	Significant impact on the decision to initiate dividend for IPO firms
Rasidah et al. (2022)	Lockup ratio, Bumiputera equity ownership, shariah status	2000-2016	OLS regression	+	Support the propositions that lockup provisions signal commitment and demand increase initial returns

(cont'd)

Authors (year)	Variables	Period	Methodology	Sign	Results
Neoclassical finance theories (cont'd)					
Albada et al. (2025)	Investors' demand, divergence of opinion, offer price, offer size, underwriter and auditor reputations	2004-2021	Machine learning approach	n.r	Random forest model evidence that investors' demand, divergence of opinion and offer price significant influence initial returns
Behavioural finance theories					
Lai and Lau (2004)	Cross-sectional standard deviation of returns or dispersion (Herding behaviour)	1992-2001	Multiple regression	n.r	Malaysian investors acted according to their own opinions during market stress and insignificant herding effect
Chong (2009)	Long-run post-listing performance of the winners' and losers' portfolios (Disposition effect)	1991-2003	Mean, t-tests	+	Evidence that disposition effect did indeed exist among IPO investors in Bursa Malaysia. Investors were found to be 2.64 times more willing to flip winning compared to losing IPOs
Low and Yong (2013)	First-day turnover and first-day price spread (Investor heterogeneity proxies)	2004-2007	Multiple regression	+	IPOs that are highly underpriced, small in offering size and are listed on the MESDAQ have high level of heterogeneous beliefs among investors
Dehghani and Sapian (2014)	Trading activities, return dispersion, and cross-sectional variability of factor sensitivity (Herding behaviour)	2001-2011	Multiple regression	+	Herding behaviour that is only constrained to technological firms during down market may be due to the risky nature of the new issues in the down market, as compared to uninformed individual investors
Bakar and Yi (2016)	Questionnaires (Psychological factors)	2016	OLS regression	+	Overconfidence, conservatism and availability bias significantly impact investors' decision-making in the Malaysian stock market

(cont'd)

Authors (year)	Variables	Period	Methodology	Sign	Results
Behavioural finance theories (cont'd)					
Narayanasamy (2017)	Market adjusted turnover, offer turnover or flipping ratio (Divergence of opinion)	2004-2014	Multiple regression	+	Individual investors' participation has a direct and positive effect on aftermarket divergence of opinion. Behavioural tendency is less when individual participation is weak
Abdollah et al. (2021)	Cross-sectional absolute deviation of returns (Herding effects)	1995-2016	Cross-sectional analysis	n.r	Insignificant effect on herding behaviour during upmarket with a non-linear relationship to the market return
Siti and Norliza (2021)	Google Search Volume Score (GSVS) (sentiment proxy)	2004-2020	OLS regression	+	GSVS is significantly and positively influenced IPO initial returns on the first day of listing (pre-market) and fifteenth day after listing (post-market)
Norliza et al. (2023)	Google Search Volume Index (GSVI) (Sentiment proxy)	2004-2020	OLS regression	+	GSVI has positively and significantly effects IPO initial returns and trading volume on the first trading day

n.r denotes Not Relevant.

Table 2.1 : Summary of previous research based on neoclassical finance and behavioural finance theories for Malaysian IPOs

(Note: Table summarises empirical studies on Malaysian IPOs highlighting variables, study period, methodologies, and findings in neoclassical and behavioural finance)

As shown in Table 2.1, recent study by Albada et al. (2025) on IPO performance using machine learning techniques to process large data sets and recognise non-linear patterns. Techniques such as random forests has high predictive accuracy, and can effectively deal with outliers and unstructured data. In contrast, traditional regression-based methods such as PCA, sPCA, PLS, and OLS regression models emphasise interpretability and are well-suited for analysing the relationships between market sentiment, fundamental and sentiment factors, and IPO performance. This method provides clarity in examining cause-and-effect dynamics, aligning closely with the objectives of this study. While machine learning has its interpretative limitations, it is less suitable for uncovering causal relationships as the direction or magnitude of causal relationships cannot be clarified, which is crucial for actionable insights. Therefore, the selected methods are better suited to achieve the objectives of this study.

In summary, empirical studies on Malaysian IPOs from both neoclassical finance and behavioural finance perspectives highlight various factors that influence IPO performance. From a neoclassical finance perspective, fundamental factors such as firm size, oversubscription ratio, and underwriter reputation have been consistently found to influence IPO pricing and initial returns. The findings suggest that factors such as liquidity, government interventions, and earnings management also play significant roles in IPO performance. On the other hand, behavioural finance theories reveal the impact of investor sentiment, psychological biases, and market behaviour such as herding, overconfidence, and speculative bubbles, in shaping IPO outcomes. These insights emphasize the importance of considering both fundamental and sentiment factors in understanding IPO underpricing and aftermarket share performance. For this study, the integration of both perspectives offers a comprehensive framework for analysing IPO dynamics in Malaysia, particularly in assessing the role of market sentiment, a core focus of this research, remains underexplored in the context of regulatory changes alongside neoclassical financial indicators in determining IPO performance.

2.5 Market sentiment

2.5.1 The concept of market sentiment

There are many factors that can influence or disrupt share prices and the overall market (Shrestha and Biggyan, 2014). Research conducted by Atiq et al. (2010); and Al-Tamimia et al. (2011) has demonstrated that the determinants of stock market prices encompass company philosophies, external factors, and market sentiment (investor behaviour). The stock market responds to new developments and information, resulting in fluctuations in share prices across market indices. According to Vincent and Bamiro (2013), share prices in the market accurately mirror all available data. The swifter and more precise the absorption and translation of this data, the more effectively the marketplace allocates resources.

The researchers also contend that fluctuations in share prices within the indices pose challenges when it comes to predicting the future condition of these share prices, whether in the short-term or beyond. However, the magnitude or impact of the market's response to new or disruptive events hinges on the level of informational imbalance between those possessing the information (sources) and the investors (end users). Some events, particularly natural disasters, can be rationalised and anticipated (Khan, 2009). Informational asymmetry inherently occurs when one group of individuals enjoys greater access to data compared to another within the same system (Copeland and Weston, 2005).

Sentiment is defined as the opinions, views and emotions of an individual or group. Meanwhile, market sentiment refers to the expectations and outlook of the entire market (Thorp, 2004). Chang et al. (2008) state that the sentiments of investors in the market is quantified by considering the market sentiment. Market sentiment, which is often subject to the bias and obstinacy of the individuals in the market is the subject of exploration and discussion in a nascent field of study called behavioural finance. Behavioural finance studies investor conduct and how it affects the share prices in the stock market (Haritha and Uchil, 2016). Figure 2.1 is a visual representation of how the market outlook leads investor's outlook and the behavioural pitfalls that affect sound business and economic judgements.

Chang et al. (2000) evidence herding behaviour, when investors follow the crowd instead of their own analysis. It is supported by Hirshliefer (2001) state that investors often depend on the same sources of information and interpreted market signals in a similar fashion which led to similar outcomes or reinforced similar decision making. The motives behind investor herding behaviour is that there is a sense of acceptance and belonging to a particular group. The common rationale is that such a large group is unlikely to make an error in judgement. People with limited know-how may follow the decisions of the group (group think) even if they are privately sure that the decision reached by the group is not rational, believing rightly or wrongly that the group is aware of or is in possession of information that they have not gotten (Eichengreen and Moody, 1998; Zaharyeva, 2009; Blasco et al., 2012; Shalom-gilo, 2013; Angela-Maria et al., 2015).

Merikas et al. (2011) consider whether macroeconomic factors influenced individual behaviour and investment decisions. The study looked at investment decisions in uncertain conditions in the Greek Stock Exchange in Athens. The research look at inflation, exchange rates, money supply, and unemployment rates among other things and the results of the study show that

32.7% of respondents made investment decisions after considering current market conditions and indicators.

Baker et al. (1977) state that investors considered the risks and returns when making financial decisions. It finds that a positive association between the risks and returns but some studies find that the reverse is true to which investors make decisions based on expected returns that they should learn. Irrespectively investor forecasts or predictions are sometimes unmet or unrealised as the actual amounts are well below the initial investments or they get less than what they bargained for, which means that they suffer a loss (Maranjian, 2013).

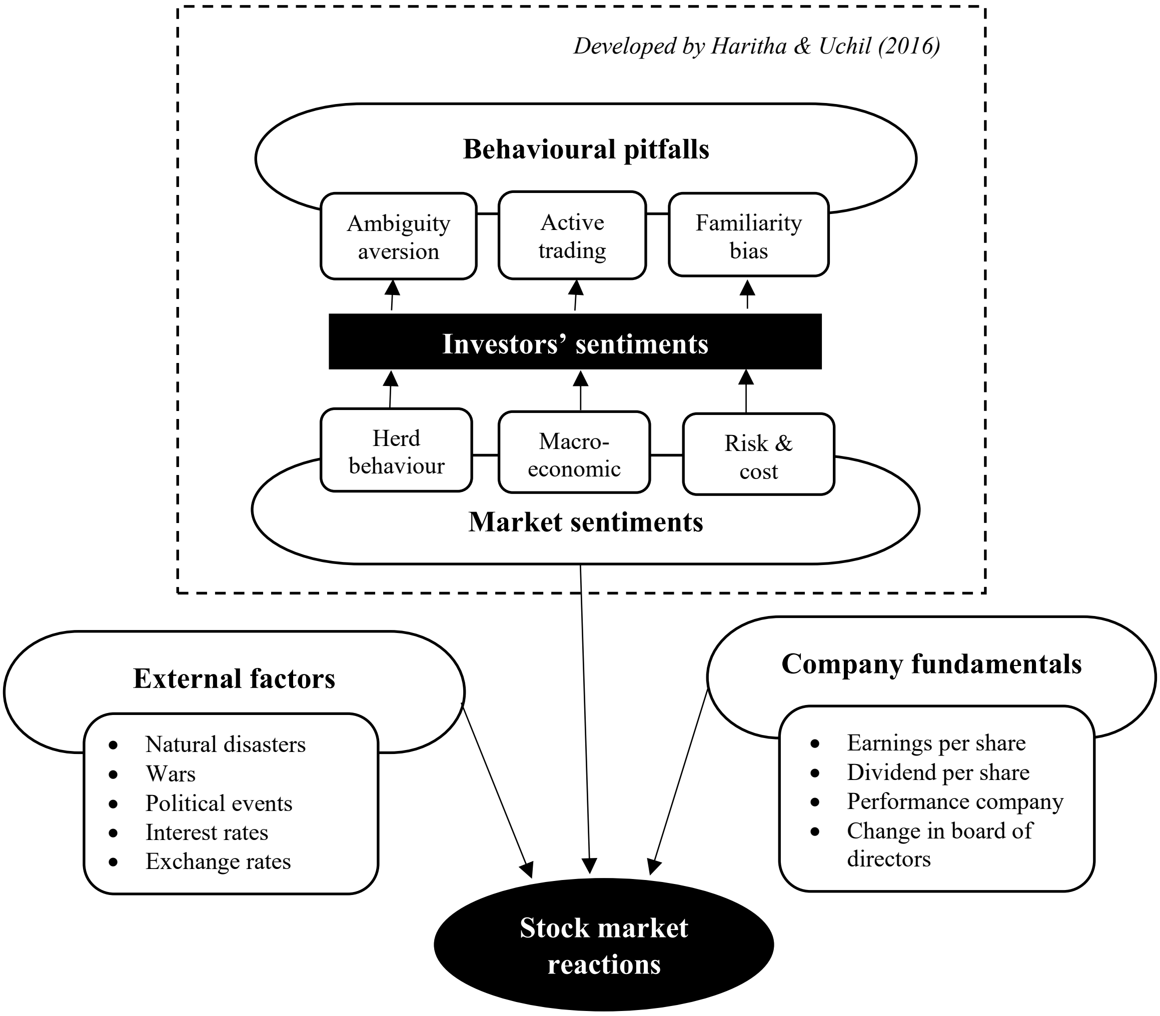

Figure 2.1 : Determinants of stock markets' reaction

Besides, market sentiment may lead to erroneous or misguided investment decisions being made. The linchpin of such judgements is usually a miscalculation of the risk tolerance or asset allocation. Therefore, investors have to learn about the characteristics of the behavioural drawbacks and how outcomes can be adversely impacted by them in order to make prudent investments. According to Haritha and Uchil (2016), such behavioural pitfalls include (i) ambiguity aversion, (ii) active trading, and (iii) familiarity bias. Meanwhile, Trautmann et al. (2008) state that an aversion to ambiguity is where investors prefer risks with known outcomes as opposed to the reverse to which risks with unknown outcomes. Elan (2010) evidence that active trading is linked to overconfidence and leads to a drop in investor herding and a rise in the increase in homogeneity of the beliefs of the stakeholders overly confident attitudes causes active trading which leads to a fall in the returns on investment or lower returns on the same. Familiarity bias refers to the tendency of investors to trust in and gravitate towards things that are familiar and comfortable as opposed to ones that are not. Strong and Xu (2003) evidence that shareholders were more bullish when investing in their own stock markets in the home country as opposed to foreign stock markets.

2.5.2 Measures of market sentiment

Baker and Wurgler (2006) construct a novel investor sentiment index that aggregates the information from 6 sentiment proxies, and find that high investor sentiment strongly predicts low returns in the cross-section, such as shares that are speculative and hard to arbitrage. Baker et al. (2012a) provide further international evidence for the forecasting power of investor sentiment. However, whether investor sentiment can predict the aggregate stock market is still an open question.

To enhance the efficiency of utilising Baker and Wurgler's (2006) 6 sentiment proxies to create a new index for explaining expected returns in the overall stock market, a novel approach is employed. In their pioneering work, Baker and Wurgler utilised the first principal component derived from these proxies as their investor sentiment measure. From an econometric perspective, this first principal component represents the optimal combination of 6 sentiment proxies that captures the maximum variation among them. Given that all proxies may contain approximation errors in relation to the true but unobservable investor sentiment, including these errors within their variations, the first principal component could potentially encompass a significant amount of common approximation errors that are irrelevant to predicting returns. The underlying concept is to align the sentiment measure with the objective of elucidating returns by extracting the most pertinent shared component from the proxies. In economic terms, this process effectively isolates information within the proxies that is germane to expected market returns, while eliminating error or noise. Zhang et al. (2022) demonstrate improved accuracy in forecasting international volatility by employing PCA method. This approach has been accepted by a growing body of research, and the related applications have grown manifold (Baker and Wurgler, 2006; Zhang et al., 2022; Zhang and Wang, 2022).

From a statistical standpoint, the PLS method, initially developed by Wold (1975) and further extended by Kelly and Pruitt (2013 and 2014), achieves a similar objective. It aligns the investor sentiment index effectively, efficiently incorporating all the pertinent forecasting information gleaned from the proxies, a fact substantiated by forecast encompassing tests in various applications. The PLS method also serves as a potent tool for extracting shared information from variables. Notably, researchers such as Huang et al. (2022), Li and Ran (2020), and Huang et al. (2015) have successfully employed PLS method in finance-related research.

Besides PCA method, there is another novel approach for consolidating shared information within sentiment-related variables, inspired by the methodology presented in Huang et al. (2022). This approach is known as the sPCA method, which is a dimension reduction technique. Similar to the investor sentiment index established using the PLS method (Huang et al., 2015), sPCA method is built upon a dimension reduction technique designed for supervised learning. Its primary objective is to eliminate common noise components found in sentiment proxies, which can significantly distort the sentiment index. Additionally, as outlined by Huang et al. (2015), among others, traditional PCA method is an unsupervised learning technique, and the first principal component may include a substantial amount of common approximation errors that have no relevance to predicting the target variable. Consequently, when compared to sentiment indicators generated through the PCA method, both the sPCA method and the PLS method can effectively separate irrelevant components from the proxy variables and focus more on forecasting statistical targets. Empirical research such as Gong et al., 2022; Huang et al., 2015; Huang et al., 2021; Li and Ran, 2020 support the notion that sPCA and PLS methods are likely to outperform investor sentiment indicators constructed using the PCA method when a common noise component is present.

2.5.3 Empirical evidence on examining market sentiment measurements within both Malaysian and international contexts

The empirical evidence on the impact of market sentiment within the Malaysian context highlights notable findings and key gaps. Malaysian studies demonstrate that market sentiment significantly influences the performance of stock market and IPO market. Table 2.2 summarises the previous research on market sentiment influences the performance of Malaysia stock market and IPO market.

Bashar (2015) examines the role of investor sentiment in the Malaysian stock market from January 2000 to December 2010. Additionally, it investigates whether the influence of the investor sentiment index on stock returns varies based on certain firm characteristics by using PCA method based on market data. It shows that there is significant relationship between the investor sentiment index and stock returns exists only at pre-crisis. The relationship between the index and stock returns also differs based on firm age and risk post-crisis. It concludes that investor sentiment has predictive power in the Malaysian equity market, emphasising the importance of considering investor sentiment in recent financial analyses.

Besides, Mohd Azwan et al. (2019) carry out a study with aims to explore the impact of investor sentiment on stock returns in Malaysia. It delves into the ongoing debate about the rationality and efficiency of the stock market, drawing from the behavioural finance perspective. Several sentiment indicators, such as closed-end fund discounts, advance-decline ratios, trading volume / turnover, consumer confidence index, and business confidence index, are employed to analyse their relationship with stock returns using statistical methods, including the ordinary least square regression model. The findings align with theoretical principles of behavioural finance and existing evidence, demonstrating a statistically significant relationship between sentiment and the stock market return index. However, the relationship between risk indicators and the stock market appears to be varied, reflecting the complex nature of the market.

Siti and Norliza (2021) using a total of 271 IPOs listed in Main Market and ACE Market of Bursa Malaysia from 2004 to 2020 this study investigates the influence of pre-market and post-market investors sentiment (using Google Search Volume Score (GSVS) as sentiment proxy) on IPO initial returns. The results show that investors sentiment significantly and positively influenced IPO returns on the first day of listing (pre-market) and fifteenth day after listing (post-market). This means that the higher number of searches of the firms in Google, the higher attention from individual investors and thus, contributed to higher IPO returns. Future studies should explore additional variables to address the low adjusted R^2, consider alternative platforms for capturing individual investor sentiment beyond Google Trends, and to extend the observation of returns to the long term.

Norliza et al. (2023) using a total of 271 IPOs listed in Main Market and ACE Market of Bursa Malaysia from 2004 to 2020 investigate how Google Search Volume Index (GSVI), a proxy for investor attention, impacts the initial returns and trading volume of Malaysian IPOs. The findings suggest that investor sentiment is a crucial indicator to consider at pre-market. It shows that more searches for a company before its IPO indicate higher investor interest, which leads to greater early returns and higher trading volumes. It suggests that investors use GSVI data to understand the sentiment better. The results show that GSVI has a significant and positive impact on both IPO initial returns and trading volume on the first day of trading.

Table 2.2 shows that only a minority of researchers have utilised the PCA method (aggregate market-based analysis) or single-variable sentiment proxies to study market sentiment's influence on Malaysia stock market, with no specific focus on the Malaysian IPO market. Moreover, it highlights that the construction of MIMSI using PCA, sPCA and PLS methods has not been applied in any empirical studies on Malaysian IPOs.

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Authors (year)	Variables	Methodology	Results
Malaysia’s stock market performance			
Bashar (2015)	Advance decline ratio, dividend premium, equity share in new issue, number of IPO, and price-earnings ratio	PCA method	The variables that are statistically significant in constructing the investor sentiment aggregate market-based index using PCA method in the Malaysian equity market have been identified. The impact of the index on stock returns differs based on age and risk after the crisis period but not before the crisis period
Mohd Azwan et al. (2019)	Closed-end fund discount, advance-decline ratio, trading / volume turnover, consumer sentiment index and business condition index (Sentiment proxies)	OLS regression	There is a correlation between the sentiment of investors and the returns on stocks, however, not consistently significance for all proxies that utilised as single-variable sentiment proxies to give impact towards stock market returns. The sentiment sensitive to both small-cap and large-cap firms
Malaysia’s IPO market performance			
Siti and Norliza (2021)	Google Search Volume Score (GSVS) (Sentiment proxy)	OLS regression	Short-run and long-run share performance of IPOs - This study highlights the influences of investor sentiment proxied by GSVS on IPO initial returns. The results show that GSVS significantly and positively influenced IPO initial returns on the first day of listing (pre-market) and fifteenth day after listing (post-market). Future studies should address the low adjusted R^2 by exploring additional variables, using alternative platforms to capture individual investor sentiment, and extending the observation of returns to the long term
Norliza et al. (2023)	Google Search Volume Index (GSVI) (Sentiment proxy)	OLS regression	Short-run share performance of IPOs - The study examines the relationship between investor sentiment proxied by GSVI, IPO initial returns, and trading volume during 2004-2020. The findings show that GSVI has positively and significantly effects IPO initial returns and trading volume on the first trading day

Table 2.2 : Previous research on market sentiment influences Malaysia’s stock market and IPO market

(Note: Table summarises empirical studies on market sentiment in Malaysia’s stock and IPO markets highlighting sentiment proxies, methodologies, and findings on impact of returns)

Table 2.3 shows some selected international empirical studies, the main literature using Baker and Wurgler’s (2007) PCA method, Jiang et al.’s (2022) sPCA method, and Huang et al.’s (2015) PLS method relevant to investor sentiment impact on asset prices and stock returns.

International studies provide further insights, particularly through the application of methodologies such as PCA, sPCA, and PLS. For example, Zhu and Niu (2016) employ PCA method to reveal the cyclical and asymmetric effects of sentiment on stock returns in the Chinese A-share market. Jiang et al. (2022) extend this analysis using sPCA method, demonstrating stronger predictive capabilities for stock market performance over extended horizons. Additionally, Huang et al. (2015) highlight the superior predictive power of the PLS method in forecasting stock returns, particularly in capturing the influence of sentiment-based variables such as IPO first-day returns. These international empirical studies show that the studies focus on investor sentiment impact on asset prices and stock return, there is no empirical study which applies to IPO market.

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Authors (Year)	Sample	Period	Sentiment variables	Methodology	Results
Using Baker and Wurgler (2007) - PCA method					
Zhu and Niu (2016)	Chinese A-share stock market: Shanghai and Shenzhen	2002-2011	▪ Closed-end fund ▪ Market turnover rate ▪ Average IPO first-day returns ▪ Consumer confidence index ▪ New A-share market accounts	Panel data regression models used to explore the combined effect of sentiment and accounting data on share prices and highlight the asymmetric effect of investor sentiment	Investor sentiment influences over cynical cycles are manifestly distinct from that of when the outlook is positive and comparatively high, specifically with regards to the required rate of return
Han and Li (2017)	Chinese A-share stock market: Shanghai	1997-2013	▪ Market turnover ratio ▪ Number of newly opened individual investor accounts in Shanghai Stock Exchange ▪ Value-weighted PE ratio	Regression models used to examine whether investor sentiment is a contrarian predictor of market returns in China	Sentiment is a small-firm effect. Global sentiment spills over to the local Chinese market, as it predicts negatively future returns over longer horizon
Li and Ran (2020)	Chinese A-share stock market: Shanghai	2003-2019	▪ Closed-end fund discount ▪ Trading volume ▪ Number of IPOs ▪ IPO average first-day return ▪ Number of new investor accounts opened ▪ Consumer confidence index	Ordinary least square method used to explore the relationship between investor sentiment and size effect	When investor sentiment falls, the size effect is more easily affected by investor sentiment, and there is a size effect reversal either in the rising period or in the falling period
Using Jiang et al. (2022) - sPCA method					
Huang et al. (2022)	Chinese stock market	1960-2017	▪ Closed-end fund discount ▪ Turnover ▪ Number of IPOs ▪ First-day IPO return ▪ Dividend premium ▪ Equity share in new issuance	Regression models used to compare the PCA and sPCA for predicting a target with many predictors	The finding shows that PCA factors fail to display significant predictive power, the sPCA factors exhibit significant predictive ability both in-sample and out-of-sample across 1 to 12 month forecast horizons
Song et al. (2023)	Chinese A-share stock market: Shanghai	2003-2022	▪ Closed-end fund discount rate ▪ First-day returns of IPOs ▪ Number of IPOs ▪ Share return ▪ Number of newly opened individual investor accounts ▪ Consumer confidence index	Regression models used to explore the predictability of sPCA for forecasting stock volatility	The finding suggest that sPCA exhibits stronger forecasting power relative to other sentiment indicators, and over longer horizons

(cont'd)

Authors (Year)	Sample	Period	Sentiment variables	Methodology	Results
Using Huang et al. (2015) - PLS method					
Huang et al. (2015)	S&P 500 index	-	▪ Closed-end fund discount rate ▪ Share turnover ▪ Number of IPOs ▪ First-day returns of IPOs ▪ Dividend premium ▪ Equity share in new issues	Regression models used to predict a new investor sentiment index, which is aligned with predicting the performance of the overall stock market	The finding shows that using PLS method has significantly stronger predictability on stock subsequent returns
Li and Ran (2020)	Mainland China (A-shares) and Hong Kong (H-shares) stock markets	2013-2019	▪ Monthly market turnover ratio ▪ Number of new opened individual investor accounts ▪ Total volume of IPOs ▪ Market-wide PE ratio ▪ Consumer confidence index ▪ Interbank offered rate ▪ Industrial value-added growth ▪ Retail sales value ▪ Money supply ▪ Exchange rate	Regression models used to examine the performance of PLS and PCA methods in predicting the A-shares and H-shares stock market	The finding shows that PLS has better predication power than PCA, and positively related to the excess returns and price premium of cross-listed companies between two stock markets
Gong et al. (2022)	Chinese A-share stock market: Shanghai	-	▪ Closed-end fund discount ▪ Stock market turnover ▪ Number of new investor accounts ▪ Consumer confidence index ▪ Number of IPOs ▪ Average first-day return of IPOs ▪ Advance-Decline Line ▪ Advance-Decline Ratio	Regression models used to investigate the predictability of sentiment measure on stock realised volatility, using a new investor sentiment index (NISI) based on PLS method	NISI shows that in-sample result and out-of-sample analysis have greater predictive power. It also has robust predictability before and after the Chinese stock market turbulence periods

Table 2.3 : Summary of previous research using PCA, sPCA, and PLS methods relevant to investor sentiment impact on asset prices and stock returns

(Note: Table summarises key empirical studies on investor sentiment and asset prices based on international evidence using PCA, sPCA, and PLS methods. It highlights sentiment proxies, methodologies, and findings on sentiment's predictive power in stock markets)

Unlike previous Malaysian studies, such as those by Siti and Norliza (2021) and Norliza et al. (2023), which rely on OLS regression model and single-variable sentiment proxies such as GSVS and GSVI, this study uses advanced multivariate techniques such as PCA, sPCA, and PLS methods. These methods combine multiple sentiment factors / proxies into the MIMSI, allowing for a more comprehensive and nuanced understanding of the impact of market sentiment on IPO performance. This is the first attempt to construct such aggregate market-based sentiment indices specifically for the Malaysian IPO market, filling a significant gap in the existing literature. Through the use of multivariate techniques, the construction of the MIMSI enables a deeper analysis of the way in which collective market sentiment influences IPO outcomes across different time horizons, thereby addressing the limitations of previous studies that do not take into account the multifactorial nature of sentiment.

This study also bridges the gap between Malaysian and international research by applying methods that have been shown to be effective in other markets. International studies such as Zhu and Niu (2016); Jiang et al. (2022); Huang et al. (2015) highlight the predictive power of PCA, sPCA, and PLS methods in analysing the impact of sentiment on asset prices and stock returns. By applying these techniques to the Malaysian IPO market for the first time, this study combines global best practises with local empirical evidence, thereby increasing the applicability of its methodology.

Finally, the study examines the interaction between IPO market sentiment and PE variations in the context of changes in Malaysia's capital market structure, which has been little researched to-date. By focusing on IPO underpricing and its determinants, it provides valuable insights into the role of market sentiment in shaping IPO performance, and thus makes a meaningful contribution to both practical applications and academic findings.

2.5.4 Principal component retention in sentiment literature: A review of empirical practice

The construction of investor sentiment indices using PCA has become a widely adopted technique in empirical finance, particularly following the seminal work of Baker and Wurgler (2006). In their approach, multiple sentiment proxies are initially orthogonalised against macroeconomic variables to isolate the irrational, non-fundamental component of sentiment. Subsequently, the first principal component is extracted and retained as a composite sentiment index, under the assumption that first principal component captures the dominant common variation among the underlying proxies.

Several subsequent studies have extended and adapted this methodology within emerging market contexts. For example, Han and Li (2017) construct a sentiment index for China's A-share market by applying PCA to three proxies: market turnover, the number of newly opened investor accounts, and the market-wide price-earnings ratio. After detrending and orthogonalising these variables, they retained only the first principal component, which accounts for 67.0% of the total variance. Their decision to rely solely on first principal component was consistent with Baker and Wurgler's approach, emphasizing the interpretability and coherence of a single-factor sentiment construct.

Similarly, Zhu and Niu (2016) incorporate six sentiment proxies tailored to the Chinese market, including closed-end fund discounts, the consumer confidence index, and IPO turnover. These variables were first orthogonalised against macroeconomic controls, and PCA was applied thereafter. Although the first principal component explains a lower proportion of the total variance of 45.2%, the authors retained only this component, arguing that it sufficiently captured the latent sentiment dimension while avoiding the inclusion of orthogonal variance from unrelated components.

Another study by Li and Ran (2020) examine sentiment effects on IPO pricing in the Chinese Growth Enterprise Market. Their sentiment index was constructed from three proxies: market turnover, net buying volume of retail investors, and excess price-earnings ratio. PCA results revealed that the first principal component explains 56.8% of total variance. In line with previous studies, only the first principal component was retained to preserve the interpretive clarity of the sentiment index.

The widespread use of the first principal component alone in these studies reflects a prevailing methodological norm in the literature. While retaining multiple components may be advantageous in settings prioritising data reconstruction or predictive accuracy, such an approach may compromise the interpretability of the index. Johnson and Wichern (2007) states that retaining multiple principal components is appropriate when the objective is data reduction, particularly when a cumulative variance threshold of 70% to 90% is targeted. In these cases, techniques such as eigenvalue rules (i.e., retaining components with eigenvalues greater than one) or scree plots guide selection. However, they caution that including additional orthogonal components such as second and third principal components may introduce variance unrelated to the core latent construct, thereby diluting the theoretical coherence of the resulting index.

Moreover, when sentiment proxies differ in scale or measurement units, it is standard practice to conduct PCA using the correlation matrix (R) rather than the covariance matrix (S). This standardisation ensures that each variable contributes equally to the analysis. This study follows Baker Wurgler (2006)'s convention in constructing the MIMSI.

In summary, while retaining multiple principal components may be justified under certain technical circumstances, the exclusive use of the first principal component remains methodologically sound when the aim is to construct a coherent and interpretable sentiment index. This approach is well-supported by both theoretical rationale and empirical evidence. Accordingly, this study adopts a single-component PCA framework, whereby the first principal component explains 38.04% of the total variance, an outcome that is consistent with established practices in the literature. Further explanation of the results and interpretation is provided in Chapter 4.

2.5.5 Market sentiment and IPOs

Market sentiment is the theory of how investors form their beliefs, hence, market sentiment and investor sentiment are inter-changeably used in this context. Barberis et al. (1998) present a formal model linking investor sentiment to psychology in the decision-making process. They propose that investors form their beliefs about a firm's earnings in 2 stages. In the first stage, investors exhibit conservatism bias, under-reacting to significant news and believing that earnings are mean-reverting. In the second stage, investors over-react to significant news, aligning earnings with historical trends and disregarding probability laws or Bayes' theorem. Consequently, investors' decisions in this stage are driven by emotions rather than the firm's financial performance. Miller (1977) and Barberis et al. (1998), Derrien (2005), Cornelli et al. (2006), and Ljungqvist et al. (2006) demonstrate that investor sentiment at the time of an offering is positively correlated with short-run IPO underpricing in the early aftermarket, and negatively correlated with long-run share underperformance.

Researchers have applied investor sentiment theory to elucidate the influence of investor sentiment on IPO initial returns (Boulton et al., 2011; Ritter and Welch, 2002; Song et al., 2014). When investors perceive the overall market trend to be positive, they increase their demand for IPO shares, resulting in higher initial returns. Conversely, when investors expect the market to decline, initial returns tend to be lower. Empirically, many researchers have used market returns prior to the first trading day as a proxy for investor sentiment (Boulton et al., 2011; Kiymaz, 2000; Mumtaz et al., 2016; Wong et al., 2017). Notably, Clarke et al. (2016) evidence sentiment-based models in the Indian market using recent IPOs, and their results supported this theory. According to the investor sentiment hypothesis, there is a positive correlation between investor sentiment and IPO initial returns (Boulton et al., 2011; Mumtaz et al., 2016; Samarakoon, 2010; Wong et al., 2017). Furthermore, Song et al. (2014) find that investor sentiment positively influences overvaluation but is unrelated to IPO underpricing.

According to Baker and Wurgler (2006), stocks that are small, young, volatile, and characterised by high intangible assets are particularly susceptible to investor sentiment. These sentiment-prone stocks often experience greater difficulty in valuation, making them more prone to mispricing. The hypothesis that firms time their IPOs to exploit periods of high investor sentiment is supported by various studies. For example, Derrien (2013) highlights that heightened investor optimism leads to higher initial returns, as investors are willing to pay premiums for newly issued shares. Additionally, Gao et al. (2016) state that market cycles and sentiment significantly affect IPO volumes, with higher sentiment periods corresponding to increased IPO activity.

Recent studies emphasize on the significant influence of investor sentiment on IPO performance. Drobetz et al. (2018) investigate the effect of sentiment on IPO pricing, revealing that optimistic market conditions drive up initial returns but may result in poorer long-run performance. Similarly, Jiang et al. (2022) find that investor sentiment impacts the efficiency of IPO pricing, particularly in emerging markets like China, where market anomalies are more pronounced. These findings underscore the importance of considering sentiment as a key factor in the IPO process, influencing not only the immediate success of the offering but also its subsequent market performance. As firms continue to navigate the complexities of going public, understanding and leveraging investor sentiment remains a critical strategy for maximising IPO performance.

In summary, the timing of IPOs during periods of optimistic market sentiment is an important strategy, as firms take advantage of sentiment-driven premiums to secure higher initial returns (Derrien, 2013; Gao et al., 2016). However, research also shows that while optimistic market sentiment boosts initial IPO performance, it often leads to mispricing. This mispricing tends to result in weaker long-run aftermarket performance, particularly in emerging markets, where inefficiencies and market anomalies are more common (Drobetz et al., 2018; Jiang et al., 2022). Despite these findings, significant gaps remain in studying developing markets like Malaysia. Most existing studies rely on simpler method to measure sentiment, such as sentiment proxies. However, relying on single-variable sentiment proxies may be insufficient to comprehensively capture market sentiment, because multiple factors contribute to variations in these single variable proxies. On the other hand, there is limited use of aggregate market-based sentiment indices such as PCA, sPCA and PLS, which could provide deeper insights, suggesting that the importance of using an index to aggregate all information among proxies rather than depending on a single proxy.

This research seeks to address these gaps by developing a comprehensive MIMSI, leveraging advanced statistical techniques to capture nuanced sentiment dynamics. Unlike prior studies, this research focuses specifically on Malaysian IPO market, offering insights into how market sentiment influences IPO pricing and performance in the context of changes in Malaysia's capital market structure. Additionally, it contrasts the efficacy of single-variable sentiment proxies against aggregate market-based sentiment indices to evaluate their predictive power. By bridging these gaps, this research not only enriches the academic discourse on market sentiment and IPOs but also provides practical insights for issuers, investors, and regulators in navigating the complexities of IPO market.

2.6 Short-run share performance of IPOs

2.6.1 Empirical evidence on short-run share performance of IPOs

IPO underpricing (overpricing) is a widely observed global phenomenon. Ritter and Welch (2002) report that in United States stock market approximately 70% of IPOs closed their first trading day at a price higher than the IPO offer price, while 16% achieved a first-day return of exactly zero. In contrast, only a limited number of IPO studies have highlighted that IPOs being overpriced (underperforming) in the short-run (Shaw, 1971). Table 2.4 shows international evidence on short-run share performance of IPOs, categorising the markets into developed, emerging and developing markets.

(a) International evidence on short-run share performance of IPOs

Country	Authors	Average initial return	Period studied	Sample size
Developed markets				
Belgium	Rogiers, Manigart and Ooghe	11.00%	1984-2017	154
Canada	Jog and Riding; Jog and Srivastava; Kryzanowski, Lazrak and Rakita	6.80%	1971-2021	811
Cyprus	Gounopoulos, Nounis and Stylianides	20.30%	1997-2012	73
Finland	Keloharju	14.50%	1971-2021	244
France	Husson and Jacquillat; Leleux and Muzyka; Paliard and Belletante; Derrien and Womack; Chahine and Filatotchev	9.70%	1983-2017	834
Germany	Ljungqvist; Rocholl; Vismara	21.80%	1978-2020	840
Hong Kong	McGuinness; Zhao and Wu; Ljungqvist and Yu; Fung, Gul and Radhakrishnan	40.50%	1980-2021	2,301
Ireland	Ritter	21.60%	1991-2013	38
Japan	Fukuda; Dawson and Hiraki; Hebner and Hiraki; Pettway and Kaneko; Hamao, Packer and Ritter; Kaneko and Pettway	48.80%	1970-2020	3,849
Netherlands	Wessels; Eijgenhuijsen and Buijs; Jenkinson, Ljungqvist and Wilhelm	12.00%	1983-2021	245
New Zealand	Vos and Cheung; Camp and Munro	15.90%	1979-2018	269
Norway	Emilsen, Pedersen and Saettem; Liden	10.30%	1984-2021	368
Singapore	Lee, Taylor and Walter; Dawson	25.80%	1973-2017	687
South Korea	Dhatt, Kim and Lim; Ihm; Choi and Heo; Mosharian and Ng; Cho	55.20%	1980-2018	2,007
Sweden	Rydqvist; Schuster	25.90%	1980-2015	405
Switzerland	Kunz, Drobetz, Kammermann and Walchli	25.20%	1983-2018	164
United Kingdom	Dimson; Vismara; Levis	15.70%	1959-2020	5,309
United States	Ibbotson, Sinderlar and Ritter	17.50%	1960-2021	13,718

(cont'd)

Country	Authors	Average initial return	Period studied	Sample size
Emerging markets				
Brazil	Aggarwal, Leal and Hernandez; Saito	29.60%	1979-2019	310
Chile	Aggarwal, Leal and Hernandez; Celis and Maturana	6.80%	1982-2019	88
China	Chen, Choi and Jiang	170.20%	1990-2020	4,177
India	Martisetty and Subrahmanyam	84.00%	1990-2020	3,202
Indonesia	Hanafi; Danny; Suherman	56.00%	1990-2020	697
Mexico	Aggarwal, Leal and Hernandez; Eijgenhuijsen and Van Der Valk	9.90%	1987-2017	149
Poland	Jelic and Briston	11.70%	1991-2019	350
South Africa	Page and Reyneke; Ali, Subrahmanyam and Gleason	17.20%	1980-2018	342
Spain	Ansotegui and Fabregat; Alvarez Otera	9.20%	1986-2018	199
Taiwan	Chen; Chiang	37.20%	1980-2019	1,915
Thailand	Wethyavivorn and Koo-smith; Lonkani and Tirapat; Ekkayokkaya and Pengniti	40.00%	1987-2018	697
Turkey	Kiymaz; Durukan; Ince; Kucukkocaoglu	9.60%	1990-2014	404
Developing markets				
Egypt	Omran; Hearn	9.40%	1990-2017	74
Iran	Bagherzadeh	22.40%	1991-2004	279
Jordan	Al-Ali and Braik	149.00%	1999-2008	53
Portugal	Almeida and Duque	11.50%	1992-2017	33
Russia	Ritter	3.30%	1999-2013	64
Sri Lanka	Samarakoon	28.90%	1987-2018	134

Table 2.4 : International evidence on short-run share performance of IPOs

(Note: Table presents international evidence on the short-run share performance of IPOs across developed, emerging, and developing markets. It summarises average initial returns, study periods, and sample sizes, highlighting variations in IPO underpricing across different markets)

(Source : The above information were extracted from 'Initial Public Offerings : Ibbotson, Sindelar and Ritter; Ritter Rydqvist' (1994, updated 2022))

Engelen and Van Essen (2010) examine the function of country specific features called country legal and institutional structures and their connections to the level of IPO underpricing in countries such as Brazil, Argentina, Finland, France, Mexico, Switzerland and Portugal. Their study find that there is a positive relationship between ex-ante uncertainty and the level of IPO underpricing.

The researchers also discover that countries with less robust legal protections are incapable of safeguarding their shareholders, so they had to undertake more risks and uncertainties in their investments to reach the required rates of return and offset the greater underpricing. Therefore, a robust legal system spearheads lower costs of going public and lowers the costs of equity financing. As a result, the variation in the level of IPO underpricing is likely because of differences in the legal frameworks between nations. A study by Van Heerden and Alagidede (2012) find that greater levels of IPO underpricing in the South African financial sector. It discovered that IPO underpricing was greater in larger shares compared with smaller IPOs in the Johannesburg Stock Exchange.

Meanwhile, Boulton et al. (2017) research the disparity between the IPO underpricing cross country and accounting conservatism. The study discovers that countries that practised more conservative accounting encountered lower IPO underpricing. Besides, it finds that conservative accounting reduced information asymmetry and the negatives associated with it, it also evidence that IPO underpricing has a negative relationship with conservative accounting. In this manner conservative accounting has an impact on IPO underpricing.

In summary, based on Table 2.4 the IPO markets of India, Indonesia, China, and Thailand provide valuable insights for understanding short-run share performance in Malaysia due to their comparable market characteristics. India's IPO market, with an average initial returns of 84.00% from 1990 to 2020, highlights the impact of market sentiment and market inefficiencies. Indonesia, with an average initial returns of 56.00%, emphasizes speculative behaviour and sentiment-driven trends, besides regulatory influences on IPO outcomes. China stands out with a high initial returns of 170.20%, driven by significant retail investor participation and frequent regulatory changes, leading to IPO underpricing and market volatility, similar to trends in Malaysia. Thailand, with a 40.00% average initial returns from 1987 to 2018, reflects the role of market sentiment and regulatory factors. These markets underscore the critical influence of market sentiment and regulations on IPO performance, providing useful examples for analysing IPO trends similar to Malaysia.

(b) Malaysian evidence on short-run share performance of IPOs

Authors (Year)	Average initial returns	Period studied	Sample size
Dawson (1987)	166.60%	1978-1983	21
Ismail et al. (1993)	114.60%	1980-1989	63
Paudyal et al. (1998)	61.80%	1984-1995	95
Jelic et al. (2001)	99.25%	1980-1995	182
Yong and Isa (2003)	94.91%	1990-1998	468
How et al. (2007)	102.00%	1989-2000	322
Abdul-Rahim and Yong (2010)	32.00%	1999-2007	386
Low and Yong (2011)	30.83%	2000-2007	368
Yatim (2011)	28.37%	1999-2008	385
Ahmad-Zaluki and Lim (2012)	37.81%	2002-2005	93
Low and Yong (2013)	26.54%	2004-2007	219
Sapian et al. (2013)	39.67%	2003-2008	191
Rasidah et al. (2014)	29.44%	2000-2012	384
Too and Wan Yusoff (2015)	23.00%	2002-2008	331
Ammer and Ahmad-Zaluki (2016)	21.22%	2002-2012	190
Wong et al. (2017)	13.40%	1998-2008	313
Narayanasamy et al. (2017)	21.62%	2004-2014	282
Badru and Ahmad-Zaluki (2018)	7.00%	2005-2015	208
Siti and Norliza (2021)	2.00%	2004-2020	271
Rasidah et al. (2022)	26.00%	2000-2016	356
Norliza et al. (2023)	2.00%	2004-2020	271
Albada et al. (2025)	27.00%	2004-2021	352

Table 2.5 : Malaysia evidence on short-run share performance of IPOs

(Note: Table presents Malaysian IPO's short-run performance showing average initial returns, study periods, and sample sizes from various empirical studies)

Bakar and Uzaki (2013) evidence that in Malaysia, offer size, age of IPO firm, issue price, and type of industry offering the IPO were the variables that explain the level of IPO underpricing in Malaysia. This issue further explore by Jelic et al. (2001) who find that market returns, the firm's operating history and net asset value was associated with high first day-of-trade returns. Another study by Yong and Isa (2003) find that oversubscription ratio was one of the most influential determinants of high first-day of trade returns for Malaysian IPOs.

In the meantime, a study by Wan-Hussin (2005) evidence that owner participation ratio is negatively related to IPO underpricing, but the fraction of the directors shares was positively related to the issue of IPO underpricing in Malaysia. The study also state that the offer size, oversubscription ratio and lock-up provisions were significant determinants of IPO underpricing. Yong (2011) also note that in a private placement there is a higher initial return on the first day of trade due to involvement of institutional investors who are usually well informed, and this has a 'jump on the bandwagon' effect on other individual investors.

Albada et al. (2025) apply a machine learning approach, using the random forest method on a sample from 2004 to 2021, to examine the key determinants of IPO initial returns in Malaysia. The results show that investor demand, divergence of opinion among investors, and offer price are the most influential factors. These findings are particularly relevant in the Malaysian market, where the dominance of the fixed-price method intensifies information asymmetry in IPO pricing.

In summary, the finding in Table 2.5 shows a declining trend of IPO underpricing in Malaysian IPOs over transformations in Malaysia's capital market structure, such as the introduction of market reforms, shifts in investor risk perception, and market sentiment. These shifts may have contributed to more efficient pricing mechanisms in the IPO market, reducing the degree of IPO underpricing observed in later years. The results reveal that significant variation in the magnitude of IPO underpricing, ranging from 7.00% to 166.60% across studies. For instance, Dawson (1987) reports an exceptionally high average initial return of 166.60% from 1978 to 1983, while more recent studies, such as Badru and Ahmad-Zaluki (2018) find a modest initial return of 7.00% from 2005 to 2015, and Siti and Norliza (2021) and Norliza (2023) also find a minimal initial return of 2.00% from 2004 to 2020. Other notable studies, such as Jelic et al. (2001) and How et al. (2007), also report high average returns of 99.25% and 102.00%, respectively, highlighting that IPOs during the 1980s and 1990s experienced considerable IPO underpricing. Conversely, the more recent studies, including those by Low and Yong (2013), Rasidah et al. (2014), Rasidah et al. (2022), and Albada et al. (2025), report lower average initial returns, with values ranging from 21.22% to 39.67%.

Given this research focus on market sentiment and the IPO market in Malaysia, these findings highlight the need for further examination into how evolving market sentiment influences IPO underpricing within the context of regulatory changes in Malaysia. Furthermore, the role of market sentiment, as reflected in IPO pricing, is crucial to understanding these trends, particularly as market sentiment has been historically linked to the degree of IPO underpricing

(Shiller, 1990a). By examining the interplay between market sentiment, regulatory changes, and IPO pricing, this research seeks to offer a comprehensive understanding of the factors driving short-run share performance of IPOs. Such insights will shed light the relationship between market sentiment and regulatory changes, contributing to a broader understanding of IPO dynamics in Malaysia.

2.6.2 Theoretical explanations for short-run share performance of IPOs

These theories provide a comprehensive framework to examine IPO underpricing in Malaysia, each offering unique insights into the factors influencing short-run share performance. While information asymmetry based theories highlight the fundamental market inefficiencies, behavioural theories emphasize the role of sentiment-driven dynamics. However, both frameworks must be contextualised within Malaysia's regulatory changes to capture the interactions between fundamental and sentiment factors. By addressing these gaps, this research contributes to a deeper understanding of IPO underpricing in the Malaysian market.

In order to address the question why IPOs are underpriced and leave money on the table to investors, researchers put forward several theories and hypotheses. Ljungqvist (1997) classify the theories of IPO underpricing into 3 broad categories:

(i) information asymmetry based theories;
(ii) institutional based theories; and
(iii) behavioural based theories.

The theories of IPO underpricing explained the short-run share performance phenomenon on various aspects of the relations between issuers, underwriter and investors. Moreover, Ritter (1998 and 2003) argue that IPO underpricing theories are not mutually exclusive and varies across different markets depends on the institutional set-up and contractual mechanism. Following Ljungqvist (1997), this section explained the theoretical explanations for short-run share theories. For institutional based theories of IPO underpricing focus on the marketplace lawsuit and price stabilisation function of the underwriter. There are 2 main institutional based theories to explain IPO underpricing. These are legal liability hypothesis (lawsuit hypothesis) and performance based on information asymmetry price stabilisation hypothesis. Both of these scenarios are not commonly found in the Malaysia stock market, thus, these theories are not apply to Malaysian IPOs.

Albada and Yong (2017) find that the average initial return of the Malaysian IPO market is still high, due to the 'still' high level of information asymmetry in the Malaysian IPO market. On the other hand, Ariff and Shamsher (1999) state that Malaysian IPO underpricing could be associated with the environment regulatory effect. According to them, regulatory intervention might be a possible cause of excessive IPO underpricing in Malaysia. In empirical study by Zainudin et al. (2019), it evidence that the relationship and influence of investor's sentiment on IPO firm performance. When investors become overly optimistic about future prospect of stocks they buy without considering other factors. The results also shows that firms successfully time the market, having IPOs near market peaks which implicates that new issues always mispriced. Behavioural based theories are explained in the following section.

Information asymmetry based theories

The most plausible explanations for IPO underpricing phenomenon are based on information asymmetry theories, mainly in the form of ex-ante uncertainties about share prices. The first major academic study on asymmetry information was conducted by Akerlof (1970). According to Akerlof (1970), asymmetric information happens in a situation where one party having superior information about the fair value of asset than another party. In the IPO process, issuing firms, underwriters and investors are the 3 major stakeholders. The asymmetric information theories of IPO underpricing undertake that one party among the 3 having superior information. Consistent with asymmetric information theory, Baron (1982) demonstrates agency problem between issuing firm and underwriter. According to Baron (1982), underwriter having better information of market condition than the issuing firm, therefore underwriter induce IPO underpricing in order to achieve optimal selling target. However, Welch (1989) conjectures that issuing firm has better information about the true value of the firm and accept IPO underpricing as a signal of good quality. In contrast, Rock (1986) assumes informational asymmetry among investors. The following subsections explained the theories based on information asymmetry.

(a) Winner's curse theory

Rock (1986) introduces the winner's curse theory. Due to the uncertainty and information asymmetry problem, this theory explains the tendency of winning bid exceed firm's intrinsic value in the stock market. A study was done by Rock where he has divided the group of investors into 2 distinguished group, i.e., informed investors with superior information about the issuing firms, and the uninformed investors. Rock's (1986) findings document that the informed investors would only buy undervalued IPO shares and sell the shares to the market when the market is getting weak and lack of good news to investors. Whilst the uninformed investors would bid all IPO shares in return to get a smaller portion of underpriced shares. In this phenomenon, the informed investors crowd out the uninformed investors where uninformed investors would get those IPO shares that were left after the informed investors' bidding. This resulted in negative IPO initial returns earned by uniformed investors and, consequentially, discourage uninformed investors from trading.

On the contrary, when IPO market is weak usually this phenomenon occurs due to no oversubscription ratio and the informed investors would guarantee the allotment of IPO shares for the uninformed investors. According to Levis (1990), such new issuance would trade below the IPO price resulting negative initial returns for uninformed investors holding large quantum of overpriced IPO shares. Thaler (1988) evidences that investors will be 'cursed' out from bidding shares at the highest prices as they overpaid by estimating the winning bid too high. The underwriter would apply a discount to the IPO price, in order to encourage participation in bidding and to attract uninformed investors to the stock market (Rock, 1986).

Ruzita et al. (2016) attempt to establish evidence on winner's curse on Malaysian IPOs from 2000 to 2013. The findings indicate that IPOs with higher institutional investors participation (private placement) produces a higher IPO initial return because they attract more investors who participate in the market by imitating the behaviour of institutional investors. It explains IPOs with high participation from institutional investors tend to receive a higher oversubscription rate (the reciprocal of the allocation rate in Amihud et al. (2003)) because these IPOs are also highly sought by the uninformed investors (non-private placement). The scenario of winner's curse is not expected to disappear from an IPO market immediately because it would push away uninformed investors from the market would force the issuing firms and underwriters to deliberately underprice their IPOs, here refers to the supply-demand theory. Both issuing firms and underwriters need to regain investors' confidence and interests in IPO market in order to ensure it is a successful one.

This theory is relevant to this research, where studies such as Ruzita et al. (2016) highlight its persistence, showing that higher institutional investor participation often signals stronger demand, attracting uninformed investors and driving oversubscription ratio. While this theory effectively explains how investor behaviour affects IPO underpricing, its primary limitation is that it assumes information asymmetry remains unchanged. It does not fully consider the impact of evolving regulatory or market sentiment on IPO outcomes. Nonetheless, it provides a useful approach to understanding IPO underpricing in the context of Malaysia's regulatory changes and evolving market conditions.

(b) Ex-ante uncertainty hypothesis

Clarkson and Merkley (1994) find that the ex-ante uncertainty theory explains the inefficiencies of information flows. This refers to the uncertainty in valuation of IPO shares when investors first subscribe the IPO. Beatty and Ritter (1986) evidence that there is a relationship between the ex-ante uncertainty and IPO underpricing. Beatty and Ritter (1986) also argue that the greater the uncertainty about the value of a new issue, the greater the underpricing needed to attract uninformed investors. Besides, they also evidence that while IPO underpricing is common, the 'need' for and extent of IPO underpricing is reduced if uncertainty about IPOs' future cash flows is reduced. For example, informed investor buys more IPO shares and its value increased with the extend of uncertainty. This causes more investors to become informed investors, worsening the winner's curse and increasing the required level of IPO underpricing. Investors require higher reward when there is a higher level of ex-ante uncertainty. However, investors with minimal knowledge on IPO will have to rely on the information disclosed in the prospectus in making investment decision. Therefore, a higher compensation is required when investors are facing high level of uncertainty and when the disclosure of information is limited. Many researchers have evoked some other models based on the relationship between ex-ante uncertainty and IPO underpricing. For example, the quality of advisers i.e., underwriters, reporting accountants and lawyer is negatively related to IPO underpricing (Booth and Richard (1986); Titman and Trueman (1986); Balvers et al. (1988); Carter and Manaster (1990); Carter et al. (1998)).

Badru and Ahmad-Zaluki (2018) investigate whether ex-ante uncertainty theory exists on Malaysian IPOs from 2005 to 2015 under fixed price mechanism structure. The results show that there is no evidence of ex-ante uncertainty hypothesis on Malaysian IPOs, however, it exists when investors have pre-IPO information in predicting IPO initial returns. Instead, the signalling effect dominates, and this could be due to IPO underpricing. It is also because the greater certainty in the listing process, for example the provision of lock-up period has been implemented on Malaysian IPOs which could have reduced uncertainty surrounding the IPO pricing valuation. The findings also highlight that due to the smaller scale of composition of IPO firms in Malaysia, the IPO price may be sensitive to other disclosures in prospectus, financial news or even market sentiment. Therefore, the study recommends to include other proxies of ex-ante uncertainty such as the utilisation of IPO proceeds and the risk factors disclosed in the IPO prospectuses for further studies on Malaysian IPOs.

This theory is relevant to this study as it helps in understanding IPO underpricing within the context of changes in Malaysia's capital market structure. It highlights the key roles of information asymmetry and market sentiment in shaping IPO pricing. Amid structural changes in the Malaysian IPO landscape, including regulatory reforms and sentiment-driven market shifts, the ex-ante uncertainty hypothesis provides a valuable framework for analysing the impact of these factors on investor behaviour and IPO valuation. The use of MIMSI further enriches this analysis by capturing behavioural dynamics, aligning with this study's focus on fundamental and sentiment factors influencing IPO performance during market transitions.

(c) Signalling hypothesis

Ibbotson (1975) introduces the signalling theory which was further studied and articulated by Allen and Faulhaber (1989); Grinblatt and Hwang (1989); Welch (1989). They state that in signalling theory, issuing firm has better information on the firm's intrinsic value than underwriters or investors. IPO underpricing has become a means of convincing to potential investors of the high quality firm i.e., issuing firm is better informed about the present value and risk of its future cash flows than investors or underwriters. Allen and Faulhaber (1989) state that IPO underpricing is to signal investors on the intrinsic value of a firm due to the information asymmetry.

Conversely, Welch (1989) argues that signalling theory has been assumed that high imitation costs usually happened in low quality firms and this is to pretend the appearances of high quality firms. This is also to ensure that firms will not benefit from the imitations if the information has been prevailed. IPO underpricing is costly to firms, thus, low quality firms price their IPO as high as possible in order to maximise the capital raised from the sales of new shares. It is believed that only high quality firms are able to absorb the costs of IPO underpricing.

Albada et al. (2019) investigate the influencing effect of information asymmetry on the relationship between the signalling variables and initial returns of Malaysian IPO using data from 2000 to 2015. The signalling variables are lock-up period, underwriter's reputation, auditor's reputation and board member's reputation. The results find that lock-up period is unable to reduce the level of information asymmetry and IPO underpricing due to mandatory regulations enforced on the issuing firms to protect investors with regards to the lock-up period (Yung and Zender, 2010). Auditor's reputation is able to reduce IPO underpricing but unable to reduce the level of information asymmetry because it requires a stronger legal enforcement (Rad and Embong, 2014). Underwriter's reputation is able to reduce the information asymmetry but unable to influence IPO underpricing due to lack of competitive pressure among underwriters in Malaysia stock market (Jelic et al., 2001). Board's reputation is able to reduce the IPO underpricing and lowering information asymmetry because board members have the ability to signal prospective investors the quality of issuing firms.

This theory is integral to this research as it explains how IPO underpricing serves as a signalling mechanism for high-quality firms to convey their intrinsic value to investors in the presence of information asymmetry. In Malaysia's evolving capital market structure, the theory highlights the influence of factors such as lock-up periods, underwriter reputation, and board quality on investor perceptions and IPO pricing. By integrating market sentiment, as measured through the MIMSI, the analysis captures the behavioural dynamics that enhance the signalling process. This aligns with the research focus on understanding how fundamental and sentiment factors shape IPO performance and pricing during structural transitions in Malaysia's capital market.

2.6.3 Behavioural explanations for short-run share performance of IPOs

Behavioural theories explained the IPO underpricing phenomenon in the presence of 'irrational investors' who opt to purchase IPO's shares beyond their intrinsic value.

(a) Informational cascades / Bandwagon effect

People do something primarily because other people are doing it, regardless of their own beliefs, which they may ignore or override and this phenomenon is called bandwagon effect which is also known as informational cascades. Bikhchandani et al. (1992) state during the initial stage of IPOs process, underwriters may intentionally underprice the IPOs price to attract more investors in order to maximise the capital and create buzz in the stock market. This would eventually lead to bandwagon effect among investors. Shefrin (2000) evidence the reason that causes the bandwagon effect is the belief and the group of investors must have known the news upfront about the IPO. Welch (1992) states that investors herd to buy a bulk for IPO shares, and the remaining investors would follow the reactions. Accordingly, underwriters will underprice IPO price in order to attract more investors at the initial stage in order to avoid negative bandwagon effect.

Yong (2011) examines the bandwagon effect on Malaysian IPOs using data from January 2001 to December 2009 by employing informed investors (private placement) and uninformed investors (non-private placement). The study shows an 'increased interest' in a particular IPO which resulted in increase in its initial returns were brought in by a group of informed investors in an IPO exercise compared to uninformed investors. Their existence results in high trading activities among investors, as indicated by a higher dispersion of initial returns. This findings evidence the existence of a group of informed investors can create a bandwagon effect when the market overreacts to the underpricing of an IPO.

This theory aligns with the research objectives as it highlights the role of market sentiment in IPO underpricing and underscores how investor behaviour can be shaped by information asymmetry and perceived market signals. However, its limitation is that it assumes investors act irrationally and that everyone follows the herd, which may potentially oversimplify how individuals make decisions. In the Malaysian IPO market, the bandwagon effect is particularly relevant due to the significant role of informed investors in shaping market sentiment. Their actions lead to increased trading activity following underpriced IPOs, providing useful insights into short-run share performance in the context of regulatory changes.

(b) Investor sentiment

Barberis et al. (1998) present a formal model of investor sentiment by linking investor's decision making process with psychology. They conjectured that investor's form their belief about firm's earning in 2 stages. In the first stage, the investor believes that the firm's earnings are mean reverting and show conservatism bias and under-react to important news. However, in the second stage, the investors over-react to important news and relate the earnings to the historical trend. In the second stage, investors ignore the law of probability, or Bayes' theorem, and shows overreaction to a series of good or bad news. Therefore, in such situation, investors make an investment decision on the basis of emotions instead of considering firm's financial performance. Based on the theory of Miller (1977), and Barberis et al. (1998), Derrien (2005), Cornelli et al. (2006), and Ljungqvist et al. (2006) show that the investor sentiment at the time of the offering is positively related with IPO underpricing in the early aftermarket and negatively related to IPO underperformance in the long-run.

Nawadali et al. (2019) investigate the influence of investor sentiment and market volatility on the IPO initial returns in Sri Lanka. The findings of the study highlight the application of investor sentiment theory in explaining the impact of investor sentiment on initial returns. According to the theory, when investors perceive a positive overall market trend, they tend to increase their demand for IPO shares by subscribing more, consequently leading to higher IPO initial returns. Conversely, if investors anticipate a decline in the overall market trend, the IPO initial returns are expected to decrease accordingly.

This theory aligns with the research objectives by emphasizing the key roles of market sentiment in IPO underpricing, particularly in the context of regulatory changes. Its strength lies in explaining how psychological biases and market perceptions shape market behaviour and IPO outcomes. In the Malaysian IPO context, the theory is relevant as it highlights how shifts in market sentiment, driven by regulatory changes can significantly impact IPO pricing.

2.7 Long-run share performance of IPOs

2.7.1 Empirical evidence on long-run share performance of IPOs

Table 2.6 summarises international evidence on long-run share performance of IPOs. The long-run share underperformance has been attributed to several factors. Ritter (1991), and Loughran and Ritter (1997) propose the market timing hypothesis, which suggests that managers strategically issue equity during periods of over-valuation to capitalise on favourable market conditions and lower their cost of capital. Leveraging superior information, managers optimise offering timing to benefit from windows of opportunity, as evidenced by Jain and

Kini (1994). However, Kang and Shivdasani (1999) find that IPOs remain underperform in the long-run, even when the market timing variable is considered. Another explanation involves the management of discretionary accruals before IPOs. Firms often engage in earnings management to inflate financial performance and attract investors, as noted by Rangan (1998), Shivakumar (2000), and Teoh et al. (1998). Teoh et al. (1998) show that firms with high accruals during the IPO year experience poorer share performance over the next 3 years after listing, as their value eventually reverts to its true level.

Besides, investor overvaluation, influenced by market fads, also contributes to long-run share underperformance. The fads hypothesis, supported by Aggarwal and Rivoli (1990), Ritter (1991), and Shiller (1990b), argue that early investor optimism drives initial over-valuation, leading to high initial returns that reverse over time. Under efficient market assumptions, IPO prices should eventually adjust to their equilibrium levels, leading to a negative correlation between initial returns and subsequent long-run share performance (Shiller, 1990b). Empirical evidence supporting the role of investor over-optimism in long-run IPO share performance is provided by Hansen and Crutchley, 1990; Jain and Kini, 1994; Brav et al., 2000. Lastly, Miller's (1977) divergence of opinion theory suggests that IPOs face greater valuation uncertainty at issuance, resulting in price declines as opinions converge over time. Firms with higher opinion divergence tend to exhibit poorer long-run share performance (Miller, 2000).

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(a) International evidence on long-run share performance of IPOs

Authors (Year)	Sample size	Country	Sample period	Approach	Portfolio of IPOs	Benchmark	Long-run IPO performance measure	Abnormal returns	Aftermarket performance up to
Ritter (1991)	1,526 IPOs	United States	1975-1984	Event-time	EW VW	Market index, Industry and size-matched company	CAAR BHAR WR	-29.10%	36 months
Loughran and Ritter (1995)	4,753 IPOs	United States	1970-1990	Event-time Calendar-time	EW VW	Market index, Sized-match company, Size and book-to-market portfolio	BHAR WR FF model	-15.50%	36 months
Goergen et al. (2007)	252 IPOs	United Kingdom	1991-1995	Event-time Calendar-time	EW	Market index, Size-matched company	CAAR BHAR FF model	-21.98%	36 months
Kooli and Suret (2004)	445 IPOs	Canada	1991-1999	Event-time	EW	Size-matched company	CAAR BHAR	-20.70%	60 months
Thomadakis et al. (2012)	254 IPOs	Greece	1994-2002	Event-time	EW	Market index	CAAR BHAR	-16.12%	36 months
Chorruk and Worthington (2010)	136 IPOs	Thailand	1997-2008	Event-time	EW	Market index	CAAR BHAR WR	-25.39%	36 months
Allen et al. (1999)	151 IPOs	Thailand	1985-1992	Event-time	EW VW	Market index	CAAR	10.02%	36 months
Ljungqvist (1997)	145 IPOs	Germany	1970-1990	Event-time	EW	Market index	BHAR	19.85%	36 months
Chen et al. (2000)	342 IPOs	China	1992-1995	Event-time	EW	Market index	BHAR WR	–212.00%	36 months

(cont'd)

Authors (Year)	Sample size	Country	Sample period	Approach	Portfolio of IPOs	Benchmark	Long-run IPO performance measure	Abnormal returns	Aftermarket performance up to
Durukan (2002)	173 IPOs	Turkey	1990-1997	Event-time	EW	Market index	BHAR	29.66%	36 months
Kirkulak and Davis (2005)	433 IPOs	Japan	1998-2001	Event-time	EW	Market index	CAAR BHAR	-34.50%	36 months
Wen and Cao (2013)	121 IPOs	Taiwan	2005-2007	Event-time	EW	Market index	BHAR	4.03%	60 months
Agathee et al. (2014)	44 IPOs	Mauritius	1989-2010	Event-time Calendar-time	EW VW	Market index, Size-matched company	CAAR BHAR WR FF model	-16.50%	36 months
Lee et al. (1996)	266 IPOs	Australia	1976-1989	Event-time	EW	Market index	BHAR	-46.00%	36 months
Jakobsen and Sorensen (2001)	76 IPOs	Denmark	1984-1992	Event-time	EW	Market index, Size-market company	CAAR BHAR	-13.00%	60 months
Alvarez and Gonzalez (2005)	34 IPOs	Spain	1987-1997	Event-time	EW	Market index, Size portfolio, Book-to-market ratio	BHAR	-24.37%	60 months

Table 2.6 : International evidence on long-run share performance of IPOs

(Note: Table summarises international evidence on long-run IPO share performance highlighting sample sizes, study periods, methodologies, benchmarks, and abnormal return measures across various countries. CAAR denotes Cumulative average adjusted returns. BHAR denotes Buy-and-Hold abnormal returns. WR denotes Wealth relative. FF model denotes Fama-French model. EW denotes Equally weighted. VW denotes Value weighted)

(b) Malaysia evidence on long-run share performance of IPOs

Authors (Year)	Sample size	Sample period	Approach	Portfolio of IPOs	Benchmark	Long-run IPO performance measure	Abnormal returns	Aftermarket performance up to
Paudyal et al. (1998)	95 IPOs	1984-1995	Event-time	EW	Market index	CAAR	+8.90%	36 months
Jelic et al. (2001)	182 IPOs	1980-1995	Event-time	EW	Market index	CAAR, BHAR, WR	+21.93%	36 months
Corhay et al. (2002)	258 IPOs	1992-1996	Event-time	EW	Market index	CAAR, BHAR, WR	+41.70%	36 months
Ahmad-Zaluki et al. (2007)	454 IPOs	1989-2000	Event-time Calendar-time	EW VW	Market index Size-matched company	CAAR, BHAR, WR, FF model	+28.20%	36 months
How et al. (2007)	322 IPOs	1989-2000	Event-time	EW VW	Market index	CAAR, BHAR	+28.20%	36 months
Ahmad-Zaluki and Lim (2012)	93 IPOs	2002-2005	Event-time	EW VW	Market index Size-matched company	CAAR, BHAR	-41.74%	36 months
Zarafat and Vejzagic (2014)	166 IPOs	2004-2007	Event-time	EW	Market index	CAAR, BHAR, WR	-32.80%	36 months
Siti and Norliza (2021)	271 IPOs	2004-2020	-	-	-	-	-8.67%	15th day of initial returns
Shari and Hassan (2024)	334 IPOs	2002-2010	Event-time	EW	Market index	BHAR	+91.27%	60 months

Table 2.7 : Malaysia evidence on long-run share performance of IPOs

(Note: Table presents Malaysia evidence on long-run IPO aftermarket share performance highlighting sample sizes, study periods, methodologies, benchmarks, and abnormal return measures. CAAR denotes Cumulative average adjusted returns. BHAR denotes Buy-and-Hold abnormal returns. WR denotes Wealth relative. FF model denotes Fama-French model. EW denotes Equally weighted. VW denotes Value weighted)

Table 2.7 summarises Malaysia evidence on long-run share performance of IPOs. The long-run share performance of Malaysian IPOs has been widely debated, with mixed results due to differences in research methods, sample periods, and market benchmarks. Shari and Hassan (2024) finds that Malaysian IPOs outperform the market over the long-run, however studies on this topic show conflicting results. Paudyal et al. (1998) examine 95 privatised IPOs on the Main Board from 1984 to 1995 and find that these IPOs outperformed the market for 3 years after listing, although the level of outperformance was below the levels reported by Jelic et al. (2001) for 182 IPOs listed from 1980 to 1995. This difference highlights how variations in sample periods and market benchmarks can influence the findings. Corhay et al. (2002) shows that IPOs from both Main Board and Second Board significantly outperformed the FTSE Bursa Malaysia KLCI Index over a 3-year period from 1992 to 1996. However, Ahmad-Zaluki and Lim (2012) find significant aftermarket share underperformance listed on MESDAQ from 2002 to 2005, particularly for high-tech firms, suggests that the sector composition of these IPOs may have played an important role.

On the other hand, Ahmad-Zaluki et al. (2007) show that investors who subscribed to IPO shares in Malaysia and held them for 3 years from 1990 to 2000 could earn significant abnormal returns, which is consistent with Jelic et al. (2001). They also found that larger IPO firms performed worse in the long-run compared to smaller firms. However, their findings did not support the fad hypothesis (Ritter, 1991) or the over-reaction hypothesis (De Bondt and Thaler, 1985), indicate that market sentiment may not be the main driver of long-run share performance.

In summary, these empirical studies highlight the complexity of understanding the long-run share performance in Malaysia, influenced by factors such as firm and market characteristics, and market sentiment. The empirical study as highlighted by Siti and Norliza (2021) examines the market sentiment of the short-run and long-run performance of Malaysian IPOs using sentiment proxy with initial returns based on shares price of 15th trading days post-listing as dependent variable. However, no prior research has used aggregate market-based sentiment indices to construct market sentiment measures for analysing the long-run share performance of IPOs in Malaysia. This study addresses this research gap by developing such indices and analysing the results over a 20-year period from 2000 to 2020 in Malaysia IPO market. It also emphasizes the need for further studies post-2009 to assess the influence of market sentiment on aftermarket share performance following the regulatory changes. This research aims to address this gap by analysing market sentiment and its impact on aftermarket share performance in the context of regulatory changes.

2.7.2 Theoretical explanations for long-run share performance of IPOs

Some empirical studies examine different factors to determine variation in IPO for the long-run share performance. The following theoretical explanation explains long-run share performance of IPOs.

(a) Agency costs and asymmetric information

Agency costs refer to the expenses incurred as a result of conflicts of interest among shareholders and are defined as such by Berk and Demarzo (2013). Throughout a firm's lifespan, a separation between ownership and control commonly occurs, particularly during the early stages when capital injections are made prior to a listing. The IPO process represents a significant instance of heightened separation between ownership and control, as shares are distributed among new investors. According to empirical researchers, this theory can shed light on why IPOs often exhibit poorer performance compared to benchmarks. The underlying rationale is that managers who possess a substantial ownership stake tend to have stronger incentives to make decisions that enhance value, thereby reducing their inclination to misuse corporate resources or engage in value-depleting choices (Berk and Demarzo, 2013). Consequently, a firm that offers a limited portion of its shares to the public and has a small number of significant shareholders should, in line with the agency cost theory, experience superior performance.

The problem of agency costs stemming from asymmetric information during ownership trading can manifest, as exemplified by the scenario of transparent markets where sellers and buyers of shares are presumed to possess perfect information. However, in the context of an IPO, conflicting interests and information asymmetry issues arise. Pre-IPO owners typically possess superior information and strive to maximise the proceeds from the IPO, while new investors aim to receive greater value in proportion to their investment. As managers and owners seek to maximise their personal wealth, they often choose to go public when there is an expected higher value for the company, which frequently occurs when investors are excessively optimistic about market returns. This problem closely aligns with the window of opportunity hypothesis proposed by Loughran (1994).

The 'lemons-problem' refers to a situation where sellers are reluctant to sell shares when market valuations are deemed too low. Rational investors anticipate this behaviour, leading to a discount in share prices due to sellers holding excessive private information. This discount contributes to a lower asset valuation and aligns with the adverse selection theory. Consequently, sellers of low-quality shares enter the market while sellers of high-quality shares exit, resulting in a market primarily composed of low-quality shares. Leland and Pyle's 1977 study supports this theory, as they argue that investors discount firm's value to account for the uncertainty associated with information asymmetry. In addition, Akerlof (1970) evidence that sellers strategically time their equity issues during periods of excessive investor optimism. They also find that the share price of already-traded companies declines when new equity is issued, as it is perceived as a reliable signal of overvaluation. This phenomenon is widely acknowledged in contemporary corporate finance literature.

The theories surrounding IPOs, including asymmetric information and adverse selection, were initially studied to explain the phenomenon of IPO underpricing and classical agency problems. However, these theories can also be applied to understand long-run underperformance. The argument posits that equity sellers tend to issue shares during periods of over-valuation, leading to initially higher company valuations and IPO underpricing. As more information becomes available, the information gap between investors narrows, causing share prices to adjust towards a lower market value. Consequently, the asymmetric information theory is deemed to have a detrimental impact on IPO performance, while the impact of the agency cost theory depends on the specific circumstances. In general, the issuance of a greater volume of shares is expected to be negatively correlated with performance due to the separation of ownership and control.

These theoretical perspectives are crucial to understand the dynamics of aftermarket share performance in the Malaysian context, particularly as market sentiment may interact with these factors, potentially modifying their impact over time. This research explores these complexities, providing a deeper understanding of how market sentiment in the Malaysian IPO market relates to the broader theories of agency costs and asymmetric information. These insights are relevant for investors and policymakers in guiding decisions related to IPOs and the long-run share performance in the context of regulatory changes phenomenon.

(b) Underwriter reputation hypothesis

Chemmanur and Fulghieri (1994) state that an underwriter's reputation is based on past IPO cases that they have underwritten. The main roles of underwriters are screening and signalling. It is evidence that the enhancement of reputation is underwriting high quality issuing firms whereas the issuing firm's reputation can be tarnished if one were to underwrite low quality issuing firms. Therefore, in order to maintain firm's reputation it is important to ensure firms can provide strong, long-run aftermarket performance. Beatty and Ritter (1986) state that effective IPO pricing evaluation is a main deliverable for underwriters.

Baron (1982) evidences that the underwriter has superior information on market demand as opposed to the issuing firms. This is because the experience of underwriter in managing the underwriting process. Therefore, reputable underwriters will usually price IPO closer to the intrinsic value based on their skills and working experiences. Beatty and Ritter (1986), and Carter and Manaster (1990) state that reputable underwriter is signalling lower ex-ante uncertainty which leads to lower IPO underpricing. Besides, reputable underwriters ensure that their risk premium analysis underlying the IPO are appropriately considered in order to protect their reputation in the market.

Jelic et al. (2001) examine the Malaysian IPO's financial performance from 1980 to 1995 and one of the main focuses is to examine the role of underwriters in the valuation of IPOs. The results suggest that extremely high and statistically significant initial premiums and positive and statistically significant long-run returns up to 3 years after listing. It contradicts with the past IPO literature that record a significant negative long-run share performance. Besides, Tong and Ahmad (2015) study the investment banks' (underwriters') reputation that affect the performance of IPOs on Main Board, Second Board and MESDAQ using data from 2002 to 2008. The results show that the reputation of underwriters have significant influence over the performance of IPO. It evidence that higher reputable underwriters tend to influence the IPO performance of Second Board, and lower reputable underwriters was confined to IPO performance of MESDAQ. However, it concludes that more research need to be carried out post-2009 which could reveal the question whether the characteristics inherent in these firms has continued to manifest and generate the similar influences particularly after the merger of Main Board and Secord Board.

This theory is relevant particularly in the context of market signalling, where reputable underwriters can reduce ex-ante uncertainty, leading to less IPO underpricing and a better aftermarket share performance. These findings suggest that the quality and reputation of the underwriters are critical in shaping IPO performance in Malaysia. In the context of this research, understanding the dynamics of underwriter reputation provides essential insights into the factors that influence aftermarket share performance, particularly as market sentiment evolves. It seeks to further explore how underwriter reputation interacts with market sentiment that affect IPO outcomes in the context of regulatory changes, providing practical insights for investors and regulators.

2.7.3 Behavioural explanations for long-run share performance of IPOs

In order to address the question why IPO underperform in the long-run as compared to the market benchmark, researchers put forwarded several theories and hypothesis. The most prominent justifications of the long-run share performance of IPOs are divergence of opinion / overreaction hypothesis, windows of opportunity hypothesis and impresarios / fads hypothesis. The following behavioural based theories have been proposed to explain the phenomenon of long-run share performance of IPOs (Ritter, 1998).

(a) Impresarios / Fads hypothesis

The fads theory is also known as "impresarios" and is attributed to Shiller (1990b). This theory evidences that underwriters are acting as impresarios deliberately underpriced the IPOs offerings in order to create excess demand and to attract investors. As a result, the excess demand is overwhelmed the market price will decrease, and issuing firms record the highest IPO underpricing would have the lowest long-run post-IPO initial returns. According to Goetzman and Ibbotson (1994), a fad occurs when share prices are moving abnormally. They state that during a fad it is expected to record a low cross-sectional variation, and also states that this condition is likely to occur during a panic or crash with investor mass pessimism. This is supported by Bikhchandani et al. (1992) who states fads cannot forecasted and predicted. Herding and fads are interconnected in reality, and fads could be the resultant of herding.

Aggarwal and Rivoli (1990) define that fads as an irregular overvaluation caused by over-optimism created by investors. Ritter (1991) states that IPOs market is subject to impresarios where IPOs are intentionally underpriced by underwriters to create excess demand. According to Aggarwal and Rivoli (1990), the IPO market is especially prone to fads, and this susceptibility can be attributed to 4 potential reasons. Firstly, estimating the intrinsic value of the issuing firm is challenging, making it difficult for investors to gauge its true worth. Secondly, issuing firms in IPOs often carry higher levels of risk, thereby increasing the likelihood of noise trading and speculative behaviour. Thirdly, IPO investors themselves tend to exhibit a more speculative mindset, leading to larger deviations from intrinsic values. Lastly, marginal buyers in the IPO market may be overly optimistic, contributing to the formation of fads.

The fads theory proposes that the long-run share underperformance, as corroborated by Aggarwal and Rivoli (1990), and Ritter (1991), is attributed to overoptimistic investors who sell their shares during the post-IPO period when their elevated expectations go unmet. This phenomenon leads to the emergence of mean-reverting fads, wherein the initial enthusiasm surrounding the IPO dissipates and share prices adjust accordingly. If we assume that the aftermarket performance of IPO shares is not immediately efficient in accurately valuing those shares, investors who are attracted to the IPO market by the temporary overvaluation in the early aftermarket are likely to sell their shares once they observe a mean-reverting pattern in share prices.

Consequently, this selling behaviour can contribute to long-run share underperformance. According to the fads theory, IPO shares that experience higher initial returns are expected to exhibit lower long-run share returns due to a greater subsequent price correction as investors adjust for the initial overpricing. Support for the fads theory is found by Aggarwal and Rivoli (1990). Their research shows that investors who purchase IPO shares in the early aftermarket and hold them for 1 year tend to underperform the overall market.

(b) Divergence of opinion / Over-reaction hypothesis

The explanation of how investor sentiment affects aftermarket share prices was primarily proposed by Miller (1977). The study of Miller (1977) assumes the divergence of opinion between optimistic and pessimistic investors regarding stock valuation. Initially, the optimistic investors assume firm's future growth and tend to purchase the securities at a higher price than its intrinsic value. As time goes on, more information became available to the market, the divergence of opinion between optimistic and pessimistic investors will become narrow and share price will have reduced to its fair value. Therefore, the valuation of optimistic (sentimental) investors tends to determine the share price above its market price at the beginning of offering which subsequently underperforms in the longer horizon.

Miller's (1977) theory evidences that aftermarket share price increases the degree of divergence of opinion. This statement gives a perception that divergence of opinion should be positively related to the aftermarket share price because it proxies for the optimists' opinion. The 'divergence of opinion' explains that great uncertainty has created overoptimism of buyers in the aftermarket share performance for IPOs. The release of timely information and transparency disclosure about a firm will reduce or disappear the differences between optimists and pessimists, and eventually this would lead to a decrease in market price and IPO underperformance in the long-run (Miller, 1977; Levis, 1993). The above scenarios are supported by Ritter (1991), De Bondt and Thaler (1985), and Thaler (1988) as it is consistent with the 'over-reaction' hypothesis which evidence that issuing firms with the highest IPO initial returns often recorded the poorest share performance in the long-run.

Ritter (1991), and Rajan and Servaes (1997) propose that when a firm intends to go public through an IPO listing during a period when investors are excessively optimistic about the prospects of the issuing firm, investors tend to overpay initially. As more information becomes available over time, investors adjust their valuation and correct their initial overpricing, leading to a decrease in long-run initial returns. This phenomenon has been supported by studies conducted by Bradley et al. (2001), Field and Hanka (2001), and Brav and Gompers (1997) which have observed a decline in share prices when the lock-up period expires and more IPO shares become available for trading in the open market. These findings provide evidence in favour of the divergence of opinion hypothesis as proposed by Ritter and Welch (2002).

Narayanasamy et al. (2017) examine the divergence of opinion and moderating effect of investors' attentions in Malaysian IPOs from 2004 to 2014. The findings support the view that the level of individual investors' participation and information disclosure requirements have implication on behavioural bias. Attentive investors will dispose their IPOs shares knowing that it is overly priced with low subscription rate, while they are willing to buy back such IPO shares at a lower premium aftermarket. This study also reveals the increase in the number of investors promotes high liquidity and at the same time is able to keep the market prices low. It also proves the efficiency in Malaysian IPOs could be reduced with low participation from individual investors although there is strong behavioural force induced by the fixed IPO price and greater access of information to other sources of listing information.

Norliza and Yoshiyuki (2021) examines the influence of investors sentiment proxied by Google Search Volume Index on Japanese IPO aftermarket performance using 520 Japanese IPOs issued from January 2010 to December 2019. The results evidence that IPOs are overpriced on the day of listing when investor sentiment is optimistic, resulting in elevated initial returns and trading volumes. These initial gains are typically short-run, driven by the preferences of uninformed investors. Consistent with the over-valuation hypothesis, the share prices are expected to reverse as investor optimism diminishes, leading to long-run underperformance of IPOs.

(c) Window of opportunity hypothesis

The window of opportunity theory explains that issuing firms take advantage of time when share prices are overpriced to sell IPOs shares to investors who are optimistic. This is the period where issuing firm has the incentive to issue IPOs shares at overvalued price as opposed to other firms in the similar industry. Nonetheless, these IPOs typically will record the worst post-IPO share performance as investors will make use of the large profits earned at the initial stage and sell their shares after IPO listings, as supported by Ritter (1991), Lerner (1994), Loughran and Ritter (1995), and Baker and Wurgler (2000).

Ritter (1991) confirms that the IPO volume is directly associated with the window of opportunity theory. Lerner (1994) supports that the finding of Ritter (1991) and states that higher share prices are offered to investors who are willing to pay during high level of the IPO volume. Hoechle and Schmid (2009) evidences that issuing firms going IPO listing in hot issue market will tend to underperform in the long-run. Depending on the IPO volume in a certain period of time, stock market can be divided into hot issue market and cold issue market. Loughran and Ritter (1995) evidence that hot issue market tends to have low quality issuing firm as compared to cold issue market. During the hot issue market, issuing firms take advantage of the peak market by disclosing lesser business and financial information to investors as it will affect the issuing firm's after IPO listing performance. On the contrary, Helwege and Liang (2004) argue that hot issue market or cold issue market make no difference in terms of quality between firms going for IPO listings.

Chong and Puah (2009) examine the relationships between IPO volume, IPO initial return and economic conditions using data from 1993 to 2006. The results show that both IPO initial returns and economic conditions are found to have a positive relationship with IPO volume in the short-run share performance and long-run share performance. The findings conclude that issuing firms 'time' their IPOs in order to take advantage of windows of opportunity when markets are optimistic either due to IPO underpricing or positive economic environment.

Nurwati and Lim (2012) examine the investment performance of IPO on Malaysia's MESDAQ using a sample period from 1999 to 2007. The findings evidence the IPO underpricing is consistent with the winners' curse theory. This theory underscores the role of information asymmetry, where uninformed investors overbid, resulting in elevated initial returns.

Conversely, long-run share performance analysis highlights significant underperformance, aligning with Shiller's (1990b) fad theory, which attributes IPO price anomalies to investor sentiment and irrational exuberance. The results indicate that while the initial IPO offer prices are inflated due to speculative demand, they eventually correct leading to lower returns in the longer term. These findings offer valuable insights into the behavioural finance theories of MESDAQ, particularly in understanding sentiment-driven pricing inefficiencies in IPO performance.

This research builds on these behavioural theories by exploring how market sentiment impact the long-run share performance in Malaysia in the context of regulatory changes. By examining factors such as market sentiment, market timing, and the extent of divergence in opinion, this research seeks to provide a deeper understanding of aftermarket share performance of IPOs in a developing market like Malaysia. These insights are critical for policymakers, regulators, and market participants to address market inefficiencies and enhance the sustainability of the IPO market.

2.8 Explanations on investor's sentiment with respect to short-run and long-run share performance of IPOs

Derrien (2005) explores the influence of individual investor demand during the book-building process on French IPOs, finding that it significantly raises IPO prices on the listing day but negatively impacts long-run performance. Cornelli et al. (2006) expand the analysis to 486 IPOs across 12 European countries, demonstrates that elevated grey market prices which reflect individual investor over-optimism, lead to higher IPO prices on the first trading day and are subsequently followed by long-run price reversals. Supporting these findings, Dorn (2009) uses trade size as a proxy for individual investor sentiment in the German market and demonstrates that such sentiment inflates aftermarket prices above their fundamental values, leading to substantial first-day returns. Similarly, Chan et al. (2004) examines the United States IPO market using trade size to measure investor participation, and concludes that investor sentiment drives IPO aftermarket share prices.

On the other hand, Da et al. (2011) use the Search Volume Index (SVI) to gauge investor attention evidence that there is a positive relationship with initial IPO returns but a negative correlation with long-run share performance. Jiang and Li (2013) employ the subscription rate for the public tranche as a sentiment proxy in their study of 567 Hong Kong IPOs, shows that investor sentiment significantly influences prices in both the pre-market and aftermarket phases. Song et al. (2014) investigate the impact of investor over-valuation in Chinese IPOs by analysing 948 offerings between 2006 and 2011. Their results indicate that investor sentiment inflates first-day closing prices to a greater extent than the IPO underpricing determined by underwriters. These findings, in conjunction with those of Jiang and Li (2013), provide further evidence for the over-valuation hypothesis, suggests that initial IPO over-pricing is driven by excessive investor optimism, which gradually diminishes, resulting in long-run price reversals.

Siti and Norliza (2021) use GSVS as a proxy for investor sentiment analyse 271 IPOs listed on Bursa Malaysia's Main Market and ACE Market from 2004 to 2020 reveals a significant positive influence of sentiment on IPO initial returns. The findings evidence that GSVS significantly and positively influenced IPO initial returns on the first day of listing (pre-market) and fifteenth day after listing (post-market). Future studies should address the low adjusted R^2 by exploring additional variables, using alternative platforms to capture individual investor sentiment, and extending the observation of returns to the long term.

Poonam et al. (2023) investigate the role of investor attention in explaining the disaggregate initial returns into 2 categories, i.e. voluntary premarket underpricing and post market mispricing of Indian IPOs. The analysis examines IPOs listed between 2005 and 2019, with investor attention measured through GSVI from Google Trends and the subscription rate as proxies. The findings reveal a positive and significant relationship between initial IPO returns and investor attention, supporting the attention theory in the Indian context. It also shows that over the long-run, price reversals occur, as evidenced by BHARs. The results highlight the behavioural tendencies of investors, particularly in the pre-market phase, contribute to information inefficiencies and price volatility in the market.

2.9 Regulatory changes in Malaysian capital market

On 25 March 2008, the Malaysian government announced that with effect from 3 August 2009, Malaysian government launch:

(i) New board structure;
(ii) New regulatory approaches; and
(iii) New guidelines and listing rules.

The Main Board and Second Board merged and were renamed the Main Market, and the MESDAQ (Malaysian Exchange of Securities Dealing and Automated Quotation) was renamed the ACE Market which is the acronym for 'Access, Certainty, Efficiency'. The main objective of the ACE Market is to provide greater certainty and efficiency in the listing process and to make it easier for issuers to tap into capital market. Under the new regime of 2009, the bankers or underwriters (principal advisers) are given responsibility to ensure suitability of IPO firms including setting offer price with fair and reasonable justifications, and more disclosure-based regime for transparency.

In the Malaysian market, the alternative market was established in 2002 as the MESDAQ. The market provides a listing avenue for younger, smaller and growth-driven firms. In August 2009, the MESDAQ was renamed ACE Market. The differences between the two markets are in terms of size, age and financial status and the listing requirements are more stringent for the Main Market. The leniency for the ACE market listing imply that the stocks carry more ex-ante uncertainties compared to the Main Market counterparts. Furthermore, most of the MESDAQ firms are from the technology sector, whilst the ACE Market firms are from smaller and younger firms that are often associated with higher ex-ante risks. Hence, it is expected that the IPOs listed in these markets will portray different investor behaviour. The different characteristics and listing requirements between the Main Market and ACE Market indicate that firms listed in these respective markets carry different risk profiles. For example, ACE Market firms appear to be riskier, hence investors would expect higher returns to adequately compensate for the associated level of risks borne by them as opposed to Main Market firms. Under the new regime of 2009:

(a) Merged Main Board and Second Board renamed Main Market

Firms must have an uninterrupted profit after tax (PAT) for a minimum of 3 financial years with a minimum aggregate of RM20 million and a minimum PAT of RM6 million for the most recent financial year in order to qualify for listing on the Main Market. Firms must also have a minimum market capitalisation of RM500 million upon listing, and has been incorporated for at least one financial year prior to the submission of listing application. Firms must also have generated operating revenue for the financial year prior to the listing application. In terms of IPO pricing, a Main Market IPO must be priced at a minimum of RM0.50 per share. The Main Market have uniform listing requirements (combining Main Board and Second Board), and comprehensive disclosure-based regulation.

(b) MESDAQ renamed ACE Market

There is no minimum requirements for ACE Market firms in terms of the above criteria. ACE Market firms tend to be younger, smaller and less financially established than Main Market counterparts. The ACE Market is a sponsor-driven market and is open to companies of all sizes and from all sectors. The sponsors, who are mostly investment bankers, evaluate the suitability of applicants seeking listing, conduct due diligence process for the ACE Market companies' documents as well as maintain regular contact with the companies for at least 3 years after listing. In conjunction with the new market structure, Bursa Malaysia also revamped its listing requirements for the Main Market and the ACE Market. One key reform to the ACE Market, apart from its being sponsor-driven and open to all companies of all sizes from all sectors, is that there is no prescribed minimum operating history or profit tracked record requirements for entry into this market. This factor empowers the sponsors to assess the suitability of listing applicants.

2.10 Impacts of regulatory changes and IPOs

Engelen and Van Essen (2010) examine the influence of cross-country variations in investor protection, the quality of legal systems, and the strength of legal enforcement across 21 countries, concluding that IPO underpricing tends to be less pronounced in jurisdictions with well-developed legal frameworks.

Recent research exploring the relationship between IPO underpricing and changes in corporate governance and transparency highlights the positive impact of securities market regulations. For instance, Johnston and Madura (2002) analyse IPO underpricing in the United States before and after the implementation of the Sarbanes-Oxley Act of 2002 (SOX). Their findings reveal that, on average, IPO underpricing was lower for shares issued following the enactment of SOX. Similarly, Ekkayokkaya and Pengniti (2012) report a significant reduction in the median IPO underpricing in Thailand after the introduction of corporate governance reforms. They attribute this decline to enhanced financial disclosure requirements, which facilitate the accurate assessment of an issuer's risk. Additionally, Shi et al. (2013) investigate IPO underpricing across 34 markets and find a negative correlation between IPO underpricing and the rigor of disclosure regulations, emphasizing the role of stringent regulatory frameworks in mitigating IPO underpricing. Rasidah et al. (2022) evidence that the revised Shariah compliance guidelines on lockup provisions signal commitment and significantly influence initial returns, indicating market competitiveness and aligning with international standards, as both domestic and international investors seek Shariah-compliant stocks in the Malaysian IPO market.

Table 2.8 illustrates the selected empirical evidence on the IPO underpricing, aftermarket share performance and changes regulatory phenomenon across countries.

Authors (Year)	Country	Period studied	Results
Saadouni et al. (2007)	Malaysia	1989-2000	This study is based on a sample of 322 IPOs that were listed on the Main Market of Bursa Malaysia between 1989 and 2000. The purpose of the study is to report on the impact of the regulatory change that took place in January 1996, both in the short-run and long-run. Specifically, the focus of the study is on the share allocation of Second Board IPOs in Malaysia and its association with IPO pricing. The findings of the study indicate that the average Market Adjusted Initial Returns (MAIR) for IPOs listed before and after 1996 was 81% and 122%, respectively. This suggests that IPO underpricing increased after the 1996 regulatory change in IPO pricing. However, the study also found that Bumiputera-controlled firms underpriced by 96% (post-1996) compared to 140% (pre-1996), but these firms performed better in the long-run. Furthermore, the study shows that the difference in IPO underpricing between Bumiputera-controlled and non-Bumiputera-controlled firms was insignificant

(cont'd)

Authors (Year)	Country	Period studied	Results
Rasidah et al. (2014)	Malaysia	2000-2012	This study is based on a sample of 384 IPOs listed on Bursa Malaysia between 2000 and 2012. The purpose of the study is to examine whether the lock-up ratio and lock-up period affect the initial returns. The results show that the lock-up period is significantly positive in explaining IPO initial returns, but the lock-up ratio is not. The findings provide new insights for testing the signalling content of lock-up provisions, particularly in a setting characterised by high information asymmetry
Jiang and Leger (2009)	China	2001-2003	This study examines the impact of significant changes to Chinese IPO regulations on IPO performance from May 2002. It is based on a sample of 209 Chinese A-share IPOs from 2001 to 2003. The short-run initial return and long-run abnormal initial returns are computed using the Cumulative Abnormal Returns (CAR) and Buy-and-Hold Abnormal Returns (BHAR) methods. Prior to the reform, the odds of success in the allocation lottery depended on the investor's subscription bid, but post-reform, odds were determined by the size of the investor's existing holding of tradeable shares. The study reveals that after the reform, an average abnormal initial return of 117.5% was achieved, which is a decrease of 43.3% from before the regulatory change, but still considered high by international standards
Too and Wan Yusoff (2015)	Malaysia	2002-2008	This study is based on a sample of 331 IPOs listed on Bursa Malaysia between 2002 to 2008. The extend of disclosure was computed by applying the disclosure index of Bukh et al. (2005). The purposes of the study is to examine the direct and indirect impact of firm-specific characteristics on the level of underpricing among Malaysian IPOs. The findings evidence that of the 5 firm characteristics examined, there is a direct relationship between the firm's financial performance and the level of foreign activity, and the level of IPO underpricing, instead of being mediated through disclosure. However, some firm characteristics have direct influence on the extend of disclosure but do not have any influence on IPO underpricing. As the findings reveal that the extent of disclosure is low in influencing the level of underpricing. Had the disclosure been higher, it may have some influence on IPO underpricing. The accounting governance board need to regulate the disclosures of the intangible resources so that the level of underpricing can be minimised

(cont'd)

Authors (Year)	Country	Period studied	Results
Cattaneo et al. (2015)	Italy	1861-2015	This study analyses data from 879 Italian IPOs that occurred between 1861 and 2015 to explore the impact of regulation interventions on IPO markets. Specifically, the study investigates the effects of changes in regulation on the number of firms going public each year and on their survival rates. The study found that tightening regulatory changes lead to improved survival rates for IPO firms. However, these same stricter listing requirements may make it more difficult for lower-quality firms to comply, which reducing the number of IPOs. The study's results indicate that statistically, the number of delisted firms decreased from 165 (between 1861 and 1935) to 40 (between 1998 and 2011), while the total number of IPOs decreased from 385 (between 1861 and 1935) to 213 (between 1998 and 2011)
Ekkayokkaya and Pengniti (2012)	Thailand	1990-2007	This study analyses the impact of governance regulation reform on investor protection in Thailand, focusing on 463 IPOs sampled from January 1990 to December 2007. The study takes into account Thailand's weak legal institutions and the scandalous corporate collapses that resulted from the 1997 East Asian financial crisis, which prompted major governance reform in the country. The reform includes increased disclosure regulations, implementation of internal control measures, and recommendations for directors' practices, affecting all firms listed and non-listed in Thailand. The study finds that Thailand's IPOs are significantly less underpriced after the reform, indicating that investors are more willing to pay a higher price for equity. In the pre-reform years, IPO underpricing reached 69.63% in 1990 and -3.19% in 1996, while post-reform years showed lower rates of 53.51% in 2003 and 29.72% in 2007
Akyol et al. (2014)	18 European markets	1998-2012	This study is based on a sample of 3,677 European IPOs that occurred from 1998 to 2012 across 18 different European markets. These markets include Euronext (which consists of the Belgian, Dutch, French, and Portuguese stock exchanges), as well as the stock exchanges of Austria, Cyprus, Czech Republic, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Norway, Poland, Slovenia, Spain, Switzerland, and the United Kingdom. The study aims to explore how corporate governance reform can decrease information asymmetry and pre-IPO uncertainty. The results indicate that following the introduction of national corporate governance codes, IPO underpricing has decreased by 23.80% for companies that listed their shares on regulated markets. This finding supports the notion that enhancing transparency and improving the quality of financial statements can lessen information asymmetries and, in turn, positively impact IPO valuations

(cont'd)

Authors (Year)	Country	Period studied	Results
Takahashi and Yamada (2015)	Japan	1977-2011	This study examines the impact of IPO markets relaxing listing standards and firms' operating growth around IPOs in Japan, based on a sample of 29,134 Japanese IPOs from 1977 to 2011. During the late 1990s, Japan experienced several deregulations of listing requirements. The results show that relaxing listing requirements enables high-growth firms to go public and subsequently grow larger after listing. However, there is an adverse effect as this situation does not lead to subsequent growth in productivity and profitability. The study provides evidence that IPO firms' excess growth in terms of profitability and productivity diminished after their IPOs while their excess growth in size measured by sales and number of employees still increased in the post-IPO period
Rasidah et al. (2022)	Malaysia	2000-2016	This study examines the revised Shariah compliance guidelines and initial returns in the Malaysian IPO market, based on a sample of 356 IPOs listed on Bursa Malaysia from 2000 to 2016. The results show that the changes has significant influence on initial returns. The revised mandatory lockup provision, which applies to the entire shareholding of major shareholders, may enhance investor confidence in subscribing to IPOs. However, a higher lockup ratio may limit opportunities for other investors to participate. Furthermore, the new mandatory lockup ratio imposed on the entire shareholding of founders or promoters (across all firms, including the ACE market and Infrastructure Property Companies) could potentially deter foreign investors from engaging. Therefore, regulators in Malaysia and other countries should reassess the lockup provisions to maintain market competitiveness and attractiveness

Table 2.8 : Selected empirical evidence on the IPO underpricing, aftermarket share performance, and changes regulatory phenomenon across countries

(Note: Table summarises some of the empirical studies on IPO underpricing, aftermarket performance, and regulatory changes across countries highlighting how regulatory changes influence IPO outcomes)

Recent studies indicate that increased regulations and disclosure requirements reduce information asymmetry and IPO underpricing (Akyol et al., 2014; Ekkayokkaya and Pengniti, 2012). However, such changes are not without challenges. Over-regulation can discourage firms from going public, resulting in a decline in the number of IPOs (Doidge et al., 2010; Gao et al., 2018). Since a lack of a robust IPO market poses significant concerns for economic and employment growth (Kenney et al., 2012), overly stringent regulations may produce unintended consequences that overwhelm their benefits. This research addresses this gap by investigating whether the regulatory changes in Malaysia has any influences on IPO performance during such changes.

2.11 Impacts of price-earnings and IPOs

Based on the Securities Commission 1995 guidelines, all issuing firms must abide by the regulation addressing IPO pricing in which IPO offer price should be established based on the PE multiples (Jelic et al., 2001; Taufil Mohd, 2007). The guideline on IPO pricing is expected to reduce the underpricing level of Malaysian IPOs. The Securities Commission has established a guideline on the range of PE multiples for each major industry and issuers are mandated to use the PE multiples in this range to determine IPO offer prices. How et al. (2007) state that since January 1996 in an attempt to improve transparency and efficiency of Bursa Malaysia, the Securities Commission moved towards a market-based pricing mechanism and firms in Malaysia have been allowed to set the prices for their IPOs using their own valuation methods. This change occurred because the previous guideline that used PE multiples to determine IPO prices was eliminated. The guideline was removed because it has limited the market's ability to influence IPO prices and overly relied on accounting values rather than market dynamics for pricing IPOs.

Understanding the PE is crucial for IPO investors seeking to make informed decisions about IPO valuation. This metric has long been used by investors and financial analysts to assess whether shares are fairly priced. The PE ratio can also be employed to compare a share's valuation against its industry peers or a benchmark index. There are 2 primary types of PE ratios: trailing PE, and forward PE. The trailing PE is based on earnings per share from the past 12 months, whereas the forward PE uses projected future earnings. Ong et al. (2021b) find that future earnings perceived as inaccurate. This research does not include a forward PE analysis due to the lack of availability of data on forward PE, it is explained in Section 3.16.2. On the other hand, Ong et al. (2023) examine how earnings forecasts in IPO prospectuses affect investor demand or oversubscription rates in Malaysian IPOs. The results show that IPOs with earnings forecasts have higher oversubscription rates than those without. Earnings forecasts signal strong firm prospects, increasing investor demand for IPO shares.

DeAngelo and DeAngelo (1990) provides evidence from a large sample of fairness opinions on management buyouts and a small sample of investment bankers' working papers indicate that investment bankers' valuation techniques extensively use accounting data. Additionally, she demonstrates that investment bankers predominantly rely on the comparable firms approach to compare its operational and financial performance with that of several publicly listed companies in the same or a similar industry. The firm and its underwriters base their pricing decision on an analysis of the market price ratios, adjusting for firm-specific differences, to determine a minimum and maximum offer price. Subsequently, they gather more recent information about the IPO market and set a final offer price.

Lutfur and Shamsuddin (2019) investigate the impact of investor sentiment on the PE in G7 countries, including the United States, United Kingdom, Canada, France, Germany, Italy, and Japan. Their findings indicate that the PE tends to rise with an increase in the dividend payout ratio and decline with higher short-term interest rates and market volatility. Boonlert (2017) examines the impact of investor sentiment on the PE using annual data from various United States industries between 1998 and 2014. The findings reveal a significant positive relationship between investor sentiment and the PE.

Ong et al. (2021a) evidence that in fixed-price offerings, there exists a negative relationship between IPO valuation and IPO underpricing. Specifically, using the PE ratio, their study found that fixed-price IPOs tend to be more undervalued, resulting in higher levels of IPO underpricing in Malaysian IPOs. This phenomenon aligns with Rock's (1986) winner's curse theory, where undervalued fixed-price IPOs reflect greater ex-ante uncertainties about the firms' intrinsic values and are prone to being overpriced. Institutional investors typically avoid such offerings, leaving them more accessible to retail investors who may lack information about the firms' true worth. Consequently, retail investors may subscribe to these IPOs only if underwriters intentionally underprice them to mitigate the risks associated with asymmetric information.

In this research, we take advantage of the new listing board classification to investigate the changes of Malaysia's capital market structure regarding the value of IPOs particularly PE as this area remains underexplored in the context of Malaysian empirical research. The introduction of new board structures has ushered in innovative regulatory approaches, along with updated guidelines and listing rules for the IPO market in Malaysia. One of the research objective of this research is to examine the significance of PE in explaining IPO underpricing amidst changes in the Malaysian capital market structure.

2.12 Summary

This section synthesizes the key insights from the literature review, highlighting the theoretical and empirical foundations relevant to this study. It examines the influence of information asymmetry, market sentiment, and regulatory changes on IPO pricing and performance in Malaysia. Drawing from neoclassical finance and behavioural finance theories, the research emphasizes the roles of fundamental and sentiment factors in IPO underpricing and aftermarket share performance. Key gaps identified include the limited use of aggregate market-based sentiment indices, such as the MIMSI, in Malaysian IPO studies, and the lack of integration between sentiment proxies and using methodologies such as PCA, sPCA, and PLS. By addressing these gaps, the research aims to offer a nuanced understanding of how market sentiment interacts with regulatory shifts to shape IPO outcomes, contributing to both academic discourse and practical policy implications.

CHAPTER 3 :
METHODOLOGY AND HYPOTHESIS DEVELOPMENT

3.1 Introduction

First, this chapter discusses the methodology used to conduct this research as well as the issues related to the chosen research methodology when investigating the study of market sentiment and Malaysian IPOs. It also focuses on the proxies used in this research on the construction of Malaysian IPO Market Sentiment Index (MIMSI) used to test whether the IPO investor sentiment explains the IPO phenomenon in Malaysia stock market. Second, this chapter provides explanation of research design, sample population, source of data, and data collection process. It aims at making clear the limitations in terms of data availability. Third, it discusses the definitions of the dependent and independent variables which are chosen in the light of various theories of IPO and from the review extensive empirical literature as discussed in Chapter 2. Following this, the subsequent part of this chapter explains the hypothesis development, model specifications and diagnostic tests for data validations. Finally, the concluding section of this chapter provides the overview of the proposed methodology for each of research objective.

3.2 Data and variables descriptive

This research takes a quantitative approach, and uses secondary data analysed with numerical methods including statistical techniques and percentage calculations, to interpret the results. Secondary data was collected from a variety of sources including books, IPO prospectuses, newspapers, research publications, statistical data sets, and annual reports.

3.2.1 Population and sample selection

In this research, all the sample data of IPOs issuing firms selection must be based on the following conditions. First, IPOs includes the issuing firms listed on Bursa Malaysia from January 2000 to December 2020 (past 21 years). Second, the sample data of IPOs identified for this research were from Main Board and Second Board, which subsequently merged into Main Market after August 2009, and MESDAQ renamed as ACE Market. Third, the eligible offerings considered in this research are limited to those conducted through public issues, offers for sale, or a combination of both, specifically involving the issuance of shares. This is consistent with prior research conducted by Abdul-Rahim and Yong (2008) and Yong (2007a), certain types of IPOs are excluded from the final sample. These exclusions encompass restricted offer-for-sale, restricted public issue, restricted offer-for-sale to eligible employees, restricted offer-for-sale to Bumiputera investors (referring to Malaysia and other indigenous people in Peninsular and East Malaysia), special and restricted issues to Bumiputera investors, tender offers, and special issues. The rationale behind these exclusions is to avoid including Malaysian companies with a typical types of issuances that may yield less meaningful outcomes in the analysis.

In Malaysia, IPOs are typically issued in 1 of 3 forms: public issues, offers for sale, or a combination of both. A public issue involves the offering of new shares to the general public for the first time, resulting in an increase in the paid-up share capital of the issuing firm. On the other hand, an offer for sale refers to shares that are already owned by the original shareholders, who then sell their shares to the public. In the case of an offer for sale, the proceeds from the sales go directly to the existing shareholders, and there is no change in the paid-up share capital of the issuing firm. Further, the final selection of sample IPOs included in this research also depends on availability of data on offer, opening and closing prices, oversubscription ratio, total number of new shares offered, types of offer, listing year, and listing board. Table 3.1 summarises the distribution of IPO based on year of listing.

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Listing year	Population	Final sample
2000	38	38
2001	20	20
2002	51	51
2003	58	58
2004	72	72
2005	79	75
2006	39	35
2007	26	22
2008	23	23
2009	14	14
2010	29	27
2011	27	25
2012	15	14
2013	18	16
2014	14	13
2015	11	9
2016	11	11
2017	13	10
2018	21	11
2019	30	15
2020	19	12
Total	628	571

Table 3.1 : Distribution of IPO samples by year of listing from January 2000 to December 2020

(Note: Table presents the yearly distribution of all IPOs listed on Bursa Malaysia between 2000 and 2020 (Population), compared with the final sample used in this study (Sample). The final sample excludes IPOs listed on the LEAP (Leading Entrepreneur Accelerator Platform) Market Real Estate Investment Trusts (REITs), and IPOs with incomplete or missing financial/prospectus data required for analysis)

This research has covered the longest sample period of 21 years (post-2000) as compared to the rest of empirical study done for Malaysian IPOs. Table 3.2 shows the sample period and sample size of past study for Malaysian IPOs. The sample period from January 2000 to December 2020 is selected due to these main reasons. The reason as discussed in Chapter 1, the period from 1 January 2000 to 31 December 2020 is characterised by a significant amount of regulatory, policy, capital market changes are inevitably imparted on investor psychology and stock market development which translate to changes in listing boards.

Author (Year)	Sample period	Sample size
Dawson (1987)	1978-1983 (5 years)	21
Ismail et al. (1993)	1980-1989 (9 years)	63
Jelic et al. (2001)	1980-1995 (15 years)	182
Isa and Yong (2003)	1990-1998 (8 years)	468
Abdullah and Taufil (2004)	1992-1998 (6 years)	70
Prasad et al. (2006)	1968-1992 (24 years)	208
How et al. (2007)	1989-2000 (11 years)	322
Ahmad-Zaluki et al. (2007)	1990-2000 (10 years)	543
Abdul-Rahim and Yong (2010)	1999-2007 (8 years)	386
Low and Yong (2011)	2000-2007 (7 years)	368
Yatim (2011)	1999-2008 (9 years)	385
Ramlee and Ali (2012)	1998-2008 (10 years)	283
Abdul-Rahim et al. (2013)	2000-2013 (13 years)	446
Sapian et al. (2013)	2003-2008 (5 years)	191
Rasidah et al. (2014)	2000-2012 (12 years)	384
Too and Wan Yusoff (2015)	2002-2008 (6 years)	331
Ammer and Ahmad-Zaluki (2016)	2002-2012 (10 years)	190
Wong et al. (2017)	1998-2008 (10 years)	313
Che-Yahya et al. (2017)	2000-2013 (13 years)	383
Narayanasamy et al. (2018)	2004-2014 (10 years)	282
Badru and Ahmad-Zaluki (2018)	2005-2015 (10 years)	208
Mohd-Rashid et al. (2019)	2000-2012 (12 years)	373
Al-Masawa et al. (2020)	2002-2017 (15 years)	304
Ong (2020)	2009-2017 (8 years)	126
Siti and Norliza (2021)	2004-2020 (17 years)	271
Rasidah et al. (2022)	2000-2016 (17 years)	356
Norliza et al. (2023)	2004-2020 (17 years)	271
Ong et al. (2023)	January 2000-February 2020 (20 years)	466
Albada et al. (2025)	2004-2021 (18 year)	352

Table 3.2 : Summary of sample periods and sizes in prior empirical studies on Malaysian IPOs

(Note: Table provides an overview of empirical studies focusing on Malaysian IPOs. It summarises the sample period and number of IPOs analysed in each study, reflecting the evolution and growing data availability in this research field. These studies span different timeframes and offer important context for the development of IPO-related literature in Malaysia. The sample sizes vary due to differing selection criteria, market segmentation, and data availability across time periods)

On the other hand, in order to examine the significance of price-earnings (PE) as a key factor in IPO underpricing during changes in Malaysia's capital market structure. The investigation window periods are divided into 3 sub-periods. The first sub-period examines prior to 24 March

2008 named as ‘Pre-Changes’, the second sub-period examines the transitional period between 25 March 2008 (date of announcement) to 3 August 2009 (date of implementation) named as ‘Transitional’, and the third sub-period examines after 4 August 2009 named as ‘Post-Changes’. Here, the objective is to examine the impact of the changes in Malaysia’s capital market structure on the financial market towards IPO underpricing. Subsequently, the results of each period are compared and discussed with the research objective to shed further light on the relationship between IPO underpricing and PE during and after the changes of Malaysia’s capital market structure. Multiple regression is a powerful statistical tool that provides a detailed understanding of the relationships between variables in identifying the key factors in research. Besides, an ANOVA test is conducted to determine if there are statistically significant differences between the means of different sub-periods.

Table 3.3 describes the IPOs samples of this research with 3 sub-periods namely, Pre-Changes has a total of 378 IPO firms represents 66.20% of total IPOs of this sample research, Transitional and Post-Changes have a total of 19 and 174 IPO firms represents 3.33% and 30.47% of total IPOs of this sample research, respectively. Nonetheless, one of the limitation for this research is that the results for Transitional is unable to generate due to the lack of total number of observations.

	Model 1	Model 2	Model 3	Model 4
	Full sample	Pre-Changes	Transitional	Post-Changes
	1 January 2000 - 31 December 2020	1 January 2000 - 24 March 2008	25 March 2008 - 3 August 2009	4 August 2009 - 31 December 2020
Total IPOs	571 (100%)	378 (66.20%)	19 (3.33%)	174 (30.47%)

Table 3.3: IPOs sample of the study with sub-periods

(Note: Table presents the distribution of the final IPO sample (N = 571) across 4 sub-periods: full sample, pre-changes, transitional, and post-changes. The percentage in parentheses indicates the proportion of IPOs falling within each sub-period. These sub-periods align with Malaysia’s capital market reforms)

3.2.2 Data collection and sources of data

The data collection process are completed following these steps. The first step is to collect all the names of issuing firms that went for listing from January 2000 to December 2020 which are identified from Bursa Malaysia’s database available on Bursa Malaysia’s website. In the second step, hand collected data were extracted from each of the IPO firm's prospectus such as offer price, IPO period, offer size, total listing costs, total IPO proceeds, listing date, listing board, underwriters, firm age, firm size, and book value per share. In the third step, the secondary historical financial and market data such as share price and trading volume are extracted from Bloomberg. Finally, the survey-based data such as consumer confidence index (CCI), and business confidence index (BCI) are obtained from Malaysian Institute of Economic Research (MIER)'s reports. Table 3.4 shows the summary of data and their sources for this research.

No.	Data	Sources
1.	Data on first-day opening and closing share prices of IPO companies, FTSE Bursa Malaysia Kuala Lumpur Composite Index (KLCI), FTSE Bursa Malaysia Emas Index, trading volume, market capitalisation, Industrial Production Index, and 3-month treasury bill rates.	Bloomberg
2.	Data on IPO characteristics including offer price, listing date and board, underwriters, firm age and size, total shares issued, proceeds raised, book value per share, equity, PE, oversubscription ratio, major shareholder ownership, return on equity, and offer closing date.	Hand collected data extracted from IPO prospectuses and annual reports
3.	Data on survey-based sentiment indicators: Consumer Confidence Index, and Business Confidence Index.	MIER's reports
4.	Data on market-based sentiment indicators: Share turnover, number of IPOs, first-day returns of IPOs, dividend premium, and equity shares in new issues.	Bloomberg

Table 3.4 : Summary of data sources used in the study

(Note: Table summarises the main data sources used in the study. Data were drawn from a combination of Bloomberg, MIER reports, and hand-collected IPO prospectuses and annual reports. The variables include firm-specific IPO characteristics, market indicators, and both survey-based and market-based sentiment proxies used in the construction of the MIMSI)

3.3 The construction of Malaysian IPO market sentiment index

3.3.1 Methods for construction of Malaysian IPO market sentiment index

According to Zhang (2008), the measurement of investor sentiment necessitates making an initial judgement regarding the ideal measure that should be encompassed. However, this process is further complicated by the fact that researchers typically hold a wide range of prior beliefs regarding the true nature of sentiment and the appropriate methods for its measurement. Therefore, it becomes imperative to evaluate the strengths of various approaches in measuring sentiment, aligning them with the proposed definition of investor sentiment. The central issue revolves around the selection of proxy variables. Considering that the indices published by different countries vary and market rules differ, it becomes necessary for each country to adapt the set of proxy variables based on their specific conditions.

In general, the measurement of investor sentiment can be approached into 3 different ways (Chen et al., 2020). The first method involves the use of direct surveys, as proposed by Shiller (1984), who has used questionnaires designed and distributed by his project team since 1989 to investigate both retail and institutional investors. This method is commonly referred to as a survey-based sentiment measure. The second method employs a single market-based indicator as the sentiment indicator. For instance, Baker and Stein (2004) have used market liquidity as the sentiment indicator. The third method, proposed by Baker and Wurgler (2006), involves the creation of an investor sentiment index by extracting principal components from a group of market-based indicators. These market-based sentiment measures are often referred to as indirect measures, as they rely on market data that correlate with investor sentiment. In addition, Da et al. (2011) have used the Google Search Volume Index as a textual-analysis-based sentiment measure, capturing investor attention. However, there is currently no consensus on which method of sentiment measurement is considered more accurate and efficient. Table 3.5 shows the pros and cons of the aforementioned methods.

We developed an investors' sentiment index by using multiple sentiment yardsticks mentioned by Baker and Wurgler (2006). Baker and Wurgler (2007) have drawn attention to the concerns raised by researchers regarding the reliability and consistency of survey data and related measurements. In line with this perspective, this research incorporates both types of sentiment measurements to address any potential inconsistencies in survey data. Firstly, we distinguish between market-based and survey-based sentiment measures. This research uses the Baker and Wurgler's sentiment index as a market-based sentiment measure, along with an updated version obtained by applying PCA. Furthermore, we employ sPCA and PLS sentiment indices to augment in this analysis.

The selection of Baker and Wurgler's sentiment index is a common practice in the field of finance literature due to its ability to capture economic cycles and market movements. This sentiment index comprises 6 constituents of investor sentiment, from which the first principal component is derived. It is worth noting that Baker and Wurgler observe a significant correlation between the raw sentiment variables and business cycles. To construct a more refined sentiment index, they performed regression analysis on each of the variables using various proxies for business cycles. This regression process ensured the creation of cleaner variables for constructing the orthogonal Baker and Wurgler's sentiment index. Hence, in this research uses the orthogonal Baker and Wurgler's sentiment index.

	Survey-based sentiment measure	Market-based sentiment measure	Textual-analysis-based sentiment measure
Pros	▪ Direct measures for sentiment. ▪ Serve as the benchmark indicator in the validation of other sentiment measures.	▪ High-frequency availability relative to survey-based sentiment indicator. ▪ Represents the mood of the economy. ▪ Easily generalised and often available from the most authentic sources.	▪ Can be measured in different frequency. ▪ Have easier access than the survey-based sentiment indicator.
Cons	▪ Measures are usually in low frequency. ▪ Costly and huge project may be out of financial reach. ▪ Likelihood of errors during stage of data collection and processing. ▪ Doubts on the quality as the questionnaires' answer can be bias, particularly for sensitive questions.	▪ They are the equilibrium of many economic forces other than investor sentiment. ▪ No specific numbers of factors to represent these market-related implicit proxies.	▪ Depends on finding the right, comprehensive, negative and positive words of dictionary.

Table 3.5 : Summary explanations for survey-based sentiment measure, market-based sentiment measure, and textual-analysis-based sentiment measure

(Note: Table presents a comparative summary of the 3 primary categories of sentiment measurement: survey-based, market-based, and textual-analysis-based approaches. Each method differs in terms of accuracy, availability, cost, and frequency of data collection. These distinctions are important for researchers selecting appropriate sentiment proxies in behavioural finance studies)

Next, as the second market-based sentiment measure, this research considers the PLS sentiment index. This index is constructed based on the concept introduced by Baker and Wurgler (2006 and 2007), using the same set of 6 variables as in Baker and Wurgler's sentiment index (Huang et al., 2015). However, Huang et al. observe that Baker and Wurgler's components contain approximation errors that limit their ability to account for stock movements and predictability.

By employing the PLS method, Huang et al. (2015) are able to separate the information embedded in the 6 components into 2 categories: information relevant for predicting stock returns and noisy information. Since the PLS sentiment measure is relatively new in the literature and has not been extensively used, we will use it in this research. According to Huang et al. (2015) and Sun et al. (2016), the PLS sentiment index exhibits higher predictive power and demonstrates the ability to forecast aggregate stock market returns, whereas Baker and Wurgler's sentiment index falls short in this regard.

In this research, the sPCA method is employed which assigns a continuous weight to each predictor. This approach assumes that all predictors are relevant to the target variable but differ in their quantitative predictive powers. A notable advantage of the sPCA method is that it eliminates the need to pre-specify a threshold for predictor selection. Consequently, it qualifies as a dense modeling technique, as described by Chernozhukov et al. (2017) and Giannone et al. (2018). Bai and Ng (2008) have highlighted that threshold selection can be sensitive to small changes in the data due to the discretisation of the decision rule. In contrast, the sPCA method accommodates all predictors without the requirement of selecting a specific cut-off level.

Following the above explanation, survey-based sentiment measure are commonly used in combination with market-based sentiment measure (Naik and Padhi, 2016). In this research, we choose 2 indicators i.e., information on survey-based sentiment includes consumer confidence index (CCI), and business confidence index (BCI) both are provided by MIER's reports. Consumer confidence index (CCI) are being considered as a classical measure of consumer's feeling and perception of the market in economics and finance, indicating optimism towards the current and future economic performance. It is an indicator that reflects the strength of consumer confidence. Respondents provide an answer which is later turned into an index. The higher the level of the index, the more optimistic respondents are about the future economic in Malaysia. Business confidence index (BCI) is an indicator of future developments in Malaysia. This index is built with the opinions taken during regular surveys asking about progress in production, sales, orders, and stocks of finished goods in the manufacturing sector of Malaysia. Whereas, the market-based indicators are share turnover (TURN), number of IPOs (NIPO), first-day returns of IPOs (RIPO), dividend premium (PDND), equity shares in new issues (ESNI), and oversubscription ratio (OVER) as explained in the following section.

In short, using aggregate index methods i.e. PCA, sPCA, and PLS methods to analyse sentiment data offers several benefits compared to using individual sentiment proxies. These methods are particularly valuable when dealing with multiple variables. The key advantages are summarised in Table 3.6 as follows:

	PCA	sPCA
Dimension reduction	PCA reduces the dimensionality of the data by transforming it into a set of uncorrelated variables called principal components. This reduces multicollinearity and simplifies the analysis by capturing the most important information in the data.	sPCA, like PCA, reduces dimensionality but also encourages sparsity in the resulting components. It identifies and retains only the most relevant variables, making it useful when dealing with large datasets with many irrelevant features.
Noise reduction	PCA helps in noise reduction by focusing on the dominant patterns in the data, filtering out random variations or measurement errors in individual sentiment proxies.	sPCA, with its emphasis on sparsity, automatically excludes noisy or irrelevant variables from the analysis.
Improved interpretability	PCA simplifies the interpretation of sentiment data by expressing it in terms of a smaller set of orthogonal components. Researchers can understand the underlying structure of sentiment more easily.	sPCA further enhances interpretability by selecting only the most informative variables, making it easier to identify which aspects of sentiment are most relevant
Collinearity handling	PCA addresses issues related to multicollinearity, where individual sentiment proxies may be highly correlated. It replaces the correlated variables with orthogonal principal components, reducing redundancy.	sPCA not only handles multicollinearity but also enforces sparsity, which can be advantageous when dealing with highly correlated sentiment indicators.
Robustness	Both PCA and sPCA methods are often robust against outliers and anomalies in the data, making them suitable for sentiment analysis in financial markets or other domains where extreme events can occur.	

Table 3.6 : Summary of key advantages of PCA and sPCA methods

(Note: Table summarises the comparative advantages of PCA and sPCA in the construction of the MIMSI. While both support dimension and noise reduction, sPCA introduces scaling to avoid dominant results from high-variance proxies, ensuring fairer weighting across sentiment indicators)

Whilst, PLS is a regression-based technique that not only reduces dimensionality but also maximises the covariance between the sentiment index and the outcome variable of interest. This can lead to improved predictive performance compared to using individual proxies.

The construction of MIMSI using PCA, sPCA, and PLS helps mitigate multicollinearity by transforming highly correlated sentiment proxies into a smaller set of uncorrelated components. PCA and sPCA achieve this by extracting principal components that capture the maximum variance in the data while maintaining orthogonality, thereby reducing redundancy among the original variables. Similarly, PLS not only addresses multicollinearity but also maximises the covariance between sentiment factors and IPO-related outcomes, making it particularly effective for predictive modelling. These methods enhance the robustness of regression analysis by minimising the distortions caused by multicollinearity among sentiment indicators.

Overall, an aggregate sentiment index provides a holistic representation of sentiment, capturing the collective sentiment across multiple sources or dimensions. This can provide a more comprehensive view of sentiment as opposed to individual proxies, which may only capture specific aspects. In conclusion, using aggregate index such as PCA, sPCA, and PLS methods for sentiment analysis offers benefits such as dimension reduction, noise reduction, improved interpretability, collinearity handling, predictive power, and robustness.

3.3.2 Variables for construction of Malaysian IPO market sentiment index

Previous studies have identified and examined several variables to measure market sentiment by constructing a sentiment index. These variables are selected and tested to capture the essence of investor sentiment. The following section discusses the empirical evidence on market sentiment proxies.

(a) Empirical evidence on investor sentiment proxies

Since there is no definitive indicator available, previous studies have employed various proxies to measure investor sentiment. This is primarily because investor sentiment is not directly observable in a tangible manner. The existing literature has established several different measures to represent this unobservable sentiment index, which can be broadly categorised as follows: Firstly, direct surveys are conducted with individual and institutional investors to gauge their anticipated movements in the stock market and the overall economy (Fisher and Statman, 2000; Brown and Cliff, 2004; Schmeling, 2009). Secondly, market-related implicit sentiment proxies are utilised (Baker and Wurgler, 2006 and 2007; Wang et al., 2006; Brown and Cliff, 2004; Li et al., 2014). These proxies capture sentiment indirectly through market-related variables and indicators. As explained in Table 3.5, the direct survey-based sentiment measure has several limitations, many recent researchers used the market-based sentiment measure as the indicators of market sentiment.

Different studies employ varied proxies based on the nature of their analysis. For instance, in the 1990s, the behavioural finance literature regarded closed-end fund discounts as a suitable variable to represent the investment sentiment indicator (Lee et al., 1991; Neal and Simon, 1998). However, contemporary studies have modified this approach and constructed conglomerate sentiment indices by combining multiple market-related sentiment proxies. This evolution in methodology allows for a more comprehensive assessment of investor sentiment in recent research. This research covers both the direct survey proxies and market-related implicit proxies. Table 3.7 lists down the investor sentiment proxies used by some previous studies.

The literature provides numerous examples of indirect measurements that can be considered as sentiment indices. Some commonly applied measures include the number of IPOs, average first-day returns on IPOs, share turnover (which reflects trading volume), the closed-end fund discount rate, and the dividend premium. As a result, researchers such as Baker and Wurgler (2006) and Huang et al. (2015) have combined multiple proxies to create a comprehensive sentiment index. In their studies, Huang et al. (2015), and Baker and Wurgler (2006) examine the functioning of investor sentiment and identify the factors that contribute to its construction.

Authors (Year)	Measure of sentiment
Schmeling (2009); and Wang et al. (2006)	Consumer confidence index
Ho and Hung (2009)	The Conference Board's Consumer Confidence Index, the Investors' Intelligence Survey Index, and the University of Michigan Consumer Sentiment Index
Baker and Stein (2004)	Market liquidity
Chen et al. (2020)	Turnover by volume
Da et al. (2011)	Google Search Volume Index
Brown and Cliff (2004)	Advance and declining ratio, high and low ratio, margin borrowings, short interest, short sales, odd lot sales to purchase, put-call ratio, monthly forecast of commodity market returns, expected volatility relative to current volatility, closed-end fund discounts, mutual fund flows, fund cash, first-day IPO returns and number of IPO
Brown and Cliff (2005)	Survey data of American Association of Individual Investors (AAII)
Kumar and Lee (2006)	Buy-sell imbalance ratio
Wang et al. (2006)	Put-call trading volume ratio, put-call open interest ratio, ARMS index (advance decline ratio), survey data of American Association of Individual Investors (AAII), investor intelligence index

(cont'd)

Authors (Year)	Measure of sentiment
Baker and Wurgler (2006)	Closed-end fund discounts, number of IPO, IPO first-day returns, turnover ratio, equity-debt ratios, and dividend premium
Zhang and Yang (2009)	Turnover, closed-end fund discounts, growth rate of investors account
Verma and Soydemir (2009)	Survey data of individual and institutional sentiment similar with Brown and Cliff (2004)
Chuang et al. (2010)	Trading volume
Yu and Yuan (2011)	Closed-end fund discounts, number of IPO, IPO first-day returns, turnover ratio, equity-debt ratios, and dividend premium similar with Baker and Wurgler (2006)
Dergiades (2012)	Closed-end fund discounts, number of IPO, IPO first-day returns, turnover ratio, equity-debt ratios, and dividend premium similar with Baker and Wurgler (2006)
Zhu and Niu (2016)	Price-to-earnings ratio, trading volume, turnover, closed-end fund discount, new account amounts, Cboe Volatility (VIX) index
Rehman (2013)	Closed-end fund discounts, number of IPO, IPO first-day returns, turnover ratio, equity-debt ratios, and dividend premium similar with Baker and Wurgler (2006)
Dash and Mahakud (2013)	Turnover volatility ratio, share turnover velocity, advance declining ratio, margin borrowings, buy-sell imbalance ratio, put-call ratio, number of IPO, equity issue in total issue, dividend premium, mutual fund flow, cash to total asset in mutual fund market, price-to-earnings high-low ratio difference
Li (2014)	Closed-end fund discounts, turnover, number of IPO, first-day return of IPO, number of Chinese A-shares net-added accounts, relative degree of active trading in equity market
Xie and Wang (2017)	The Search Index of Shanghai Stock Index, released by the website Baidu as online platforms
Li et al. (2014)	The foreign sentiment proxy is originally extracted from Twitter by Hedonometer Team
Qian (2014)	Sentiment indicator based on the BosonNLP sentiment analysis engine

Table 3.7 : List of investor sentiment proxies used in previous studies

(Note: Table summarises the various investor sentiment proxies used in past empirical studies, including both direct measures (i.e., survey-based indicators like consumer confidence index) and indirect measures (i.e., trading-based, market-based, and textual-analysis sentiment indicators). This table serves as a reference for the sentiment proxies reviewed and informs the selection of indicators used in the construction of the MIMSI in this study)

(b) Proxies for construction of Malaysian IPO market sentiment index

Baker and Wurgler (2006) indicates that each proxy is likely to carry idiosyncratic components unrelated to sentiment. It is then important to obtain the common component that represents investment sentiment. To this end, Principal Component Analysis (PCA) multivariate technique was used to isolate the common component in these proxies, thus obtaining a better representation of investor sentiment.

In this research, Baker and Wurgler sentiment indicators are adopted as baseline regression because it is extensively accepted in various empirical studies. This research follows the same sentiment indicators adopted by Baker and Wurgler (2006 and 2007), to formulate IPO investor sentiment index. For the purpose of predicting the MIMSI, this research use some of the relevant sentiment proxies previously adopted by Huang et al. (2015), and Baker and Wurgler (2006) in their studies namely, share turnover (TURN), number of IPOs (NIPO), first-day returns of IPOs (RIPO), dividend premium (PDND), and equity shares in new issues (ESNI). The proxy of close-end fund discount rate (CEFD) has been excluded in this research because there is only one close-end fund company listed on Main Market of Bursa Malaysia. Therefore, it could create biasness to analysis results. Besides, for the construction of Malaysian IPO investor sentiment index purposes, the following 3 additional sentiment proxies which are related to Malaysian IPO investor sentiment have been included in the construction of MIMSI: Oversubscription ratio (OVER), consumer confidence index (CCI), and business confidence index (BCI).

The predictive regression in constructing of MIMSI is as follows:

$$MIMSI_{it} = \beta_0 + \beta_1 \, TURN_{it} + \beta_2 \, NIPO_{it} + \beta_3 \, RIPO_{it} + \beta_4 \, PDND_{it} + \beta_5 \, ESNI_{it} + \beta_6 \, BCI_{it} + \beta_7 \, CCI_{it} \tag{3.1}$$

Survey-based sentiment measurements are commonly used in combination with market-based measurements (Naik and Padhi, 2016). Consumer confidence index (CCI), and business confidence index (BCI) are survey-based sentiment indicators, whilst the remaining variables namely, share turnover (TURN), number of IPOs (NIPO), first-day returns of IPOs (RIPO), dividend premium (PDND), and equity shares in new issues (ESNI), and oversubscription ratio (OVER) are market-based sentiment indicators. All these variables were extracted from Bloomberg on a quarterly basis, as the Consumer Confidence Index (CCI) and Business Confidence Index (BCI) are reported quarterly, which is the highest frequency available among all variables. These proxies are explained below:

(i) Share Turnover (TURN)

TURN is a market-based sentiment indicator. The turnover rate on the first day of IPO refers to the ratio of the trading volume to the total share capital, an indicator of liquidity strength. When the mood is optimistic, more investors will buy and sell IPO shares. Optimistic emotions will have a high turnover rate, and pessimistic investors will have extremely high trading volume. According to Baker and Stein (2004), optimistic sentiment tends to lead to high turnover, and pessimistic sentiment leads to low turnover.

(ii) Number of IPOs (NIPO)

NIPO is a market-based sentiment indicator. Baker et al. (2012a) state that firms tend to raise additional capital when the market value of the firm is high, and they repurchase their shares when the market value is low. This strategy is driven by the desire to capitalise on market sentiment until it aligns with the fundamental value of the firm. In a bullish market, the issuance of new shares transfers wealth from new shareholders to either the company or existing shareholders. This market timing hypothesis suggests that a higher (lower) number or value of IPOs indicates a bullish (bearish) market sentiment (Baker and Wurgler, 2006). Therefore, IPO activity is regarded as a critical component of the sentiment index as it reflects the pulse of the market. Baker and Wurgler (2006) suggest that NIPO which represents the increases of the underlying demand for IPO sentiment is high. However, it has a characteristic of high fluctuation and large sensitivity to investor sentiment.

(iii) First-day Returns of IPOs (RIPO)

RIPO is a market-based sentiment indicator. Uygur and Tas (2012) assert that investor enthusiasm plays a significant role in explaining IPOs. Rational firms capitalise on the prevailing market sentiment and utilise IPOs as a means to raise new equity. As a result, IPOs tend to occur in waves that correspond to periods of high or low sentiment. In addition, IPOs are often characterised by substantial underpricing, leading to significant price increases on the first-day of trading when these companies make their debut in the public market. In contrast, Uygur and Tas (2012) also state that other factors should be considered in measuring sentiment and not solely on IPOs, even though IPOs and sentiment are correlated.

(iv) Dividend Premium (PDND)

PDND is a market-based sentiment indicator. As highlighted by Baker and Wurgler (2007), the dividend premium reflects a firm's inclination to pay dividends and can serve as a proxy for a safety characteristic. It signifies firms that are larger, more profitable, but with lower growth opportunities. In other words, the dividend premium captures the tendency of such firms to prioritise stability and consistent payouts to shareholders rather than aggressively pursuing growth. An inverse relationship is expected between dividend premium and investor sentiment. In this research, due to the availability of data in Malaysia the dividend premium was calculated using the fraction of net income of an issuing firm pays to its shareholders in the form of dividends, instead of the firm's dividend premium payable into between payers and non-payers at the end of financial year as explained by Baker and Wurgler (2006).

(v) Equity Shares in New Issues (ESNI)

ESNI is a market-based sentiment indicator. The measure of total equity and debt issues by all firms, or more broadly, equity financing activity, can serve as an indicator of investor sentiment. Baker and Wurgler (2000) discover that equity markets may become overvalued as a result of investor sentiment. Consequently, during periods of high sentiment, there tends to be a greater issuance of equity compared to debt in an effort to lower the cost of capital. This strategic approach aims to mitigate the impact of high sentiment and is driven by the belief that elevated equity valuations correspond to lower expected stock market returns. In Malaysian IPO market, it is solely on equity issuance there is no combination of both equity issuance and debt issuance in an IPO. Thus, this research has used the proxy of the total share of equity issues which was calculated using the amount of shares traded on the Malaysia stock market. This value represents all traded prices, multiplied by the number of shares relating to each share price, and then the value is summed up.

(vi) Oversubscription Ratio (OVER)

OVER is a market-based sentiment indicator. Oversubscription ratios represents the ratios when demand for IPO shares exceeds the total new shares issued by an issuing firm. The oversubscription of IPOs during the offer period is regarded as a critical factor contributing to IPO underpricing, as reported by Keloharju (1993), and Koh and Walter (1989). Paudyal et al. (1998) further suggest that a higher demand multiple indicates a larger absorption capacity within the market. Consequently, if shares are offered at a price below the equilibrium level, they are likely to generate a substantial premium due to the strong market demand. Based on the above, OVER has been adopted as a sentiment proxy in this research.

(vii) Consumer Confidence Index (CCI)

CCI is a survey-based sentiment indicator. The consumer confidence index is an indicator reflecting the psychological expectations of consumers. It measures and quantifies various indicators of Malaysian's livelihood including macroeconomics. CCI serves as an indicator that gauges the strength of consumer confidence. It quantifies consumers' assessment of the current economic situation and their subjective sentiments regarding economic prospects and income levels. Moreover, CCI provides insights into predicting economic trends and consumption patterns. It is akin to the University of Michigan Consumer Sentiment Index and establishes a link between consumer spending and firm profitability. When consumer confidence declines, it leads to a decrease in consumer spending, resulting in reduced firm profits and share prices (Schmeling, 2009).

(viii) Business Confidence Index (BCI)

BCI is a survey-based sentiment indicator. This index is constructed by collecting opinions through regular surveys that inquire about the progress in production, sales, orders, and stocks of finished goods within the manufacturing sector. BCI provides valuable insights into the sentiment and outlook of businesses in the manufacturing industry. BCI serves as an information on future developments based on upon opinion surveys developed. It is an indicator of future developments in Malaysia. Sulaiman et al. (2020) investigate the impact of investor sentiment towards stock returns based on firm-level listed in Bursa Malaysia, in his study BCI was one of the sentiment proxies selected to act as behavioural factor.

3.4 Methodology for short-run share performance of IPOs

3.4.1 Measures of short-run share performance of IPOs

This research adopts IPO's initial returns as a dependent variable to investigate the short-run share performance of IPOs. On the other hand, for the long-run share performance of IPOs, this research uses the IPO's long-run returns as a dependent variable.

(a) Initial returns

Aggarwal and Conroy (2000); Barry and Jennings (1993); Bradley et al. (2001); Chorruk and Worthington (2010); and Schultz and Zaman (1994) use initial returns (IR), and market adjusted initial returns (MAIR) to measure short-run share performance of IPOs using the following equation:

$$\mathrm{IR_{it}} = \frac{P_{i1} - P_{i0}}{P_{i0}} \times 100 \tag{3.2}$$

where:

IR_{it}	=	the initial return of the $stock_i$ at $period_t$
P_{i0}	=	the IPO offer price of the $stock_i$ as stated in the IPO prospectus
P_{i1}	=	the closing price of the $stock_i$ at the end of the first day of trading

(b) Market adjusted initial returns

The formula for computing the initial returns does not account for changes in market conditions or stock exchanges, which could impact the accuracy of the results. Consequently, many researchers opt for an alternative formula that adjusts the returns based on market fluctuations. This research adopts IPO's MAIR as a dependent variable to investigate the short-run share performance of IPOs.

$$\mathrm{MAIR_{it}} = \left(\frac{P_{i1} - P_{i0}}{P_{i0}} - \frac{MI_{i1} - MI_{i0}}{MI_{i0}}\right) \times 100 \tag{3.3}$$

where:

$MAIR_{it}$	=	the initial return of $stock_i$ adjusted to the market effect of the corresponding stock exchange for $period_t$
MI_{i0}	=	the closing price of the general market index of the stock exchange where $stock_i$ is listed at offering day of the stock
MI_{i1}	=	the closing price of the general market index of the stock exchange where $stock_i$ is listed at the end of the first day of trading

3.4.2 The determinants of short-run share performance of IPOs

In the field of finance literature, researchers explore the factors influencing the short-run performance of IPO shares in order to shed light on the IPO underpricing phenomenon. These determinants are examined within the framework of theoretical models and supported by empirical evidence. Within the literature on IPOs, a significant body of research has focused on enhancing the understanding of factors that directly or indirectly impact the short-run share performance of IPOs (Perera and Kulendran, 2014; Loughran and Ritter, 2004; Johnston and Madura, 2002; Habib and Ljungqvist, 1998 and 2001; Tinic, 1988; Beatty and Ritter, 1986). In this research, the choice of dependent and independent variables are selected based on 2 conditions: (i) mostly discussed in the previous literature, and (ii) availability of the data. In addition, the independent variables used in the empirical model can be classified into behavioural, issue, firm, and market characteristics.

All the determinants are grouped as Panel A consist of behavioural characteristics; Panel B consist of behavioural, and issue characteristics; Panel C consist of behavioural, issue and firm characteristics; Panel D consist of behavioural, issue, firm, and market characteristics (overall). The summary of each variable is given with their empirical studies in relation to the relevant theory. The following subsections explain variables of short-run share performance of IPOs at the behavioural-issue-firm-market characteristics.

(i) Behavioural characteristics

(a) Market sentiment

Market sentiment refers to the prevailing attitude among investors regarding the price movement in a given market. It reflects the overall trend of the stock market prior to a stock's listing and also serves as a test for the institutional delay in share offerings (Kiymaz, 2000; Ritter, 1984). Market sentiment is measured by examining the overall stock market returns from the issuance date to the first day of trading.

The market sentiment indicates investors' expectation about the overall stock market returns which reflects the demand for the IPO stocks. If the market sentiment goes up, it indicates that the investors' expectation about the overall market is positive, which indicates that the demand for the IPO stock is high. This leads to price appreciation or IPO underpricing as a result of high demand. Similarly, a decrease in market sentiment leads to low demand for IPO shares, which adversely affects the price or level of IPO underpricing on the first day. Therefore, a positive relationship between short-run share performance of IPOs and market sentiment can be expected. A highly statistically significant positive relationship between the first-day returns and market sentiment has been reported by Ho et al. (2001), Dimovski et al. (2011), and Jewartowski and Lizinska (2012).

Market sentiment shows the aggregate attitude of investors toward the short-run direction of overall market's trend (Samarakoon, 2010). Positive sentiment of investors towards the overall market can be seen in the positive trend and is likely to upsurge the demand for IPO shares on the first trading day, which can result in high initial returns. The downward trends in the same way indicates a negative trend which would mean that the investor expects the overall market to decline in the short-run. In the IPO literature, market sentiment and investor sentiment is used interchangeably. Cornelli et al. (2006) debated that market sentiment at the time on offering can have a positive impact on the demand of retail investors (irrational investors) for shares and consequently after market pricing. Following the investor sentiment model of Cornelli et al. (2006), empirical studies have shown a direct relationship between IPO underpricing and market sentiment (Dimovski et al., 2011; Ho et al., 2001; Jiang and Li, 2013; Ljungqvist et al., 2006; Samarakoon, 2010). However, few empirical studies have documented an inverse relationship between IPO underpricing and market sentiment (Kutsuna et al., 2008; Gong and Shekhar, 2001). Hence, the following hypothesis was theorised:

Hypothesis 1 (a) : There is a statistically significant negative relationship between IPO market sentiment and the short-run share performance of IPOs

(ii) Issue characteristics

(a) IPO period

The variable of the total listing period represents the total time taken for a listing. It can be utilised to test the winner's curse hypothesis as well as the uncertainty hypothesis in the IPO literature. A statistically significant negative relationship between short-run underpricing and the time period to listing has been found by Lee et al. (1996), How (2000), How et al. (2007), and Ekkayokkaya and Pengniti (2012). They hypothesised that longer issues are less underpriced due to a lower level of informed demand. This hypothesis confirms Rock's hypothesis. However, a significant positive relationship between time to listing and IPO underpricing has been found by Chen and Shih (2004), and Suchard and Singh (2007). It was argued that a longer gap between the issuing of IPOs and their listing may increase the risk to investors. Thus, investors would require greater gains to compensate for the risk, resulting in heavy underpricing on the listing date.

Chen et al. (2002), and Yu and Tse (2005) have elucidated the relationship between a longer time lag, IPO underpricing, and heightened ex-ante uncertainty. The duration between the announcement date of an IPO and its first trading date can significantly influence the level of ex-ante uncertainty and the initial returns. However, when considering the Thailand stock market, Komenkul and Siriwattanakul (2016) discover no statistically significant relationship between the time-lag variable and the initial returns. Therefore, when treating the time lag between the IPO offer date and the first trading date as a separate variable, a positive relationship can be anticipated with the initial returns. Hence, the following hypothesis was theorised:

Hypothesis 2 (a) : There is a statistically significant negative relationship between IPO period and the short-run share performance of IPOs

(b) Offer price

Moderate results were empirically evident in the relationship between the level of IPO underpricing and the offer price. Ibbotson et al. (1988), Guo and Brooks (2008), and Dimovski et al. (2011) evidence that firms that offer very low prices usually record a prominent level of IPO underpricing. Certo et al. (2003) suggest that higher offer prices were associated with lower uncertainty regarding the future performance of a firm. However, in contrast to these findings, Kutsuna et al. (2008) observe a positive relationship between the offer price and IPO underpricing. In addition, Jain and Kini (1999) discover that a low offer price was linked to lower short-run share performance of IPOs. On the other hand, Fernando et al. (1999) identify a U-shaped relationship between these variables, indicating that the offer price may also reflect the level of IPO underpricing, although its economic significance appears to be limited.

Similarly, the offer price of an IPO can be utilised as a proxy and a distinct variable for ex-ante uncertainty, with an expected negative relationship to the initial performance. Previous studies have indicated that the offer price can serve as a measure of the uncertainty surrounding the value, as an increase in the offer price implies reduced uncertainty, leading to a decrease in IPO underpricing. Chalk and Peavy (1987), and Krishnamurti and Kumar (2002) discover that smaller offer prices tend to experience greater underpricing. Besides, Daily et al. (2003) state that higher offer prices are linked to diminished uncertainty concerning the future performance of the firm. Hence, the following hypothesis was theorised:

Hypothesis 2 (b) : There is a statistically significant negative relationship between IPO price and the short-run share performance of IPOs

(c) Offer size

The ex-ante risk of an IPO can be assessed by considering the size of the offer. A negative relationship exists between the IPO offer price and the level of IPO underpricing, reflecting the uncertainty surrounding IPO firms (Clarkson and Merkley, 1994; Miller and Reilly, 1987). Larger IPOs are typically initiated by well-established issuing firms with strong track records and reputable brand names. Empirical evidence from various research studies has consistently demonstrated a negative association between the offer size (amount of funds raised) and the extent of IPO underpricing (Chalk and Peavy, 1990). However, Ali et al. (2010), and Suchard and Singh (2007) evidence that there is a positive relationship between initial returns and gross offer proceeds. Hence, the following hypothesis was theorised:

Hypothesis 2 (c) : There is a statistically significant negative relationship between offer size and the short-run share performance of IPOs

(d) Issue costs ratio

There are numerous direct and indirect costs associated with IPOs. The issue cost encompasses various components, such as management fees, registration and annual report fees, broker commissions, industry reports, printing fees, and auditing expenses, all of which contribute to the overall cost of going public. The direct issue cost of an IPO varies based on the size of the capital raised, with an average direct cost of 11% in the United States (Ritter, 1998). The risk factor and investor expectations play a significant role in determining the returns on the first day of listing, establishing a direct relationship between them. It is expected that there is a positive correlation between IPO underpricing and the amount of capital retained. To gauge the ex-ante uncertainty surrounding the IPO price, Dimovski and Brooks (2004) examine retained capital (after deducting issue costs) as an explanatory variable for IPO market performance. Their study revealed an inverse relationship between retained capital and IPO underpricing. Hence, the following hypothesis was theorised:

Hypothesis 2 (d) : There is a statistically significant positive relationship between issue cost ratio and the short-run share performance of IPOs

(e) Underwriter reputation

The underwriter who is usually an investment bank assists the IPO's firm to float their shares in the stock market. The underwriter has a significant role in the IPO process their expert knowledge of the market. According to Beatty and Ritter (1986), reputed underwriters are associated with lower underpricing so as to maintain their reputation. Similarly, Carter and Manaster (1990) speculate that reputed underwriters only dealt with superior quality IPOs to maintain their reputation. Empirically, Carter and Manaster (1990), and Mudambi et al. (2012) evidence a negative impact of underwriters on the short-run share performance of IPOs, thus, confirming that the more reputed the underwriter are linked to low level of IPO underpricing.

However, Ritter (1984), Hoberg (2007), Dimovski et al. (2011), and Dimovski and Brooks (2004) find that there is a direct relationship between reputed underwriters and IPO underpricing. Reputed underwriters use their expert knowledge on the market condition and intentionally to underprice IPOs to increase the gross IPO proceeds (Ritter, 1984). In contrast, Hoberg (2007) debate that reputed underwriters deliberately underpriced new offerings so as to maximise their own profit rather than gross proceeds. Hence, the following hypothesis was theorised:

Hypothesis 2 (e) : The reputation of the IPO underwriter has statistically significant impact on the relationship between underwriter reputation and the short-run share performance of IPOs

(ii) Firm characteristics

(a) Book value per share

Beatty (2000) state that what is important to the first day return as well as IPO pricing is firm specific accounting information. They identified a positive correlation between book value and earnings as well as shared insights into when and how accounting information is impounded when share price is examined. Klein (1996) conduct investigations on the influence of accounting variables and items contained in IPO prospectuses. The results show that accounting information is crucial to pricing of IPOs. In addition, Pukthuanthong-Le and Varaiya (2007) evidence that IPOs that have a robust financial health indicates high offer value which means, high positives in the following parameters book values, earnings, sales, cash flow, profit margin and sales. Hence, the following hypothesis was theorised:

Hypothesis 3 (a) : There is a statistically significant positive relationship between book value per share and the short-run share performance of IPOs

(b) Firm age

Age serves as a representation of a firm's operating history prior to an IPO. According to Ritter (1991), age is considered a superior proxy for ex-ante uncertainty compared to issue size. Mature firms, due to the availability of more public information, are expected to exhibit lower levels of ex-ante uncertainty compared to younger firms (Chen et al., 2004; Kirkulak and Davis, 2005; Loughran et al., 1994). Thus, in line with Ritter's findings, a negative correlation between age and initial returns is anticipated.

On the other hand, there are few studies that documented a positive relationship between age of the firm and underpricing (Esfahanipour et al., 2015; How et al., 2007; Suchard and Singh, 2007; Tian , 2011). They have identified a direct relationship between underpricing and the age of a firm, which shows that older firms deliberately underprice their offerings in order to highlight it as superior quality (How et al., 2007). Similarly, Tian (2011) debates that older firms distinguish themselves from newer firms by the manner in which they underpriced their offerings in order to attract more investors, thus, displaying a direct relationship to IPO underpricing.

Sohail and Nasir (2007) evidence the important determinants for IPO underpricing in Pakistan was information asymmetry in the presence of ex-ante uncertainty. Whereby, the ex-ante uncertainty hypothesis of underpricing suggested that older firms are less underpriced than younger firms' due to less ex-ante uncertainty. This suggest that in Pakistan ex-ante uncertainty and information asymmetry exits when the age of the firms lower the underpricing. Therefore, this study expects a negative relationship between 'age' of the firm and IPO's short-run performance. Hence, the following hypothesis was theorised:

Hypothesis 3 (b) : There is a statistically significant negative relationship between firm age and the short-run share performance of IPOs

(iii) Market characteristics

(a) Market volatility

Market volatility refers to the extent of uncertainty or risk about variations in the market returns. The high ex-ante market volatility exhibits large uncertainty in the market returns and leads to the greater IPO underpricing. Beatty and Ritter (1986) argue that high ex-ante uncertainty surrounding IPO firms lead to higher information asymmetry and consequently IPO firms are more underpriced. Consistent with the argument of Beatty and Ritter (1986), Jog and Wang (2002) demonstrate that the level of aftermarket underpricing depends on the intensity of market volatility. In other words, higher market volatility exhibits higher IPO underpricing. Similarly, Paudyal et al. (1998) find that underwriters tend to set the offer price below its intrinsic value as a way of compensating informed investors which may result in higher ex-post underpricing in a highly volatile market. A large number of empirical studies documented the significant positive relationship between the market volatility and IPO underpricing (Boulton et al., 2010; Cassia et al., 2004; Ekkayokkaya and Pengniti, 2012; Jog and Wang, 2002; Malhotra and Nair, 2015; Paudyal et al., 1998; Xia et al., 2013). However, Omran (2005), Ekkayokkaya and Pengniti (2012), and Belghitar and Dixon (2012) evidence that there is a negative relationship between IPO underpricing and market volatility. Hence, the following hypothesis was theorised:

Hypothesis 4 (a) : There is a statistically significant positive relationship between market volatility and the short-run share performance of IPOs

(b) Oversubscription ratio

Theoretically, the extent of IPO underpricing is contingent upon the level of demand for the IPO. The oversubscription ratios can be used to measure the demand for an IPO. Rock (1986), and Michaely and Shaw (1994) debate that information heterogeneity among investors was the reason for the level of IPO underpricing. They further mention that the degree of heterogeneity grew as the demand for the firm's shares increased. Several researchers have empirically utilised the oversubscription ratio as an independent variable to elucidate the first-day returns in IPO performance. Notably, Agarwal and Rhee (2008), Boudriga et al., (2009), Kandel et al. (1999), and Chowdhry and Sherman (1996) identify a positive correlation between short-run market performance and the subscription ratio. Based on the theory of Rock (1986), Cornelli and Goldreich (2003) put forth another explanation of oversubscription (high demand) of shares and related it to pre-market retail investor's exuberance. They further explained that IPO's oversubscription shows the demand of exuberant investor in the pre-market, and exhibit IPO underpricing. Empirically, McGuinness (2009), and Agarwal et al. (2008) find that retail investor sentiments are determined by the average oversubscription rate which positively correlated to the first day IPO underpricing. Hence, the following hypothesis was theorised:

Hypothesis 4 (b) : There is a statistically significant positive relationship between oversubscription ratio and the short-run share performance of IPOs

(c) Hot issue market

Market condition refers to the periodic cycles of hot and cold issue market phenomena. Ibbotson and Jaffe (1975); Ritter (1984); and Lowry and Schwert (2002) document that IPOs appears in periodic cycles in term of volume and initial returns (IPO underpricing). The phenomenon of recurring patterns, characterised by high volume and high initial return, is commonly referred to as a 'hot issue' market, while periods of low volume and low initial return are known as a 'cold issue' market. In a 'hot issue' market, IPOs tend to be associated with significant initial returns in the short-run but exhibit lower returns in the long-run (Ibbotson and Jaffe, 1975). It has been argued by Ritter (1984) that the hot issue market is typically characterised by a large number of IPOs, oversubscription, and substantial underpricing. In the same way, Lowry and Schwert (2002) evidence that IPO underpricing and the number of IPOs are highly auto-correlated. They also debated that during periods of high initial returns more firms tend to go public.

Similarly, Loughran and Ritter (2004) find that periods of high IPO volume are positively correlated to IPO underpricing. Lowry et al. (2010) speculate the ‘hot issue’ market the higher initial returns for IPO’s were caused by increased level of information asymmetry. There is extensive literature available documenting the direct relationship between IPO underpricing and hot issue market in developed and emerging markets (Agathee et al., 2012; Alli et al., 2010; Ibbotson and Jaffe, 1975; Lowry et al., 2010; Lowry and Schwert, 2002; Ritter, 1984; Samarakoon, 2010; Thorsell and Isaksson, 2012). Samarakoon (2010) survey the emerging markets in Sri Lanka and found the ‘hot issue’ phenomena to be related to IPO underpricing. The similar findings documented by Agathee et al. (2012) for the emerging market of Mauritius and Alli et al. (2010) for the emerging market of South Africa.

During ‘hot issue’ market, companies often adjust their IPOs to take advantage of windows of opportunity. Cho and Lee (2013), Loughran (1994), and Lowry and Schwert (2002) discover a strong positive relationship between IPO volume and average initial returns. Gounopoulos et al. (2007) and Loughran (1994) note that high initial returns in IPOs are generated due to increased new IPOs and overall market risk during ‘hot issue’ market. Alanazi and Al-Zoubi (2015), and Colak (2012) suggest that instead of selecting ‘cold issue’ market to issue IPOs, firms may benefit from higher initial returns by issuing IPOs during ‘hot issue’ market. Hence, the following hypothesis was theorised:

Hypothesis 4 (c) : The market condition of the IPO has statistically significant impact on the relationship between hot issue market and the short-run share performance of IPOs

(d) Board listing

According to Uddin and Raj (2001), firms listed in the secondary market exhibit higher initial underpricing compared to IPOs listed in the main market. This study introduces a dummy variable that takes the value ‘1’ if the IPO is listed on the Main Market and ‘0’ if it is listed on the ACE market. In the Malaysian IPO market, the listing board is currently divided into the ACE Market or the Main Market categories. It has been observed by Yong (2015) that IPO firms listed on the ACE Market are considered riskier than those listed on the Main Market due to their perceived speculative nature. As a result, ACE Market firms find themselves facing higher levels of uncertainty. In addition, ACE Market firms are characterised by Yong (2015) as being small in size, having insufficient financial tracked records, and experiencing difficulties in securing conventional sources of financing. These characteristics contribute to the challenge of assessing the value of IPOs listed on the ACE Market, ultimately leading to greater valuation uncertainty when compared to IPO firms listed on the Main Market. Therefore, it is proposed by this research that the listing board, which represents the size of the IPO firm, serves as a factor that can explain the heterogeneity of opinion regarding the value of the issuing firm.

Further, it has been argued by Vega (2006) that smaller firms exhibit a larger price drift compared to larger firms due to their high speculative nature, whereas larger firms are considered more transparent. Lastly, according to Yong (2015), IPOs listed on the ACE market are characterised by a low offer price, which attracts a greater number of potential buyers. As a result, this situation leads to a higher dispersion of beliefs arising from a wider spectrum of investors with heterogeneous beliefs regarding the true value of the IPO.

Hypothesis 4 (d) : The classification of board listing has statistically significant impact on the relationship between board listing and the short-run share performance of IPOs

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Table 3.8 summarised the selected dependent and independent variables for short-run share performance of IPOs and their empirical evidence which were identified in previous studies, the expected sign and theory applied for each variables.

Factors	Variables	Variables measurements	Authors (Year)	Expected sign	Theory	Data
Dependent variable	Market adjusted initial return (MAIR) : First-day initial returns	$MAIR_{it} = \left(\frac{P_{i1} - P_{i0}}{P_{i0}} - \frac{MI_{i1} - MI_{i0}}{MI_{i0}} \right) \times 100$ P_{i0} = the IPO offer price of the $stock_i$ as stated in the IPO prospectus P_{i1} = the closing price of the $stock_i$ at the end of the first day of trading MI_{i0} = the closing price of the general market index of the stock exchange where $stock_i$ is listed at offering day of the stock MI_{i1} = the closing price of the general market index of the stock exchange where $stock_i$ is listed at the end of the first day of trading	Aggarwal and Conroy (2000); Barry and Jennings (1993); Bradley et al. (2001); Chang et al. (2008); Chorruk and Worthington (2010)	-	-	Cross-sectional: Listing date
Independent variables	(i) Behavioural Characteristics					
	Malaysian IPO Market Sentiment Index (MIMSI)	Malaysian IPO market sentiment index was constructed using PCA, sPCA, and PLS methods by applying sentiment proxies (as detailed in Section 4.2.2 of Chapter 4)	Boulton et al. (2011); Ritter and Welch (2002); Song et al. (2014)	+ve	Ex-ante uncertainty / Signalling hypothesis	Raw data is collected on a quarterly basis and synchronised with the respective quarters of the listing date

(cont'd)

Factors	Variables	Variables measurements	Authors (Year)	Expected sign	Theory	Data
Independent variables	(ii) Issue Characteristics					
	IPO period (IPOP)	Period from opening to closing days of the offer (in calendar days)	Lee et al. (1996); How (2000); How et al. (2007); and Ekkayokkaya and Pengniti (2012)	-ve	Winner's curse / Rock hypothesis	Cross-sectional: Listing date
	Offer price (PRICE)	Offer price of the IPO share	Guo and Brooks (2008); Dimovski et al. (2011); Certo (2003); and Kutsuna et al. (2008)	-ve	Ex-ante uncertainty / Signalling hypothesis	Cross-sectional: Listing date
	Offer size (OSIZE)	Natural log of total gross proceeds from the IPO	Alanazi and Al-Zoubi (2015); Chi and Padgett (2005); Pradhan and Shrestha (2016); and Yu and Tse (2005)	-ve	Ex-ante uncertainty hypothesis	Cross-sectional: Listing date
	Issue cost ratio (ICOR)	Natural log of total issue costs relative to the total offer proceeds. Total issue costs such as professional fees, brokers' fees, printing and other costs	Ritter (1998); and Dimovski and Brooks (2004)	+ve	Ex-ante uncertainty hypothesis	Cross-sectional: Listing date
	Underwriter reputation (UREP)	Underwriter dummy equals '1' if the lead underwriter includes one of the Tier 1 financial institutions, CIMB Bank, Maybank and RHB Bank and '0' if otherwise	Colaco et al. (2017)	+ve	Ex-ante uncertainty / Signalling hypothesis	Cross-sectional: Listing date
	(iii) Firm Characteristics					
	Book value per share (BOOK)	Total equity capital divided by the number of equity shares (Equivalent to net assets per share)	Pukthuangthong-Le and Varaiya (2007); Klein (1996); and Beatty and Ritter (1986)	+ve	Signalling hypothesis	Cross-sectional: Listing date

(cont'd)

Factors	Variables	Variables measurements	Authors (Year)	Expected sign	Theory	Data
Independent variables	(iii) Firm Characteristics (cont'd)					
	Firm age (FAGE)	Age of the firm since incorporation	Ritter (1984); Kirkulak and Davis (2005); and Loughran et al. (1994)	-ve	Ex-ante uncertainty hypothesis	Cross-sectional: Listing date
	(iv) Market Characteristics					
	Market volatility (MVL)	Standard deviation of the daily FTSE Bursa Malaysia KLCI for the first one month (30 calendar days) prior to the IPO	Omran (2005); and Paudyal et al. (1998)	+ve	Ex-ante uncertainty hypothesis	Cross-sectional: Listing date
	Oversubscription ratio (OVER)	Indicates magnitude of response of the investors for an IPO. Estimated as the ratio of application size to the issue size (in volume)	Agarwal et al. (2008); Kandel et al. (1999); and Chowdhry and Sherman (1996)	+ve	Signalling / Ex-ante uncertainty / Winner's curse hypothesis	Cross-sectional: Listing date
	Hot issue market (HOT)	Hot issue market was identified as issue year using IPO volume and first-day return, where number of IPOs and average first-day return are greater than the sample's average. Dummy variable, which denotes '1' for hot issue market and '0' for otherwise	Guo et al. (2010); Lowry et al. (2010); Samarakoon (2010); and Alli et al. (2010)	+ve	Ex-ante uncertainty / Window of opportunity hypothesis	Cross-sectional: Listing date
	Board listing (BLIST)	Board listing is to determine Main Market (established listing company) and ACE Market (young and growing company). Dummy variable, which denotes '1' for Main Market and '0' for ACE Market	Chen et al. (2004); Abdul-Rahim and Yong (2010); and Gounopoulos (2007)	-ve	Signalling / Ex-ante uncertainty hypothesis	Cross-sectional: Listing date

Table 3.8 : Summary of variables for short-run share performance of IPOs

(Note: Table summarises key variables, measurements, theories, and data sources from empirical studies on IPO short-run share performance)

The data set included variables obtained from different data frequencies, including quarterly data, firm-specific data anchored to the listing date. To ensure consistency and comparability between variables, all data points were harmonised in a uniform framework, with the listing date (T) serving as a temporal reference point. This harmonised data set, which is structured as a cross-sectional series and includes 571 IPO firms, integrates firm-level characteristics and prevailing market conditions at the time of IPO.

The quarterly data were matched to the listing date by generating temporal markers, including the ‘listing quarter,’ which serves as an anchor for synchronising the quarterly variables. For example, the quarterly reported market sentiment (MIMSI) was matched to the listing quarter of each IPO. This adjustment ensures that the sentiment values accurately capture market behaviour during the quarter in which the IPO occurred. Quarters with no IPO activity were systematically excluded as they were considered irrelevant to the analysis. This step was taken to maintain the consistency and reliability of the data set.

Firm-specific data, inherently linked to the listing date was included directly into the data set, using the listing date as the primary key. This ensured that this firm-specific data was accurately linked to the time lag of the IPOs. IPOs with incomplete or missing data were excluded from the analysis to ensure the robustness of the findings.

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3.4.3 Hypothesis development for short-run share performance of IPOs

The short-run share performance of IPOs hypothesis are set out in Table 3.9:

Behavioural Characteristics		
IPO market sentiment	Hypothesis 1 (i)	There is a statistically significant negative relationship between IPO market sentiment and the short-run share performance of IPOs
Issuing Characteristics		
IPO period	Hypothesis 2 (i)	There is a statistically significant negative relationship between IPO period and the short-run share performance of IPOs
IPO price	Hypothesis 2 (ii)	There is a statistically significant negative relationship between IPO price and the short-run share performance of IPOs
Offer size	Hypothesis 2 (iii)	There is a statistically significant negative relationship between offer size and the short-run share performance of IPOs
Issue costs ratio	Hypothesis 2 (iv)	There is a statistically significant positive relationship between issue cost ratio and the short-run share performance of IPOs
Underwriter reputation	Hypothesis 2 (v)	The reputation of the IPO underwriter has statistically significant impact on the relationship between underwriter reputation and the short-run share performance of IPOs
Firm Characteristics		
Book value per share	Hypothesis 3 (i)	There is a statistically significant positive relationship between book value per share and the short-run share performance of IPOs
Firm age	Hypothesis 3 (ii)	There is a statistically significant negative relationship between firm age and the short-run share performance of IPOs
Market Characteristics		
Market volatility	Hypothesis 4 (i)	There is a statistically significant positive relationship between market volatility and the short-run share performance of IPOs
Oversubscription ratio	Hypothesis 4 (ii)	There is a statistically significant positive relationship between oversubscription ratio and the short-run share performance of IPOs
Hot issue market	Hypothesis 4 (iii)	The market condition of the IPO has statistically significant impact on the relationship between hot issue market and the short-run share performance of IPOs
Board listing	Hypothesis 4 (iv)	The classification of board listing has statistically significant impact on the relationship between board listing and the short-run share performance of IPOs

Table 3.9 : Summary of hypotheses for short-run share performance of IPOs

(Note: Table outlines the hypotheses relating to the short-run share performance of IPOs. The hypotheses are grouped under 4 categories: (i) behavioural characteristics, (ii) issuing characteristics, (iii) firm characteristics, and (iv) market characteristics. Each hypothesis posits the expected direction and relationship between the respective factor and short-run share performance of IPOs, measured using MAIR. These hypotheses are tested using multiple regression analysis to determine the influence of both sentiment and fundamental factors on initial returns)

3.4.4 Ordinary least square regression model for short-run share performance of IPOs

The below equation provides the association between the firm level determinants and IPO's short-run share performance based on OLS regression model.

$$\begin{aligned} MAIR_i = {} & \beta_0 + \beta_1\, MIMSI_i + \beta_2\, IPOP_i + \beta_3\, PRICE_i + \beta_4\, OSIZE_i + \beta_5\, ICOR_i \\ & + \beta_6\, BOOK_i + \beta_7\, FAGE_i + \beta_8\, MVL_i + \beta_9\, OVER_i + \beta_{10}\, D_{UREPi} \\ & + \beta_{11}\, D_{HOTi} + \beta_{12}\, D_{BLISTi} + \varepsilon_i \end{aligned} \tag{3.4}$$

where, $MAIR_i$ is the market adjusted first-day initial returns of $firm_i$. $MIMSI_i$ is the Malaysian IPO market sentiment index was constructed using 3 different methods including PCA, sPCA, and PLS methods. $IPOP_i$ is calculated as the period from opening to closing days of the offer (in calendar days). $PRICE_i$ is calculated as the offer price of the IPO share. $OSIZE_i$ is the natural log offer size calculated as total gross proceeds from the IPO. $ICOR_i$ is calculated as the total issue costs relative to the total offer proceeds such as professional fees, brokers' fees, printing and other costs. $BOOK_i$ is calculated as the total equity capital divided by the number of equity shares (equivalent to net assets per share). $FAGE_i$ is calculated as the age of the firm since incorporation. MVL_i is calculated as the standard deviation of the daily FTSE Bursa Malaysia KLCI for the first one month (30 calendar days) prior to the IPO. $OVER_i$ is calculated as the magnitude of response from investors to an IPO, which is estimated as the ratio of the application size to the issue size (in volume). D_{UREPi} {underwriter dummy equals '1' if the lead underwriter includes one of the Tier 1 financial institutions, CIMB Bank, Maybank and RHB Bank and '0' if otherwise}. D_{HOTi} {hot issue market was identified as issue year using IPO volume and first-day return, where number of IPOs and average first-day return are greater than the sample's average. Dummy variable, which denotes '1' for hot issue market and '0' for otherwise}. D_{BLISTi} {board listing is to determine Main Market (established listing company) and ACE Market (young and growing company). Dummy variable, which denotes '1' for Main Market and '0' for ACE Market}. β_0 is the intercept of the equation. ε_i is the error term of the equation.

3.5 Methodology for long-run share performance of IPOs

3.5.1 Measures of long-run share performance of IPOs

The aftermarket underperformance of IPOs is a debatable issue across the globe due to the conflicting results and controversial findings by past researchers. Most of the theoretical explanations for long-run share performance of IPOs provided by different authors are weakly supported from empirical evidence. Some reported overperformance or underperformance but, others have argued that long-run underperformance do not exist when different methodologies are adopted (Abukari and Vijay, 2011; Ahmad-Zaluki et al., 2007; Gompers and Lerner, 2003; Kooli and Suret, 2004). Some researchers document that there is no abnormal aftermarket share performance for IPOs or the underperformance is marginal. Therefore, they discovered that the market efficiency do not hold true in the long-run (Gompers and Lerner, 2003; Ibbotson, 1975; Jenkinson and Ljungqvist, 2003). The results concerning the long-run share performance of Malaysian IPOs from existing studies are inconclusive.

There are 2 main approaches to compute the IPO's long-run performance; (i) event-time approach, and (ii) calendar-time approach. The event-time approach is the most common method to compute the long-run share performance of IPOs because it measures the post-listing share price behaviour surrounding specific events (Kothari and Warner, 1997).

According to Barber and Lyon (1997), the event-time approach mainly 'buy-and-hold abnormal returns' are more representative of investor experience than the calendar time approach. Therefore, this research adopts event time approach to measure the long-run share performance of IPOs. The event time approach is consisting of 3 methods:

(i) Cumulative Average Abnormal Returns (CAAR);
(ii) Buy-and-Hold Abnormal Returns (BHAR); and
(iii) Wealth Relatives (WR).

The following are the explanation of different methods (CAAR, BHAR, and WR) used to compute the long-run share performance of IPOs based on the event-time approach.

(a) Cumulative average abnormal returns

Ritter (1991) states the CAAR are computed for 2 periods: (i) the initial return period, and (ii) the aftermarket returns period. The initial returns period is denoted by ‘month 0’ and refer to the first-day returns after the listing. However, the aftermarket returns period is denoted by ‘month 1 to 48’ and defined as the 4 years’ period returns of IPO after the listing date excluding of the initial returns period. Based on Ritter (1991), and Allen and Land (1999), the aftermarket period returns are computed as follow:

$$R_{it} = \frac{P_{i1}}{P_{i0}} - 1 \tag{3.5}$$

where R_{it} is the aftermarket returns of IPO firm ‘i’ in the event month ‘t’, consist of ‘month 1 to 48’. P_{i1} is the closing price of IPO share on the last day of event month ‘t’ and P_{i0} is the closing price of IPO share on the first day of event month ‘t’. Similarly, the benchmark adjusted return is calculated as follow:

$$AR_{it} = R_{it} - R_{mt} \tag{3.6}$$

where AR_{it} is the market benchmark adjusted returns of firm ‘j’ in the event month ‘t’, while R_{it} is the IPO firm ‘i’ raw return in the event month ‘t’. R_{mt} is the market return calculated from the opening and closing value of market index, i.e. FTSE Bursa Malaysia Emas Index, for each firm in the event month ‘t’. Similarly, the average market benchmark adjusted returns for the portfolio of IPO firms are calculated as follow:

$$AAR_t = \frac{1}{n}\sum_{t=1}^{n} AR_{it} \tag{3.7}$$

while AAR_t is the equally-weighted average market benchmark-adjusted return on a portfolio of n stocks for event month ‘t’. AR_{it} is the market adjusted returns of firm ‘j’ in the event month ‘t’. Similarly, the cumulative benchmark-adjusted return for the event ‘month 1 to 48’ are computed from the summation of average market adjusted returns (AAR_t) in the event month ‘t’. The cumulative average adjusted returns ($CAAR_{it}$) from month 1 to month t are given as:

$$CAAR_{it} = \sum_{i=1}^{t} AAR_t \tag{3.8}$$

According to Fama and Eugene (1998), the decision to use equally-weighted (EW) or value-weighted (VW) returns depends on the researcher's objectives. Lyon et al. (1999) suggest that if the researcher's focus is on investigating potential stock market mispricing, then equally weighted returns would be more appropriate. On the other hand, Brav et al. (2000) argue that when the researcher aims to calculate the average wealth change of investors following an event, a value-weighted scheme should be employed. The value-weighted market-adjusted returns (AAR_t) is given below:

$$AAR_t = \sum_{t=1}^{n} W_j * AR_{it} \tag{3.9}$$

while AAR_t is the value-weighted average market benchmark-adjusted return for event month t. AR_{it} is the market adjusted returns of firm 'i' in the event month 't'. The W_j is the value-weight, computed as the market capitalisations of firm 'i' at offer price immediately after the listing, divided by the total market capitalisation of the entire IPO sample. The value-weighted $CAAR_{1t}$ are the sum of value-weighted market-adjusted returns (AAR_t) are as follow:

$$CAAR_{1t} = \sum_{i=1}^{n} AAR_t \tag{3.10}$$

(b) Buy-and-Hold abnormal returns

The buy-and-hold strategy is an investment approach where an investor purchases stocks and holds them for an extended period. Kooli and Suret (2004) argue that buy-and-hold returns effectively capture the investor's experience. Gompers and Lerner (2003) further explain that buy-and-hold returns provide more accurate results compared to CAAR when the market experiences higher volatility. Specifically, compounding short-run returns to obtain long-run buy-and-hold returns better reflects the long-run investor experience. As such, as an alternative measure to CAAR, the BHAR, which is defined as a strategy where a stock is purchased at the first closing market price after going public and held until its time period T.

$$R_{iT} = \prod_{t=1}^{T} (1 + r_{it}) - 1 \tag{3.11}$$

where R_{iT} is the buy-and-hold returns of the IPO firm 'i' at time T, while T is the number of months for which investors hold the IPO stocks. Here, T is 48 months, as this research is examining the long-run IPO share performance up to 4 years period of time. r_{it} is the total raw return of IPO firm 'i' at the event month 't'. Similarly, the benchmark adjusted buy-and-hold returns are computed as follow:

$$BHAR_{it} = \left[\prod_{t=1}^{T} (1 + r_{it}) - 1\right] - \left[\prod_{t=1}^{T} (1 + r_{mt}) - 1\right] \tag{3.12}$$

where $BHAR_{it}$ is the buy-and-hold adjusted returns of firm 'i' at the event month 't'. r_{it} is the raw return of firm 'i' at the event month 't', however, r_{mt} is the market return at the time of event month 't'. The mean equally-weighted BHAR of all the firm at the event month 't' is computed as:

$$ABHAR_{it} = \frac{1}{n} \sum_{t=1}^{nt} BHAR_{iT} \tag{3.13}$$

$ABHAR_t$ is the equally-weighted average buy-and-hold adjusted returns on a portfolio of n stocks for event month t. $BHAR_{it}$ is the buy-and-hold adjusted returns of firm 'j' in the event month 'T'. Similarly, the value-weighted BHAR is shown below:

$$ABHAR_t = W_j \sum_{i=1}^{nt} BHAR_{iT} \tag{3.14}$$

while $ABHAR_t$ is the value-weighted average buy-and-hold adjusted returns for event month t. $BHAR_{iT}$ is the market adjusted buy-and-hold returns of firm 'j' in the event month 'T'. The W_j is the value-weight, computed as the market capitalisations of firm i at offer price immediately after the listing, divided by the total market capitalisation of the entire IPO sample.

(c) Wealth relative

Ritter (1991), Ahmad-Zaluki et al. (2007), Agathee et al. (2014), Loughran and Ritter (1995), and Brav and Gompers (1997) use WR to measure long-run performance of IPOs. In accordance with Ritter's research in 1991, WR is defined as the ratio between the end-of-period wealth obtained from holding a portfolio of issuers and the end-of-period wealth acquired from holding a portfolio of matched companies or benchmarks. The formula for calculating this ratio is as follows:

$$\text{WR} = \frac{1 + \text{Average four years total BHAR on IPOs}}{1 + \text{Average four years total BHAR on benchmark}}$$

$$WR_t = \frac{\frac{1}{n}\ \sum_{i=0}^{n} \prod_{t=1}^{T} (1 +\ R_{it})}{\frac{1}{n}\ \sum_{i=0}^{n} \prod_{t=1}^{T} (1 +\ R_{mt})} \tag{3.15}$$

where WR_t is the wealth relative ratio for the period between t = 1 and t = T. R_{it} is the market return of firm i in month t, R_{mt} is the return on the stock index and n is the number of IPOs. If the WR is greater (smaller) than 1, it signifies that the IPO firm's performance surpasses (falls behind) the performance of the benchmark.

In assessing long-run share performance of IPOs, researchers often employ measures such as raw (absolute) performance or performance relative to a benchmark, known as abnormal returns (Ritter and Welch, 2002). However, relying solely on raw returns may not be the most suitable approach for evaluating whether an IPO's performance aligns appropriately with the associated risks and returns (Bessler and Thies, 2007). To thoroughly analyse the long-run IPO share performance following their listing, adjustments were made to raw returns using various benchmarks, and event-study methodology was also utilised. Monthly abnormal returns were calculated for a period of up to 48 months post-IPO.

A WR exceeding 1 can be interpreted as an indication that IPOs have outperformed a portfolio of comparable companies or market benchmarks. Conversely, a WR below 1 indicates that IPOs have underperformed compared to their matched companies or benchmarks. Table 3.10 summarises the formulation of the dependent variable (BHAR) for long-run share performance of IPOs.

Dependent variables	Definition	Empirical evidence
CAAR	It is computed: (i) the initial return period, and (ii) the aftermarket returns	Ritter (1991); Ahmad-Zaluki et al. (2007); Chen et al. (2000); and Gompers and Lerner (2003)
BHAR	It is an investment strategy in which an investor buy stocks and hold it for a long time	Kooli and Surent (2004); Chen et al. (2000); Agathee et al. (2014); and Gompers and Lerner (2003)
WR	It is the ratio of the end-of-period wealth from holding a portfolio of issuing firms to the end-of-period	Kooli and Suret (2004); Chen et al. (2000); Agathee et al. (2014); and Gompers and Lerner (2003)

Table 3.10 : Formulation of dependent variables for long-run share performance of IPOs

(Note: Table defines the dependent variables used to measure the long-run share performance of IPOs including CAAR, BHAR, and WR along with their empirical references)

3.5.2 The determinants of long-run share performance of IPOs

In this research, the choice of the dependent and independent variables was based on previous research. Besides, the independent variables used in the empirical model other classifications include behavioural, issue, firm, and market characteristics. Table 3.8 summarises the selected dependent and independent variables for long-run IPO share performance and their empirical evidence which were identified in previous studies.

(i) Behavioural characteristics

(a) Market sentiment

In general, during periods of high market sentiment, investors driven by exuberance tend to overvalue IPO shares based on their assumptions about the growth prospects of the issuing firm. This overvaluation leads to high initial returns in the short-run but lower returns in the long-run. Cornelli et al. (2006), and Ljungqvist et al. (2006) argue that investor sentiment during the offering period is positively associated with IPO prices (underpricing) in the early aftermarket and negatively associated with IPO prices (underperformance) in the long-run. Similarly, Aggarwal and Rivoli (1990) suggest that IPO returns diminish over time due to the presence of exuberant investors. Initially, these investors tend to overreact and purchase IPOs at prices higher than their market value, resulting in subsequent underperformance in the long-run. Bancel and Mittoo (2009), Derrien and Kecskes (2007), Gajewski and Gresse (2005), and Lowry (2003) document the significant negative relationship between market sentiment and long-run returns. However, Dimovski and Brooks (2004) find there is a positive relationship between these two variables in Australia. They have argued that the positive result is contradictory to the conventional theory of investor sentiments because of the institutional differences. Hence, the following hypothesis was theorised:

Hypothesis 1 (a) : There is a statistically significant positive relationship between IPO market sentiment and the long-run share performance of IPOs

(ii) Issue characteristics

(a) Initial return

Initial returns are the positive average abnormal returns that IPOs generate over a short period of time following their issuance. Shiller (1990a) argue that IPO firms with high initial returns tend to yield low returns in the long-run. He further explained that underwriters sometimes deliberately underprice their offerings to attract more investors' attention, resulting in higher initial returns in the short-run. However, as more information becomes available to the market over time, firms with high initial returns tend to underperform in the long-run. Similarly, Carter and Manaster (1990) suggest that underwriters intentionally underprice the issue to signal quality to investors during the offering, but these stocks subsequently underperform in the long-run.

Shiller (1990a), and Carter and Manaster (1990) argue that firms with high initial returns in IPOs tend to underperform in the long-run. Extensive literature supports the inverse relationship between initial returns in the short-run and long-run share performance of IPO shares (Chi et al., 2010; Kutsuna et al., 2009; Cai et al., 2008; Ahmad-Zaluki et al., 2007;

Johnston and Madura, 2002; Ritter, 1991; Aggarwal and Rivoli, 1990). This body of research provides evidence for the notion that firms experiencing significant initial returns tend to exhibit lower performance over an extended period. However, there are empirical studies that have reported a direct positive relationship between long-run performance and initial returns (Belghitar and Dixon, 2012; Alvarez and Gonzalez, 2005; Lee et al., 1996a). These studies explain that underpricing serves as a signal of high-quality firms, enabling them to issue shares in subsequent offerings at a market value price. This perspective challenges the notion that firms with high initial returns necessarily underperform in the long-run and highlights the potential benefits of IPO underpricing as a strategy for signaling firm quality.

Agathee et al. (2014) argue that emerging markets are less efficient where underwriters play a significant role to create excess demand for shares at the time of offerings which subsequently lead them to underperform in the long-run. Omran (2005), Su (2015), Mayur and Mittal (2014), and Agathee et al. (2014) document a significant negative relationship between IPO underpricing and underperformance in the emerging markets of Egypt, China, India, and Mauritius, respectively. Hence, the following hypothesis was theorised:

Hypothesis 2 (a) : There is a statistically significant negative relationship between initial return and the long-run share performance of IPOs

(b) Offer size

Total issue capital is commonly used as a measure of the issue size of firms. However, empirical studies investigating the relationship between long-run share performance and issue size have produced conflicting results. Some studies, such as Keloharju (1993), How (2000), Goergen and Renneboog (2007), Bird and Yeung (2010), Belghitar and Dixon (2012), and Minardi et al. (2013), find that there is a positive relationship between issue size and long-run share performance of IPOs. These findings suggest that higher issue sizes outperform lower issue sizes in the long-run. On the other hand, studies by Lee et al. (1996b), Cai et al. (2008), Chorruk and Worthington (2010), Chi et al. (2010), Liu et al. (2013), and Thomadakis et al. (2012), report that there is a negative relationship with long-run share performance of IPOs. These studies indicate that higher issue sizes perform poorly in the long-run as compared to lower issue sizes. Hence, the following hypothesis was theorised:

Hypothesis 2 (b) : There is a statistically significant positive relationship between offer size and the long-run IPO share performance

(c) Underwriter reputation

Carter et al. (1998) conduct empirical studies and found that IPOs managed by reputable underwriters tend to exhibit lower underperformance in the long-run compared to those managed by less prestigious underwriters. The IPOs handled by reputable underwriters experience less divergence of opinion, resulting in a relatively lower degree of long-run underperformance. Similarly, Dong et al. (2011), Chan et al. (2004), Brav and Gompers (1997), Booth and Richard (1986), and Chemmanur and Fulghieri (1994) examine the impact of underwriters on IPO's long-run share performance and observed a significant positive relationship. However, certain empirical studies have documented a negative relationship between underwriter reputation and long-run performance (Su and Bangassa, 2011; Thomadakis et al., 2012; Wang et al., 2003). Wang et al. (2003) discover instances where deliberately underpriced offerings by underwriters led to long-run underperformance. Hence, the following hypothesis was theorised:

Hypothesis 2 (c) : The reputation of the IPO underwriter has statistically significant positive impact on the relationship between underwriter reputation and the long-run share performance of IPOs

(iii) Firm characteristics

(a) Firm age

The older the firm the more of its operating history is available prior to its going public, this can be used to measure the ex-ante risk of the offer. Newly formed firms exhibit higher ex-ante uncertainty than older firms. Ritter (1984), and Hensler et al. (1997) realise that the older the firms the more information was available leading to a reduction of IPO information asymmetry. The age of a firm is determined by calculating the difference between the IPO year and the founding year. Similar to firm size, this variable is linked to the uncertainty hypothesis and is anticipated to have a positive relationship with IPO performance. Accordingly, an older company is generally associated with reduced uncertainty. Ritter (1991) discovers evidence indicating that young IPO firms exhibited poor long-term performance compared to more established firms. He interpreted this finding as supporting the overoptimism and fads hypothesis. However, Schultz (2003) finds contradictory relationships in his study, showing evidence of newer firms experiencing significant abnormal returns. A negative relationship between firm maturity and IPO's long-run share performance could be explained by the greater growth potential of newer firms, particularly considering their easier access to capital following the IPO. Hence, the following hypothesis was theorised:

Hypothesis 3 (a) : There is a statistically significant positive relationship between firm age and the long-run share performance of IPOs

(b) Board size

The board size refers to the number of directors who sit on the firms board. Empirical evidence on a board's size and firms performance is mixed. However, Pfeffer and Salancik (1978) debate that firms who have a bigger board will be able to bring in more views and external connections, thus allowing them to exploit more opportunities and also strengthen the power of the board when compared to the CEO (Peng and Luo, 2000). Thus, firms with larger boards are expected to have lesser IPO underpricing and better IPO's long-run share performance (Certo et al., 2001). Hence, the following hypothesis was theorised:

Hypothesis 3 (b): There is a statistically significant positive relationship between board size and the long-run share performance of IPOs

(c) Major shareholder ownership

Major shareholder ownership refers to the percentage of ownership held by the largest shareholder. It has been observed by Holderness (2003) that a large controlling stockholder gives rise to both private and shared benefits of control. Shared benefits stem from the larger incentives and enhanced monitoring possibilities afforded to the large shareholders in comparison to smaller owners. In other words, the presence of a large shareholder can effectively mitigate free-rider problems (Holderness, 2003). While shared benefits indicate a positive relationship between large stockholder ownership and long-run IPO performance, the opposite effect is seen with private benefits. Private benefits are characterised by the increased potential for a large owner to exploit their voting power for personal gain, resulting in the consumption of corporate resources and the enjoyment of private benefits. The value of the firm can be diminished by such self-dealing and opportunistic behaviours, as shared benefits and private benefits of large owners exert contrasting effects. The overall impact of the variable will depend on which one dominates.

In the context of an IPO, it can be argued that large shareholders are more inclined to involve previous, potentially smaller shareholders in the decision-making process, given their presumed extensive knowledge about the company. This suggests that the shared benefits derived from such inclusion are likely to outweigh the private benefits enjoyed by the large stockholder. Consequently, we anticipate a positive relationship between this variable and long-run share performance of IPOs. Hence, the following hypothesis was theorised:

Hypothesis 3 (c) : There is a statistically significant positive relationship between major shareholder ownership and the long-run share performance of IPOs

(iv) Market characteristics

(a) Market volatility

Volatility in finance, in terms of price and returns, is commonly employed as a measure of risk and uncertainty, as well as a proxy for the divergence of opinion among market participants. The greater the divergence of opinion, the more susceptible the market becomes to random buying and selling, which is reflected in a steeper slope of the demand curve. Consequently, price and return volatility can serve as indicators of the level of divergence of opinion. It is important to note that volatility cannot be measured prior to a company's public listing, but it can be utilised as a measure afterward.

The market volatility variable is calculated as FTSE Bursa Malaysia KLCI standard deviation over 30 calendar days after the listing, which is in line with previous literature such as Paudyal et al. (1998), Omran (2005), and Menyah et al. (1995). Paudyal et al. (1998) argue that the positive relation between market volatility and the long-term performance of IPOs, can be seen by taking offer strategies imposed by underwriters into consideration. More specifically, they argue that one of the critical elements prior to an IPO is market conditions. Hence, if the market is a very volatile advisors are likely to suggest a lower offer price, which implies that the offer value of the share should be lower than its true value. This theory should be seen in relation to IPO underpricing and the signalling hypothesis. The reason for underwriters lowering the price is to secure a positive first-day return, ensuring positive signals to the investors, thus creating positive long-term performance.

Hence, the following hypothesis was theorised:

Hypothesis 4 (a) : There is a statistically significant positive relationship between market volatility and the long-run share performance of IPOs

(b) Oversubscription ratio

Cornelli and Goldreich (2003) argue that the presence of high pre-market investor demand indicates the presence of irrational investors. When the high underpricing is caused by high irrational investors it will lead to IPO's underperforming in the long-run. That is why highly demanded i.e. oversubscribed IPO's are associated with lower returns in the long-run. Likewise, according to Ljungqvist et al. (2006), IPOs with higher levels of investor demand are associated with increased ex-ante uncertainty and a greater divergence of opinion between rational and irrational investors. As a result, these IPOs tend to underperform in the long-run. Chowdhry and Sherman (1996), Cornelli and Goldreich (2003), Ljungqvist et al. (2006), McGuinness (2009), and Agarwal (2008) reported an inverse relationship between long-run performance and oversubscription ratio of IPO. However, Boreiko and Lombardo (2011), and Wadhwa et al. (2014) document a positive relationship between these two variables. In Pakistan, Kafayat and Farooqi (2014) find there is a positive relationship between oversubscription rate and short-run returns. This indicates that highly demanded IPOs in Pakistan tend to be underpriced in the short-run. However, according to the divergence of opinion hypothesis, these oversubscribed IPOs are expected to underperform in the long-run. Hence, the following hypothesis was theorised:

Hypothesis 4 (b) : There is a statistically significant positive relationship between oversubscription ratio and the long-run share performance of IPOs

(c) Hot issue market

The windows of opportunity hypothesis suggests that IPOs issued during high-volume periods experience initial high valuations and generate significant short-run returns, followed by lower long-run returns. Ritter (1984, 1991), and Loughran and Ritter (1995) propose that managers are more inclined to issue shares during periods of high volume and high initial returns, known as the 'hot issue' market taking advantage of investor's optimism. Consequently, IPOs issued in such periods tend to exhibit high initial returns but lower IPO's long-run share performance. Extensive research on IPOs in both emerging and developed markets supports the negative relationship between a 'hot issue' market and IPO's long-run share performance (Agathee et al., 2012; Bancel and Mittoo, 2009; Helwege and Liang, 2004; Jain and Kini, 1994; Loughran et al., 1994; Lowry, 2003; Lowry and Schwert, 2002; Ritter, 1991; Thomadakis et al., 2012).

Hypothesis 4 (c) : The market condition of the IPO has statistically significant negative impact on the relationship between hot issue market and the long-run share performance

(d) Board listing

In Malaysia stock market, firms listed on the Main Market are established and sizeable firm whereas, firms listed on the ACE Market are young and small firms. IPO firms listed on Main Market are less risky than younger and smaller firm listed on ACE Market as less stringer listing requirements to adhere to. In the context of IPOs, the divergence of opinion hypothesis suggests that larger firms tend to outperform smaller firms in the long-run. This is attributed to the fact that larger firms enjoy a better reputation, resulting in reduced information asymmetry. As a result, they generate superior returns over time.

Several studies have consistently found a positive relationship between firm size and the long-run IPO share performance (Banu Durukan, 2002; Belghitar and Dixon, 2012; Bird and Yeung, 2010; Brav and Gompers, 1997; Goergen et al., 2007; How, 2000; Loughran and Ritter, 1995; Minardi et al., 2013; Ritter, 1991). However, contrasting empirical studies have argued that the negative returns observed in the long-run for larger IPOs may be attributed to their high initial returns in the short-run, which can be seen as a signal of the firm's quality (Cai et al., 2008; Chi et al., 2010; Chorruk and Worthington, 2010; Liu et al., 2013; Thomadakis et al., 2012).

Sohail and Nasr (2007), and Mumtaz et al. (2016) provide explanations indicating that ex-ante uncertainty holds more influence over IPOs compared to signalling. In this context, the divergence of opinion hypothesis of IPOs suggests that larger firms tend to outperform in the long-run. Consequently, this research anticipates a positive relationship between board listing and the long-run performance of IPOs. Hence, the following hypothesis is built:

Hypothesis 4 (d) : The classification of board listing has statistically significant positive impact on the relationship between board listing and the long-run share performance of IPOs

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Table 3.11 summarised the selected dependent and independent variables for long-run share performance of IPOs and their empirical evidence which were identified in previous studies, the expected sign and theory applied for each variables.

Factors	Variables	Variables measurements	Authors (Year)	Expected sign	Theory	Data
Dependent variable	Buy-and-Hold Abnormal Return (BHAR): 1-month, 3-month, 6-month, 12-month, 24-month, 36-month, and 48-month	$\text{BHAR}_t = W_j \sum_{i=1}^{nt} \text{BHAR}_{iT}$ The value-weighted average buy-and-hold adjusted returns for event month t. BHAR_{iT} is the market adjusted buy-and-hold returns of firm 'j' in the event month 'T'. The W_j is the value-weight, computed as the market capitalisations of firm $_i$ at offer price immediately after the listing, divided by the total market capitalisation of the entire IPO sample	Ritter and Welch (2002); Schultz (2003); Teoh et al. (1998); Kooli and Suret (2004); and Ahmad-Zaluki et al. (2007)	-	-	Panel data: After listing date and calculated for different window periods from monthly data
Independent variable	(i) Behavioural Characteristics					
	Malaysian IPO Market Sentiment Index (MIMSI)	2 years moving average of Malaysia IPO market sentiment index constructed using PCA, sPCA, and PLS methods by applying sentiment proxies including share turnover, number of IPOs, first-day returns of IPOs, dividend premium, and equity shares in new issues, consumer confidence index, and business conditions index (as detailed in Section 4.6.2 of Chapter 4)	Boulton et al. (2011); Ritter and Welch (2002); and Song et al. (2014)	+ve	Divergence of opinion / Overreaction hypothesis Impresarios / Fad hypothesis	Raw data is collected on a quarterly basis and synchronised with the respective quarters of the listing date, as well as the corresponding window periods

(cont'd)

Factors	Variables	Variables measurements	Authors (Year)	Expected sign	Theory	Data
Independent variables	(ii) Issue Characteristics					
	Initial return (IR)	$\frac{P_{i1} - P_{i0}}{P_{i0}} \times 100$ P_{i0} = the IPO offer price of the $stock_i$ as stated in the IPO prospectus P_{i1} = the closing price of the $stock_i$ at the end of the first day of trading	Shiller (1990b); Carter and Manaster (1990); Chi et al., (2010); Kutsuna et al., (2008); Cai et al., (2008); Ahmad-Zaluki et al., (2007); and Johnston and Madura (2002)	-ve	Divergence of opinion / Overreaction hypothesis Impresarios / Fad hypothesis	Panel data: Repeating observations at listing date across different window periods of each firm
	Offer size (OSIZE)	Natural log of total gross proceeds from the IPO	Alanazi and Al-Zoubi (2015); Chi and Padgett (2005); Pradhan and Shrestha (2016); and Yu and Tse (2005)	+ve	Window of opportunity hypothesis	Panel data: Repeating observations at listing date across different window periods of each firm
	Underwriter reputation (UREP)	Underwriter dummy equals '1' if the lead underwriter includes one of the Tier 1 financial institutions, CIMB Bank, Maybank and RHB Bank and '0' if otherwise	Carter et al., (1998); Michaely and Shaw (1994); Dong et al., (2011); Chan et al., (2004); Brav and Gompers (1997); Booth and Chua (1986); and Chemmanur and Fulghieri (1994)	+ve	Underwriter reputation hypothesis Divergence of opinion / Overreaction hypothesis	Panel data: Repeating observations at listing date across different window periods of each firm

(cont'd)

Factors	Variables	Variables measurements	Authors (Year)	Expected sign	Theory	Data
Independent variables	(iii) Firm Characteristics					
	Firm age (FAGE)	Age of the firm since incorporation	Ritter (1984); Kirkulak and Davis (2005); and Loughran et al. (1994)	+ve	Agency costs and asymmetric information	Panel data
	Board size (BOARD)	Total number of board of directors	Pfeffer and Salancik (1978); Peng and Luo (2000); and Certo et al., (2001)	+ve	Divergence of opinion / Overreaction hypothesis	Panel data
	Major shareholder ownership (MAJOR)	Proportion of shares for the major shareholders prior to IPO	Holderness (2003)	+ve	Entrenchment theory	Panel data
	(iv) Market Characteristics					
	Market volatility (MVL)	Standard deviation of daily FTSE Bursa Malaysia KLCI market returns over three months (90 calendar days) prior to the closing date of subscription	Paudyal et al. (1998), Omran (2005), Al-Hassan et al. (2010), Omran (2005), Ekkayokkaya and Pengniti (2012), Belghitar and Dixon (2012), Menyah et al. (1995)	+ve	Divergence of opinion / Overreaction hypothesis	Panel data
	Oversubscription ratio (OVER)	Indicates magnitude of response of the investors for an IPO. Estimated as the ratio of application size to the issue size (in volume)	Agarwal et al. (2008); Kandel, et al. (1999); and Chowdhry and Sherman (1996)	+ve	Divergence of opinion / Overreaction hypothesis	Panel data: Repeating observations at listing date across different window periods of each firm

(cont'd)

Factors	Variables	Variables measurements	Authors (Year)	Expected sign	Theory	Data
Independent variables	(iv) Market Characteristics (cont'd)					
	Hot issue market (HOT)	Hot issue market was identified as issue year using IPO volume and first-day return, where number of IPOs and average first-day return are greater than the sample's average. Dummy variable, which denotes '1' for hot issue market and '0' for otherwise	Guo et al. (2010); Lowry et al. (2010); Samarakoon (2010); and Alli et al. (2010)	-ve	Window of opportunity hypothesis	Panel data: Repeating observations at listing date across different window periods of each firm
	Board listing (BLIST)	Board listing is to determine Main Market (established listing company) and ACE Market (young and growing company). Dummy variable, which denotes '1' for Main Market and '0' for ACE Market	Chen and Shih (2004); Rahim and Yong (2010); and Gounopoulos et al. (2007)	-ve	Divergence of opinion / Overreaction hypothesis	Panel data: Repeating observations at listing date across different window periods of each firm

Table 3.11 : Summary of variables for long-run share performance of IPOs

(Note: Table summarises key variables, measurements, theories, and data sources from empirical studies on IPO's long-run share performance)

A panel data series covering the period from the day of listing (T) to 48 months thereafter (T+48) was created to analyse the performance of shares after the IPO. This structure enables the analysis of time-varying firm and market characteristics and at the same time ensures the consistency of the observations. A time variable representing the months after the listing was created and labelled T+1 month to T+48 month. It serves as a time marker for aligning and analysing the data over the specified period after the IPO.

In order to standardise the data set and ensure comparability, variables available at different frequencies (i.e. monthly, quarterly and listing date) were harmonised to match the T+48 month timeframe. For example, the quarterly variables were adjusted to the corresponding quarter within the T+1 to T+48 timeline to ensure the temporal consistency of all data points.

Firm-level and market-level data were integrated using a unique identifier for each IPO (i.e. Firm ID) as the cross-sectional identifier and the time variable as the temporal identifier. This ensures that all observations are precisely matched to the time frame of the respective firm after the IPO, which facilitates efficient handling of the panel data analysis.

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3.5.3 Hypothesis development for long-run share performance of IPOs

The long-run share performance of IPOs hypothesis are set out in Table 3.12:

Behavioural Characteristics		
IPO market sentiment	Hypothesis 1 (a)	There is a statistically significant positive relationship between IPO market sentiment and the long-run share performance of IPOs
Issuing Characteristics		
Initial return	Hypothesis 2 (a)	There is a statistically significant negative relationship between initial return and the long-run share performance of IPOs
Offer size	Hypothesis 2 (b)	There is a statistically significant negative relationship between offer size and the long-run share performance of IPOs
Underwriter reputation	Hypothesis 2 (c)	The reputation of the IPO underwriter has statistically significant impact on the relationship between underwriter reputation and the long-run share performance of IPOs
Firm Characteristics		
Firm age	Hypothesis 3 (a)	There is a statistically significant positive relationship between firm age and the long-run share performance of IPOs
Board size	Hypothesis 3 (b)	There is a statistically significant positive relationship between board size and the long-run share performance of IPOs
Major shareholder ownership	Hypothesis 3 (c)	There is a statistically significant positive relationship between major shareholder ownership and the long-run share performance of IPOs
Market Characteristics		
Market volatility	Hypothesis 4 (a)	There is a statistically significant positive relationship between market volatility and the long-run share performance of IPOs
Oversubscription ratio	Hypothesis 4 (b)	There is a statistically significant positive relationship between oversubscription ratio and the long-run share performance of IPOs
Hot issue market	Hypothesis 4 (c)	The market condition of the IPO has statistically significant impact on the relationship between hot issue market and the long-run share performance of IPOs
Board listing	Hypothesis 4 (d)	The classification of board listing has statistically significant impact on the relationship between board listing and the long-run share performance of IPOs

Table 3.12 : Summary of hypotheses for long-run share performance of IPOs

(Note: Table outlines the hypotheses relating to the long-run share performance of IPOs. The hypotheses are grouped under 4 categories: (i) behavioural characteristics, (ii) issuing characteristics, (iii) firm characteristics, and (iv) market characteristics. Each hypothesis posits the expected direction and relationship between the respective factor and long-run share performance of IPOs, measured using BHAR. These hypotheses are tested using multiple regression analysis to determine the influence of both sentiment and fundamental factors on aftermarket returns)

3.5.4 Ordinary least square regression model for long-run share performance of IPOs

According to Kooli and Suret (2004), BHAR has the advantage on others, to capture the long-term investor experience. Moreover, Gompers and Lerner (2003) explain that BHAR provides the appropriate result as compared to CAAR and WR. In particular, the long-term investor experience is better captured by compounding the short-term returns to acquire long-term buy-and-hold returns. Thus, in this research, the dependent variable for the long-run share performance of IPOs is proxied by the BHAR. The independent variables (determinants) of long-run share performance of IPOs are then denotes as the behavioural, issue, firm, and market characteristics.

The below equation provides the IPO's long-run share performance based on OLS regression model:

$$\begin{aligned} BHAR_{it} = \beta_0 + \beta_1 MIMSI_{it} + \beta_2 IR_{it} + \beta_3 OSIZE_{it} + \beta_4 FAGE_{it} + \beta_5 BSIZE_{it} \\ + \beta_6 MAJOR_{it} + \beta_7 MVL_{it} + \beta_8 OVER_{it} + \beta_9 D_{UREPit} + \beta_{10} D_{HOTit} \\ + \beta_{11} D_{BLISTit} + \varepsilon_{it} \end{aligned} \tag{3.17}$$

where, $BHAR_{it}$ is the buy-and-hold adjusted returns of $firm_i$. $MIMSI_{it}$ is 2 years moving average of Malaysian IPO market sentiment index was constructed using 3 different methods including PCA, sPCA, and PLS methods. IR_{it} is calculated as the closing price of the $stock_i$ at the end of the first day of trading minus the IPO_{it} offer price of the $stock_i$ as stated in the IPO prospectuses. $OSIZE_{it}$ is the natural log offer size calculated as total gross proceeds from the IPO. $FAGE_{it}$ is calculated as the age of the firm since incorporation. $BSIZE_{it}$ is calculated as the total number of board of directors. $MAJOR_{it}$ is calculated as the proportion of shares for the major shareholders prior to IPO. MVL_{it} is calculated as the standard deviation of daily FTSE Bursa Malaysia KLCI market returns over the three months before the closing date of subscription. $OVER_{it}$ is calculated as the magnitude of response from investors to an IPO, which is estimated as the ratio of the application size to the issue size (in volume). D_{UREPit} {underwriter dummy equals '1' if the lead underwriter includes one of the Tier 1 financial institutions, CIMB Bank, Maybank and RHB Bank and '0' if otherwise}. D_{HOTit} {hot issue market was identified as issue year using IPO volume and first-day return, where number of IPOs and average first-day return are greater than the sample's average. Dummy variable, which denotes '1' for hot issue market and '0' for otherwise}. $D_{BLISTit}$ {board listing is to determine Main Market (established listing company) and ACE Market (young and growing company). Dummy variable, which denotes '1' for Main Market and '0' for ACE Market}. β_0 is the intercept of the equation. ε_i is the error term of the equation.

3.6 Interaction analysis for short-run and long-run share performance of IPOs

Interaction analysis is employed to examine whether the impact of specific IPO characteristics such as offer price, firm age, or board listing on IPO performance varies depending on prevailing market sentiment. This approach facilitates the investigation of conditional relationships, wherein market sentiment may amplify (i.e., strengthen) or temper (i.e., weaken) the influence of these variables on short-run and long-run IPO share performance. These moderation effects are consistent with behavioural theories, such as those proposed by Barberis et al. (1998), which suggest that investor overreaction and biased expectations can result in time-varying mispricing, particularly during periods of heightened market sentiment. Accordingly, interaction analysis provides a more nuanced empirical framework that captures these dynamics and offers deeper insight into how market sentiment interacts with both firm-level and market-level factors in shaping IPO performance.

The following regression model is used to assess interaction effects:

$$Y_i = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \beta_3 X_{i3} + \ldots + \beta_{10} X_{10} + \beta_{11} X_{11} + \beta_{12} X_{12} + \varepsilon_i \tag{3.18}$$

where Y_i is the predicted value of a dependent variable, in this case it refers to market sentiment (MIMSI), X_i is the key determinant of independent variables, β_i is the regression coefficients and ε_i = the error term of the model.

3.7 Binary regression model for short-run and long-run share performance of IPOs

The binary regression model holds greater significance for IPO investors compared to the multiple regression model due to several reasons: Firstly, it does not rely on assumptions of normal distribution and linearity. Secondly, it allows for the estimation of associated probabilities (risks) of determinants, which is particularly important given the dynamic nature of economic and financial factors in the market. Thirdly, the associated probability (risk) of a determinant, known as marginal probability, becomes crucial in identifying directional changes in IPO market performance. Lastly, the marginal probability can provide valuable information related to the market timing, which is of utmost importance for investment decisions. However, binary regression models have generally received less attention in the IPO literature, including the specific context of Malaysia. Consequently, in order to identify the determinants of short-run and long-run market performance of IPOs, this research employed the binary regression models such as logit and probit regression models.

The binary regression model is utilised to estimate the probability of an outcome, which is represented by binary variables. A value of '1' indicates the occurrence of a target outcome, while '0' represents its absence. The binary regression model provides a more realistic approach compared to the multiple regression model. This is because it estimates the associated probabilities (risks) of the determinants, which is crucial given the dynamic nature of financial and non-financial factors in the market. Therefore, in this research, the logit and probit binary regression models are employed to estimate the determinants of short-run and long-run share performance in IPOs.

The difference between the logit and probit regression models lies in the error term associated with each model, as reported by Kulendran and Wong (2011). When the error term's cumulative distribution is logit, the model is referred to as a logit model, whereas if the cumulative distribution is normal, it is known as a probit model. Maddala (2001) demonstrated that the results of these binary models remain consistent unless the sample size is small. The application of the logit regression model holds greater significance than the probit regression model due to the simplicity of its distribution function and the ease of interpreting the results (Amemiya, 1981). Given the large sample size of this research, both models were employed to analyse IPO share performance and identify meaningful results.

Model specifications for binary regression model

In order to estimate the logit regression model, this research estimates the positive and negative return of IPOs both in the short-run and long-run. Subsequently, the positive and negative returns are coded as '1' and '0' respectively. The positive returns coded '1' indicates the underpricing in the short-run and overperformance in the long-run, while negative returns coded '0' indicates overpricing in the short-run and underperformance in the long-run. To estimate the binary regression model for short-run and long-run share performance of IPOs, the same process will be followed.

Then, in order to estimate the probit regression model, the research initially classified the positive and negative returns (IR, MAIR, CAAR, and BHAR) of the IPO companies in the short-run and long-run as binary variables, denoted by '1' and '0'. Here, '1' signifies positive returns, while '0' indicates negative returns. Specifically, positive returns in the short-run IPO market were considered as IPO underpricing, while in the long-run they were regarded as aftermarket overperformance. Conversely, negative returns in the short-run market were interpreted as overpricing, and in the long-run, they were seen as underperformance.

The binary regression equations are as follows:

Logit regression equation:

$$\left(\frac{P_i}{1-P_i}\right) = \alpha + \sum_{j=i}^{m} \beta_i D_{ij} + \varepsilon_i \tag{3.19}$$

Probit regression equation:

$$P_i = \alpha + \sum_{j=i}^{m} \beta_i D_{ij} + \varepsilon_i \tag{3.20}$$

where P_i =the probability of underpricing (overperformance) (1) occurs in the short-run (long-run) market, 1 - P_i = the probability of underpricing (overperformance) does not occur or the overpricing (underperformance) (0) occurs in the short-run (long-run) market, $(\frac{P_i}{1-P_i})$ = the odds ratios (in other words, the probability of occurring) for the event of underpricing (overperformance) (1) occurrence, β_i = coefficient of the explanatory variables, $D_{i,j}$ = explanatory variables and ε_i = the error term of the model.

(i) Binary regression model for short-run share performance of IPOs

It is important to know how behavioural, issue, firm, and market characteristics influence the likelihood of IPO underpricing and overpricing. As such, a binary regression model, considering the probability of conducting an IPO underpricing and overpricing is estimated.

The below equation provides the IPO's short-run share performance based on estimated logit and probit regression models:

Logit regression model:

$$\begin{aligned}\left(\frac{P_i}{1-P_i}\right) = {} & \beta_0 + \beta_1 \text{ MIMSI}_i + \beta_2 \text{ IPOP}_i + \beta_3 \text{ PRICE}_i + \beta_4 \text{ OSIZE}_i + \beta_5 \text{ ICOR}_i \\ & + \beta_6 \text{ BOOK}_i + \beta_7 \text{ FAGE}_i + \beta_8 \text{ MVL}_i + \beta_9 \text{ OVER}_i + \beta_{10} \text{ D}_{\text{UREPi}} \\ & + \beta_{11} \text{ D}_{\text{HOTi}} + \beta_{12} \text{ D}_{\text{BLISTi}} + \varepsilon_i\end{aligned} \tag{3.21}$$

Probit regression model:

$$\begin{aligned}P_i = {} & \beta_0 + \beta_1 \text{ MIMSI}_i + \beta_2 \text{ IPOP}_i + \beta_3 \text{ PRICE}_i + \beta_4 \text{ OSIZE}_i + \beta_5 \text{ ICOR}_i \\ & + \beta_6 \text{ BOOK}_i + \beta_7 \text{ FAGE}_i + \beta_8 \text{ MVL}_i + \beta_9 \text{ OVER}_i + \beta_{10} \text{ D}_{\text{UREPi}} \\ & + \beta_{11} \text{ D}_{\text{HOTi}} + \beta_{12} \text{ D}_{\text{BLISTi}} + \varepsilon_i\end{aligned} \tag{3.22}$$

where, P_i = the probability of IPO underpricing (1) occurs in the short-run IPO market, 1 - P_i = the probability of IPO underpricing does not occur or the underperformance (0) occurs in the short-run IPO market, $(\frac{P_i}{1-P_i})$ = the value of the odds ratios (in other words, the probability of occurring) for the event of IPO underpricing (1) occurrence, $MAIR_i$ is the market adjusted first-day initial returns of $firm_i$. $MIMSI_i$ is the Malaysian IPO market sentiment index was constructed using 3 different methods including PCA, sPCA, and PLS methods. $IPOP_i$ is calculated as the period from opening to closing days of the offer (in calendar days). $PRICE_i$ is calculated as the offer price of the IPO share. $OSIZE_i$ is the natural log of offer size calculated as total gross proceeds from the IPO. $ICOR_i$ is calculated as the natural log of total issue costs relative to the total offer proceeds such as professional fees, brokers' fees, printing and other costs. $BOOK_i$ is calculated as the total equity capital divided by the number of equity shares (equivalent to net assets per share). $FAGE_i$ is calculated as the age of the firm since incorporation. MVL is calculated as the standard deviation of the daily FTSE Bursa Malaysia KLCI for the first one month (30 calendar days) prior to the IPO. $OVER_i$ is calculated as the magnitude of response from investors for an IPO, which is estimated as the ratio of application size to the issue size (in volume). D_{UREPi} {underwriter dummy equals '1' if the lead underwriter includes one of the Tier 1 financial institutions, CIMB Bank, Maybank and RHB Bank and '0' if otherwise}. D_{HOT} {hot issue market was identified as issue year using IPO volume and first-day return, where number of IPOs and average first-day return are greater than the sample's average. Dummy variable, which denotes '1' for hot issue market and '0' for otherwise}. D_{BLISTi} {board listing is to determine Main Market (established listing company) and ACE Market (young and growing company). Dummy variable, which denotes '1' for Main Market and '0' for ACE Market}. β_0 is the intercept of the equation. ε_i is the error term of the equation.

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(ii) Binary regression model for long-run share performance of IPOs

The estimated logit and probit regression models used for the long-run share performance of IPOs were:

Logit regression model:

$$\left(\frac{P_{it}}{1-P_{it}}\right) = \beta_0 + \beta_1\,MIMSI_{it} + \beta_2\,IR_{it} + \beta_3\,OSIZE_{it} + \beta_4\,FAGE_{it} + \beta_5\,BSIZE_{it} + \beta_6\,MAJOR_{it} + \beta_7\,MVL_{it} + \beta_8\,OVER_{it} + \beta_9\,D_{UREPit} + \beta_{10}\,D_{HOTit} + \beta_{11}\,D_{BLISTit} + \varepsilon_{it} \quad (3.23)$$

Probit regression model:

$$P_{it} = \beta_0 + \beta_1\,MIMSI_{it} + \beta_2\,IR_{it} + \beta_3\,OSIZE_{it} + \beta_4\,FAGE_{it} + \beta_5\,BSIZE_{it} + \beta_6\,MAJOR_{it} + \beta 7\,MVL_{it} + \beta_8\,OVER_{it} + \beta_9\,D_{UREPit} + \beta_{10}\,D_{HOTit} + \beta_{11}\,D_{BLISTit} + \varepsilon_{it} \quad (3.24)$$

where, P_{it} = the probability of aftermarket overperformance (1) occurs in the long-run IPO market, 1 - P_{it} = the probability of aftermarket overperformance does not occur or the aftermarket underperformance (0) occurs in the long-run IPO market, $(\frac{P_{it}}{1-P_{it}})$ = the value of the odds ratios (in other words, the probability of occurring) for the event of aftermarket overperformance (1) occurrence, $BHAR_{it}$ is the buy-and-hold abnormal returns of $firm_i$. $MIMSI_{it}$ is the 2 years moving average of Malaysian IPO market sentiment index was constructed using 3 different methods including PCA, sPCA, and PLS methods. IR_{it} is calculated as the initial return. $OSIZE_{it}$ is the natural log offer size calculated as total gross proceeds from the IPO. $FAGE_{it}$ is calculated as the age of the firm since incorporation. $BSIZE_{it}$ is calculated as the total number of board of directors. $MAJOR_{it}$ is calculated as the proportion of shares for the major shareholders prior to IPO. MVL_{it} is calculated as the standard deviation of daily FTSE Bursa Malaysia KLCI market returns over the 3 months before the closing date of subscription. $OVER_{it}$ is calculated as the magnitude of response from investors for an IPO, which is estimated as the ratio of application size to the issue size (in volume). D_{UREPit} {underwriter dummy equals '1' if the lead underwriter includes one of the Tier 1 financial institutions, CIMB Bank, Maybank and RHB Bank and '0' if otherwise}. D_{HOTit} {hot issue market was identified as issue year using IPO volume and first-day return, where number of IPOs and average first-day return are greater than the sample's average. Dummy variable, which denotes '1' for hot issue market and '0' for otherwise}. $D_{BLISTit}$ {board listing is to determine Main Market (established listing company) and ACE Market (young and growing company). Dummy variable, which denotes '1' for Main Market and '0' for ACE Market}. β_0 is the intercept of the equation. ε_i is the error term of the equation.

3.8 Marginal probability analysis for short-run and long-run share performance of IPOs

Although marginal probability analysis is applied in other areas of finance research, the IPO literature indicates that it has not been applied to analyse the share performance of IPOs in Malaysia. Therefore, analysing short-run and long-run share performance of IPOs using marginal probability analysis is a new contribution of this research for Malaysia stock market.

Marginal probability analysis was used to identify the directional changes between short-run underpricing and overpricing, or the long-run underperformance and overperformance due to change in probability (Δp) associated with the determinants. Marginal probabilities can be estimated only with the logit model because the logit model transforms the estimated function into a logistic probability using logistic distribution function. Following Kulendran and Wong (2011), Maddala (2001), and Gujarati et al. (2012), this research estimated the marginal probability (Δp) of each variable in the logit models as follows:

$$\Delta p = \beta_i P_i (1 - P_i) \tag{3.25}$$

where P_i = the probability of IPO underpricing (overperformance) (1) occurs in the short-run (long-run) market, Δp = marginal probability, β_i = coefficient of each explanatory variable and X_i = the average value of each explanatory variable.

3.9 Methodology for price-earnings

3.9.1 Measures of price-earnings

The PE refers to the ratio of share price divided by earnings per share, which is an important indicator to evaluate the value of a firm. In general, a higher PE indicates a greater firm's share potential and a higher price that investors are willing to accept. When more investors choose to invest in this firm with value potential, the demand for shares will increase, resulting in price growth and stimulating IPO underpricing (Gitman, 2009).

(a) Trailing price-earnings

PE is used by various parties or investors to buy shares. Investors will buy shares of a company due to the high PE ratio, the high PE ratio illustrates the net income per share is quite high. It can be indicated as below:

$$\text{Price-earnings ratio} = \frac{\text{Share price}}{\text{Earnings per share}}$$

PE has the influence on the level of IPO underpricing (Tian, 2012). The investors can use the PE in formulating whether to invest or not to their firms. Investors can also use the PE as an indicator of how the firm set the price of the share. Theoretically, PE is an indicator that can be used to determine whether the share price is overvalued or undervalued, so that the investors can determine when to buy or sell the share price.

In this research, we have used the price-earnings differential (PEDF) as trailing price-earnings. PEDF is the difference of PE ratio of IPO firm on the listing day minus industrial PE ratio. The formulation of PEDF is set out below:

$$\text{PEDF} = (\text{Price-earnings ratio of IPO firms on the listing day}) - (\text{Industrial price-earnings ratio})$$

(b) Forward price-earnings

The forward PE, a variation of the PE ratio, is calculated using an estimate of earnings for the next 12 months. Wu (2014) reports that the forward PE serves as a stronger estimator of future growth than the traditionally used trailing PE. This is consistent with Ritter (1999) states that PE multiples using forecasted earnings result in much more accurate valuations than multiples using trailing earnings.

The IPO market in Malaysia is considered to have severe uncertainties, as firms intending to list in emerging markets are characterised as firms with low information efficiencies (Eldomiaty, 2008). Ammer and Ahmad-Zaluki (2017) posit that voluntary earnings forecast disclosures can be effective in improving the accuracy of earnings forecasts. However, a recent study by Ong et al. (2021b) find that under a voluntary regime, Malaysian IPOs that disclosed earnings forecasts were undervalued by underwriters due to investors' belief that the information on earnings forecasts in IPO prospectuses was inaccurate. It is difficult for earnings forecasts to be accurate due to unanticipated variables. Chong and Ho (2007), and He (2018) evidence that issuers may conceal 'bad news' from the public either by not releasing earnings forecasts or by presenting biased earnings. Therefore, investors may expect significant returns from their share subscriptions.

In contrast, Ong et al. (2023) investigate whether the inclusion of earnings estimates in prospectuses may assist investors in deciding whether to purchase shares in Malaysian IPOs. It examines the relationship between IPO investor demand and the disclosure of earnings forecasts. The findings show that IPOs with earnings forecasts obtained higher oversubscription rates than those without earnings forecasts. IPOs with earnings forecasts provide value-relevant signals to prospective investors about the good prospects of firms, resulting in an increase in the demand for IPO shares. This situation poses a challenge for investors attempting to estimate the earnings forecast of many IPOs. Due to the lack of availability of data on forward PE, this research does not include a forward PE analysis.

3.9.2 Determinants for price-earnings analysis and IPO underpricing

(a) The determinants of price-earnings

The impacts of the dividend payout ratio, earnings growth, and discount rate are represented by the fundamental components, while the influences of investor sentiment are captured by the non-fundamental components. This line of modelling is in accordance with De Long et al. (1990) recognise that financial markets comprise 2 types of traders namely, rational arbitrageurs and irrational traders who are affected by behavioural biases. Based on previous studies and literature, this research has selected a combination of sentiment and fundamental factors that could affect PE. The determinant factors and hypothesis development are as follows:

(i) Variables for fundamental factors of price-earnings

(a) Dividend premium

In this research, due to the availability of data in Malaysia the dividend premium was calculated using the fraction of net income of an issuing firm pays to its shareholders in the form of dividends. In this case, dividend premium refers to dividend payout ratio. According to the Gordon growth model (Gordon, 1959), the dividend payout ratio is a direct determinant of the PE. A high dividend payout ratio leads to correspondingly high expected returns for investors, which in turn causes investors to place a high valuation on the stock. This results in an increase in the firm's PE. Conversely, a lower dividend payout ratio will lead to a decline in the PE. Fahmi (2011) posits that dividend per share, which is the distribution of profits to all shareholders in proportion to the number of shares owned, significantly influences investor interest in a firm's shares. Higher dividends per share attract more investors, leading to an increase in the firm's share price. On the other hand, Boonlert (2017) investigates the conditional and nonlinear relationship between the PE and dividend payout ratio. The findings show that when the return on equity exceeds (or falls below) the required rate of return, a negative (or positive) relationship and positive (or negative) convexity are observed between the PE and the dividend payout ratio. Therefore, it is hypothesised that a significant positive relationship exists between the dividend payout ratio and the PE, particularly when the return on equity exceeds the required rate of return. This scenario results in positive convexity within the relationship. Hence, the following hypothesis was theorised:

Hypothesis 3 (a)(i) : There is a statistically significant positive relationship between dividend premium and PE

(b) Growth of industrial production index

In mature securities markets, firms listed across various industries exhibit differences in market structures, profitability, interrelatedness with the macroeconomic cycle, and industry life cycles and stages. Consequently, these variations lead to significant differences in business performance and shares investment risk-return profiles. Therefore, taking into account industry factors into practical security analysis is essential. Specifically, the industries in which firms are listed, along with the industrial average PE, directly influence the PE of individual firms. Due to differences in profitability, development levels, and expectations regarding future growth and profitability, individual shares inevitably show variation. High-growth industries typically have higher average PE, which in turn result in higher individual PE. On the other hand, conventional industries with poor growth prospects tend to have lower PE. This pattern indicates a positive correlation between the industrial average PE and the PE of individual firms. Hence, the following hypothesis was theorised:

Hypothesis 3 (a)(ii) : There is a statistically significant positive relationship between growth of industrial production index and PE

(c) Short-term interest rate

The influence of interest rates on share prices manifests into 2 key aspects. Firstly, fluctuations in interest rates directly impact the movement of funds within securities markets. When interest rates decline, capital tends to flow into securities markets, increasing the supply of funds and consequently driving up share prices and PE. Conversely, a rise in interest rates causes capital to reflow into banks, resulting in a critical reduction in fund supply, a decrease in share prices, and a lower PE. Therefore, a negative correlation exists between interest rates and the average PE. Additionally, changes in interest rates have a direct impact on corporate earnings. An increase in interest rates burdens companies, leading to reduced earnings and diminished equity, assuming all other conditions remain constant. This creates a significant deviation between operational performance and expected returns, which cannot sustain a high PE, resulting in declining share prices. Conversely, when interest rates decrease, share prices increase, accompanied by higher PE. According to Maio and Santa-Clara (2017), the PE of individual shares will inversely move in response to changes in interest rates. Hence, the following hypothesis was theorised:

Hypothesis 3 (a)(iii) : There is a statistically significant negative relationship between short-term interest rate and PE

(d) Market volatility

Kane et al. (1996) evidence that the PE is highly sensitive to market volatility. Their findings indicate that a 1% increase in market volatility can reduce the PE by 1.8 times over time. Therefore, any market valuation assessment that ignores the impact of volatility on the equilibrium PE is inherently flawed. Market volatility affects the market risk premium and, consequently, the discount rate. An increase in the discount rate leads to a lower equilibrium price for any given earnings stream. If market volatility causes an increase in the required return on the market, this variable should exhibit a negative coefficient. Hence, the following hypothesis was theorised:

Hypothesis 3 (a)(iv) : There is a statistically significant negative relationship between market volatility and PE

(ii) Variables for sentiment factors of price-earnings

(a) Consumer confidence index

Consumer confidence index (CCI) is a survey-based sentiment indicator provided by MIER's reports. The consumer confidence index is an indicator reflecting the psychological expectations of consumers. It is being considered as a classical measure of consumer's feeling and perception of the market in economics and finance, indicating optimism towards the current and future economic performance. It is an indicator that reflects the strength of consumer confidence. It quantifies consumers' assessment of the current economic situation and their subjective sentiments regarding economic prospects and income levels. Respondents provide an answer which is later turned into an index. The higher the level of the index, the more optimistic respondents are about the future economic in Malaysia. Lutfur and Shamsuddin (2019) evidence that in the cases of Canada, Italy and Japan, the effect of consumer confidence on the PE is larger in the higher quantiles. For the United States and France, the effect of consumer confidence is more prevalent in the lowest and highest quantiles. It indicates that consumer confidence has a more pronounced impact in periods coinciding with stock market bubbles or bursts when the PE are either excessively high or low. Hence, the following hypothesis was theorised:

Hypothesis 3 (a)(v) : There is a statistically significant positive relationship between consumer confidence index and PE

(b) Business confidence index

Business confidence index (BCI) is a survey-based sentiment indicator provided by MIER's reports. The business confidence index is constructed by collecting opinions through regular surveys that enquire about the progress in production, sales, orders, and stocks of finished goods within the manufacturing sector. Business confidence index provides valuable insights into the sentiment and outlook of businesses in the manufacturing industry. Business confidence index serves as an information on future developments based on upon opinion surveys developed. It is an indicator of future developments in Malaysia. Sulaiman et al. (2020) investigates the impact of investor sentiment towards stock returns based on firm-level listed in Bursa Malaysia, in his study business confidence index was one of the sentiment proxies selected to act as behavioural factor and business confidence is positively significance towards stock returns. Lutfur and Shamsuddin (2019) evidence that business confidence does not exert any statistically significant influence in any PE quantiles in the United States and Japan. For the United Kingdom, the effect of business confidence on the PE is larger at higher quantiles. Although the effect of business confidence on the PE varies across quantiles for other countries, there is no discernible pattern found. Hence, the following hypothesis was theorised:

Hypothesis 3 (a)(vi) : There is a statistically significant positive relationship between business confidence index and PE

(c) Turnover ratio

Market liquidity, measured by the ratio of trading volume to total market capitalisation (turnover ratio), is used as an additional proxy for investor sentiment. Baker and Stein (2004) develop a theory that identifies market liquidity as an indicator of sentiment. Their model includes 2 types of investors: rational and irrational. The irrational investors' underreaction to information contained in order flows results in increased liquidity. In a market constrained by short-sales, higher liquidity indicates the presence of irrational investors, leading to overvaluation. Besides, Baker and Stein (2004) demonstrate that liquidity, as a sentiment indicator, is inversely related to dividend yields. This relationship suggests that high market liquidity corresponds to high prices relative to dividends. Supporting this theory, Liu (2014) evidence there is co-variation between investor sentiment and market liquidity. In contrast, Lutfur and Shamsuddin (2019) evidence that the PE has not always co-varied with turnover ratio. The turnover ratio has minimal effect on the PE with positive coefficient but statistically insignificant. Thus, investors' willingness to pay the price per dollar of earnings is invariant to liquidity, which may be attributed to the fact that liquidity is a noisy indicator of investor sentiment. Hence, the following hypothesis was theorised:

Hypothesis 3 (a)(vii) : There is a statistically significant positive relationship between turnover ratio and PE

(d) Malaysian IPO investors market sentiment index

Additionally, in this research, Baker and Wurgler sentiment indicators are adopted as baseline regression because it is extensively accepted in various empirical studies. This research follows the same sentiment indicators adopted by Baker and Wurgler (2006 and 2007), to formulate IPO investor sentiment index. For the purpose of predicting the MIMSI, this research use some of the relevant sentiment proxies previously adopted by Huang et al. (2015), and Baker and Wurgler (2006) in their studies namely, share turnover (TURN), number of IPOs (NIPO), first-day returns of IPOs (RIPO), dividend premium (PDND), and equity shares in new issues (ESNI). The proxy of close-end fund discount rate (CEFD) has been excluded in this research because there is only one close-end fund company listed on Main Market of Bursa Malaysia. Therefore, it could create biasness to analyse results. Besides, for the construction of Malaysian

IPO investor sentiment index purposes, the following 3 additional sentiment proxies which are related to Malaysian IPO investor sentiment have been included in the construction of MIMSI: Oversubscription ratio (OVER), consumer confidence index (CCI), and business confidence index (BCI).

With regard to investor sentiment, Baker and Wurgler (2006) argued that if several optimism pushes share prices beyond fundamental values, a harmonisation should be kept between the duration of both the good investor feeling and the length of the excessive PE. Furthermore, Lutfur and Shamsuddin (2019) evidence that after controlling for the effects of fundamental factors, PE increases with an improvement in investor sentiment. Hence, the following hypothesis was theorised:

Hypothesis 3 (a)(viii) : There is a statistically significant positive relationship between Malaysian IPO investors market sentiment index and PE

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Table 3.13 summarised the selected dependent and independent variables for PEDF and their empirical evidence which were identified in previous studies, the expected sign and theory applied for each variables.

Factors	Variables	Variables measurements	Authors (Year)	Expected sign	Data
Dependent variable	Price-earnings differential (PEDF)	Natural logarithm of the difference of price-earnings ratio of IPO firm on the listing day minus industrial price-earnings ratio, named as 'price-earnings differential'	Graham and Dodd (1934); Reilly and Brown (1997); Ong et al. (2010)	-	Monthly frequency: Average PE differential of all IPOs in a month
(i) Sentiment Factors					
Independent variables	Changes in Consumer confidence index (ΔCCI)	The consumer confidence index has a base of 100, and we take their changes (Δ) over time t-1 to t. Due to co-movement between the consumer confidence index, the consumer confidence index has been orthogonalised against the business confidence index to avoid potential multicollinearity	Fisher and Statman (2000); Qiu and Welch (2006); Schmeling (2009)	+ve	Quarterly frequency
	Changes in Business confidence index (ΔBCI)	The business confidence index has a base of 100, and we take their changes (Δ) over time t-1 to t. Due to co-movement between the business confidence index, the business confidence index has been orthogonalised against the consumer confidence index to avoid potential multicollinearity	Sulaiman et al. (2020)	+ve	Quarterly frequency
	Turnover ratio (TURN)	Natural logarithm of the ratio of trading volume to market capitalisation, and represents market liquidity	Liu (2014); Baker and Stein (2004)	+ve	Quarterly frequency

Factors	Variables	Variables measurements	Authors (Year)	Expected sign	Data
(i) Sentiment Factors (cont'd)					
	Malaysian IPO investors market sentiment index (MIMSI)	Malaysian IPO market sentiment index was constructed using PCA, sPCA, and PLS methods as sentiment factors (as detailed in Section 4.2.2 of Chapter 4)	Baker and Wurgler (2006); Baker et al. (2012); Schmeling (2009); Bathia and Bredin (2013); Chua et al. (2014); Sum (2014); Shiller (1990a); Chen et al. (2013)	+ve	Quarterly frequency
(ii) Fundamental Factors					
Independent variables	Dividend premium (PDND)	Natural logarithm of dividend premium was calculated using the fraction of net income of an issuing firm pays to its shareholders in the forms of dividends at the end of financial year prior to listing	Anderson and Brooks (2006); Cho (1994); Huang and Wirjanto (2012); Kane et al. (1996); Nikbakht and Polat (1998); Ramcharran (2002); Reilly et al. (1983); Shamsuddin and Hillier (2004); White (2000); Fahmi (2011)	+ve	Quarterly frequency
	Growth of industrial production index (GROW)	Natural logarithm of the first difference of industrial production index, and acts as a proxy for aggregate earnings growth	Divanbeigi and Ramalho (2015)	+ve	Monthly frequency
	Short-term interest rate (INT)	First difference of 3-month treasury bill rates, and taken as the short-term interest rate	Maio and Santa-Clara (2017)	-ve	Monthly frequency
	Market volatility (MVL)	Monthly sum of squared daily returns of FTSE Bursa Malaysia KLCI	Kane et al. (1996)	-ve	Monthly frequency

Table 3.13 : Summary of sentiment and fundamental factors for price-earnings

(Note: Table summarises the dependent and independent variables influencing PEDF categorised into sentiment and fundamental factors. It includes variable measurements, empirical references, expected signs, and data frequency to provide a comprehensive understanding of their role in price-earnings analysis)

In this study, data sets with different frequencies were matched to ensure consistency and comparability in the analysis. Variables were adjusted to a monthly frequency to ensure consistency between data sets and consistency with the analytical framework of the study. This approach is in line with the research objective, which is to divide the analysis into 3 sub-divided time periods: Pre-Changes, Transitional, and Post-Changes.

In order to align higher frequency data (i.e., firm-specific data or data at the time of listing) with a monthly frequency, a method known as 'downsampling' was used. In this method, the data frequency is reduced by averaging the observations of all IPOs within a month. In this context, the average values for each month were calculated to represent the monthly data. By using monthly averages, the approach captures the underlying trends and fluctuations in the higher frequency data sets while minimising noise from short-term fluctuations.

After downsampling, the data sets were merged based on their timestamps to ensure temporal alignment. Any missing values that occurred during this process were left as blank fields in the data set, as there was IPO activity in certain months.

(b) The determinants that influence IPO underpricing during the regulatory changes

There are many literature focusing on the determinants that influence IPO underpricing during the regulatory changes. In this research, we build upon the study by Cheung et al. (2009), which examines the impact of regulatory changes on IPO underpricing in China. The aim is to investigate whether the determinant factors identified in that study have been applied in subsequent research to assess market reactions to date of announcement and date of implementation in relation to changes of capital market structure within Malaysian IPO market. This research aims to fill this gap by examining the applicability of these factors in the context of the Malaysian IPO market, particularly in relation to market responses to key regulatory events. The factors related to IPO underpricing is explained below.

Table 3.14 summarised the selected dependent and independent variables that influence IPO underpricing during the regulatory changes and their empirical evidence which were identified in previous studies, the expected sign and theory applied for each variables.

Factors	Variables	Variables measurements	Authors (Year)	Expected sign	Data
Dependent variable	Market adjusted initial return (MAIR) : First-day initial return	$MAIR_{i,t} = \left(\frac{P_{i,1} - P_{i,0}}{P_{i,0}} - \frac{MI_{i,1} - MI_{i,0}}{MI_{i,0}} \right) \times 100$ P_{i0} = the IPO offer price of the stock$_i$ as stated in the IPO prospectus P_{i1} = the closing price of the stock$_i$ at the end of the first day of trading $MI_{i,0}$ = the closing price of the general market index of the stock exchange where stock$_i$ is listed at offering day of the stock $MI_{i,1}$ = the closing price of the general market index of the stock exchange where stock$_i$ is listed at the end of the first day of trading	Aggarwal and Conroy (2000); Barry and Jennings (1993); Bradley et al. (2001); Chang et al. (2008); Chorruk and Worthington (2010)	-	Monthly frequency: Average market adjusted initial return of all IPOs in a month

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(cont'd)

Factors	Variables	Variables measurements	Authors (Year)	Expected sign	Data
(i) Sentiment Factors					
Independent variable	Changes in Consumer confidence index (ΔCCI)	The consumer confidence index has a base of 100, and we take their changes (Δ) over time t-1 to t. Due to co-movement between the consumer confidence index, the consumer confidence index has been orthogonalised against the business confidence index to avoid potential multicollinearity	Fisher and Statman (2000); Qiu and Welch (2006); Schmeling, 2009	+ve	Quarterly frequency
	Changes in Business confidence index (ΔBCI)	The business confidence index has a base of 100, and we take their changes (Δ) over time t-1 to t. Due to co-movement between the business confidence index, the business confidence index has been orthogonalised against the consumer confidence index to avoid potential multicollinearity	Sulaiman et al. (2020)	+ve	Quarterly frequency
	Turnover ratio (TURN)	Natural logarithm of the ratio of trading volume to market capitalisation, and represents market liquidity	Liu (2014); Baker and Stein (2004)	+ve	Quarterly frequency
	Malaysian IPO investors market sentiment index (MIMSI)	Malaysian IPO market sentiment index was constructed using PCA, sPCA, and PLS methods using sentiment proxies (as detailed in Section 4.2.2 of Chapter 4)	Baker and Wurgler (2006); Baker et al. (2012); Schmeling (2009); Bathia and Bredin (2013); Chua et al. (2015); Sum (2014); Shiller (1990a); Chen et al. (2013)	+ve	Quarterly frequency

(cont'd)

Factors	Variables	Variables measurements	Authors (Year)	Expected sign	Data
(ii) Fundamental Factors					
Independent variable	Price-earnings differential (PEDF)	Natural logarithm of the difference of price-earnings ratio of IPO firm on the listing day minus industrial price-earnings ratio, named as 'price-earnings differential'	Graham and Dodd (1934); Reilly and Brown (1997); Ong et al. (2010)	+ve	Monthly frequency: Average price-earnings differential of all IPOs in a month
	Capital raised (CAPR)	Natural logarithm of firm size worth value raised in the IPO	Dimovski et al. (2011)	+ve	Monthly frequency: Average capital raised of all IPOs in a month
	Offer price (PRICE)	Price offer at the IPO	Guo and Brooks (2008); Dimovski et al. (2011); Certo et al. (2003); Kutsuna et al. (2008)	-ve	Monthly frequency: Average offer price of all IPOs in a month
	Process time (TIME)	The number of days from the end of offer date to the first listing day	Mok and Hui (1998), Su and Fleisher (2015), Chan et al. (2004)	+ve	Monthly frequency: Average process time of all IPOs in a month

cont'd)

Factors	Variables	Variables measurements	Authors (Year)	Expected sign	Data
(ii) Fundamental Factors (cont'd)					
	Oversubscription ratio (OVER)	Indicates magnitude of response of the investors for an IPO. Estimated as the ratio of application size to the issue size (in volume)	Agarwal et al. (2008); Kandel et al. (1999); Chowdhry and Sherman (1996)	+ve	Monthly frequency: Average oversubscription ratio of all IPOs in a month
	Major shareholder ownership (MAJOR)	Proportion of shares for the major shareholders prior to IPO	Holderness (2003)	+ve	Monthly frequency: Average major shareholder ownership of all IPOs in a month
	Return on equity (ROE)	The return on equity at the fiscal year end before the IPO	Ong et al. (2014); Kim, et al. (1995)	+ve	Monthly frequency: Average return on equity of all IPOs in a month
	Market volatility (MVL)	Standard deviation of the daily FTSE Bursa Malaysia KLCI percentage return for first one month (30 calendar days) after the IPO	Ritter (1984); Hanley (1993)	+ve	Monthly frequency

Table 3.14: Summary of dependent and independent variables that influence IPO underpricing during the regulatory changes

(Note: Table summarises the key factors influencing IPO underpricing during regulatory changes including dependent and independent variables, their measurements, empirical references, expected signs, and data frequency. The variables are categorised into fundamental and sentiment factors to highlight their respective roles in shaping IPO pricing outcomes)

The data processing steps described for Table 3.13, including the alignment of data sets to a monthly frequency, downsampling, and handling of missing values, were also applied to the data presented in Table 3.14. This ensures consistency of the analytical framework and the comparability of the tables.

3.9.3 Hypothesis development for price-earnings analysis and IPO underpricing

(a) Hypothesis development for price-earnings and its determinants

The PE hypothesis are set out in Table 3.15:

Sentiment Factors		
Changes in Consumer Confidence Index (ΔCCI)	Hypothesis 3 (a)(v)	There is a statistically significant positive relationship between Consumer Confidence Index and PE
Changes in Business Confidence Index (ΔBCI)	Hypothesis 3 (a)(vi)	There is a statistically significant positive relationship between Business Confidence Index and PE
Turnover ratio (TURN)	Hypothesis 3 (a)(vii)	There is a statistically significant positive relationship between turnover ratio and PE
Malaysian IPO investors market sentiment index (MIMSI)	Hypothesis 3 (a)(viii)	There is a statistically significant positive relationship between Malaysian IPO investors market sentiment index and PE
Fundamental Factors		
Dividend premium (PDND)	Hypothesis 3 (a)(i)	There is a statistically significant negative relationship between dividend premium and PE
Growth of Industrial Production Index (GROW)	Hypothesis 3 (a)(ii)	There is a statistically significant positive relationship between growth of Industrial Production Index and PE
Short-term interest rate (INT)	Hypothesis 3 (a)(iii)	There is a statistically significant negative relationship between short-term interest rate and PE
Market volatility (MVL)	Hypothesis 3 (a)(iv)	There is a statistically significant negative relationship between market volatility and PE

Table 3.15 : Summary of hypotheses for price-earnings and its determinants

(Note: Table presents the hypotheses for examining the relationship between various macroeconomic, market-based, and sentiment-related factors and the price-earnings of IPOs. The factors are grouped into 2 main categories: (i) sentiment factors, which capture behavioural and confidence-driven market influences (i.e., consumer/business confidence, trading activity, and composite sentiment index); and (ii) fundamental factors, which reflect economic and market conditions (i.e., dividend premium, growth rate of industrial output, interest rate, and market volatility). Each hypothesis specifies the expected direction of association with PE and forms part of the broader analysis under Research Objective 3 (RO3) to understand IPO pricing dynamics)

(b) Hypothesis development for determinants that influence IPO underpricing during the regulatory changes

Based on the Securities Commission 1995 guidelines, all issuers must abide by the regulation addressing IPO pricing in which IPOs' prices should be established based on the PE (Jelic et al., 2001; Taufil Mohd, 2007). The guideline on IPO pricing is expected to reduce the underpricing level of Malaysian IPOs. The Securities Commission has established a guideline on the range of PE for each major industry and issuers are mandated to use the PE in this range to determine offer prices. Starting from 1996, issuers have the flexibility to price their offerings using their own valuation method, as the guideline of PE ranges was abolished. The reason being the PE ranges guideline restricts the market's role in the offer prices setting and accentuates using the accounting values in IPO pricing.

Zhou and Lao (2012) use data sample of 65 IPO firms listed in ChiNext to examine the possible influencing factors to IPO underpricing based on the empirical analysis. The findings evidence that the PE has negative relationship with the IPO underpricing in ChiNext. Further, Ong et al. (2021a) evidence that as the pricing of Malaysian IPOs is mostly based on the fixed-price mechanism, underwriters and issuers fix the offer prices lower due to the greater information asymmetry (Mohd-Rashid et al., 2018; Yong, 2015). IPO valuation has a negative effect on IPO underpricing in Malaysia stock market. Their findings is consistent with empirical studies (Beatty and Ritter, 1986; Rock, 1986), IPOs are undervalued at offer prices to compensate for the higher levels of information asymmetry among uninformed investors. This assumption is in line with the explanation of the winner curse's theory by Rock (1986).

With the changes in Malaysia's capital market structure in 2009 the relationship between PE and IPO underpricing remain questionable. Therefore, based on the discussion above, the IPO underpricing hypothesis is developed:

Hypothesis 3 (b) : PE is a key factor in IPO underpricing during changes in Malaysia's capital market structure

3.9.4 Model specifications for price-earnings analysis and IPO underpricing

These variables are commonly used in the literature as fundamental determinants of the PE. For instance, earnings growth, volatility of earnings and dividend payout are found to be important in explaining across-firm variation in the PE (Beaver and Morse, 1978; Zarowin, 1990; Cho, 1994; Fairfield, 1994). In time-series modelling of the aggregate PE, Reilly et al. (1983) document that inflation, earnings growth and dividend payout ratios are significant factors. Kane et al. (1996) report that market volatility exerts a negative effect on the PE. In a similar vein, others find that dividend payout ratios, interest rates, credit risk and economic growth rate are the most important determinants of the aggregate PE (Ramcharran, 2002; Shamsuddin and Hillier, 2004; Ang and Zhang, 2004).

(a) Ordinary least square regression model for price-earnings and its determinants

In this research, 3 single sentiment proxies have been selected namely, consumer confidence index (CCI), business confidence index (BCI), and turnover ratio (TURN). Also, this research applies the market sentiment which was constructed using PCA, sPCA and PLS methods as sentiment factors for comparative analysis.

$$\begin{aligned} PEDF_t = {} & \beta_0 + \beta_1 PDND_t + \beta_2 GROW_t + \beta_3 INT_t + \beta_4 MVL_t \\ & + \beta_5 \Delta CCI_t + \beta_6 \Delta BCI_t + \beta_7 TURN_t + \varepsilon_t \end{aligned} \tag{3.26}$$

$$\begin{aligned} PEDF_t = {} & \beta_0 + \beta_1 PDND_t + \beta_2 GROW_t + \beta_3 INT_t + \beta_4 MVL_t \\ & + \beta_5 MIMSI_t + \varepsilon_t \end{aligned} \tag{3.27}$$

where, $PEDF_t$ is the natural logarithm of price-earnings differential as the dependent variable. In this research, the independent variables of fundamental factors for PE including natural logarithm of dividend payout ratio $PDND_t$, growth of industrial production index $GROW_t$, short-term interest rate (INT_t), and market volatility (MVL_t). $PDND_t$ is the dividend premium for the respective IPO firms at the point of listing. $GROW_t$ is the growth rate of industrial production computed by natural logarithm of the first difference of industrial production index and acts as a proxy for aggregate earnings growth. INT_t is the first difference of 3-month treasury bill rates is taken as the short-term interest rate. MVL_t is the variance of stock market returns, it is a proxy of market-wide risk and the market volatility is calculated as stock variance for the monthly sum of squared daily returns of FTSE Bursa Malaysia KLCI.

The independent variables of sentiment factors for PE can be divided into 2 categories (i) using single-variable sentiment proxy such as consumer confidence index (ΔCCI_t) and taking their changes over time t-1 to t, business confidence index (ΔBCI_t) and taking their changes over time t-1 to t, and turnover ratio ($TURN_t$) as shown in Equation 3.26; and (ii) using the constructed Malaysian IPO market sentiment index (MIMSI) by applying PCA, sPCA and PLS methods as shown in Equation 3.27. Consumer confidence index (CCI) and business confidence index (BCI) are the information on survey-based sentiment provided by MIER's reports. Consumer confidence index (CCI) is an indicator that reflects the strength of consumer confidence. Business confidence index (BCI) is an indicator of future developments in Malaysia. This index is built with the opinions taken during regular surveys asking about progress in production, sales, orders, and stocks of finished goods in the manufacturing sector of Malaysia. Turnover ratio (TURN) is natural logarithm of the ratio of trading volume to market capitalisation and represents market liquidity. The MIMSI constructed using PCA, sPCA, and PLS methods using sentiment proxies including share turnover, number of IPOs, first-day returns of IPOs, dividend premium, and equity shares in new issues, consumer confidence index, and business conditions index. β_0 is the intercept of the equation. ε_t is the error term of the equation.

Besides, in this research the lagged PE is included in the PE regression model as shown in Equation 3.28 and 3.29. The PE is known for its high persistence, leading to autocorrelated residuals when OLS regression model is applied without a lagged dependent variable. In such cases, the OLS estimator becomes inefficient and the standard errors of the regression coefficients are biased. Incorporating a lagged dependent variable is an effective method to mitigate autocorrelation, as suggested by Kelly and Keele (2006) and Wilkins (2018), and aligns with the established literature on PE (Kane et al., 1996).

From an economic perspective, the inclusion of the lagged dependent variable is also compelling. It is hypothesized that, in any given period t, market participants adjust the PE by a positive fraction of the difference between the normal PE at time t and the PE from the previous period. This partial adjustment may stem from behavioural biases such as investor overconfidence and cognitive limitations, or from the costs associated with portfolio rebalancing. Regardless of the underlying cause, this adjustment results in a model where the PE at time t is a function of its value at time t-1, modified by new information contained in the independent variables at time t. The inclusion of a lagged dependent variable addresses autocorrelation, thereby enhancing the credibility and accuracy of the results for the other variables.

By inserting the lagged dependent variable, the final PE regression model is set out below:

$$\begin{aligned} PEDF_t = {} & \beta_0 + \beta_1 PDND_t + \beta_2 GROW_t + \beta_3 INT_t + \beta_4 MVL_t \\ & + \beta_5 \Delta CCI_t + \beta_6 \Delta BCI_t + \beta_7 TURN_t + \beta_8 (PEDF)t{-}1_t + \varepsilon_t \end{aligned} \tag{3.28}$$

$$\begin{aligned} PEDF_t = {} & \beta_0 + \beta_1 PDND_t + \beta_2 GROW_t + \beta_3 INT_t + \beta_4 MVL_t \\ & + \beta_5 MIMSI_t + \beta_6 (PEDF)t{-}1_t + \varepsilon_t \end{aligned} \tag{3.29}$$

(b) Quantile regression model for price-earnings analysis

The most popular analytical method in IPO research is the OLS regression model. The OLS is best used when the model is at best a linear unbiased estimate and the regression residuals are normally distributed. However, normality is generally an exception for Malaysian IPO data because of the outliers generated by fat-tailed distributions. Thus, OLS may not be the most efficient tool to estimate the linear and non-linear estimators. Hence, this research uses quantile regression to understand the model description regardless of the median, maximum or minimum percentile of the dependent variable. It provides the baseline and robust regression results of the quantile regression at the different quantiles (Q_q) (10th, 20th, 30th, 40th, 50th, 60th, 70th, 80th and 90th).

Further, this research uses quantile regression proposed by Koenker and Gilbert (1978) to examine the effects of independent variables at different levels of PE. A key advantage of using quantile regression is that it could provide a different impact at different levels of PE. The impacts of PE are evaluated using the left tail (10th quantile) and right tail (90th quantile), where q represents from 10th quantile to 90th quantile. The quantile regression equations are as follows:

$$\begin{aligned} Q_qPEDF_t = {} & \beta_0 + \beta_{q,1}PDND_t + \beta_{q,2}GROW_t + \beta_{q,3}INT_t \\ & + \beta_{q,4}MVL_t + \beta_{q,5}\Delta CCI_t + \beta_{q,6}\Delta BCI_t + \beta_{q,7}TURN_t \\ & + \beta_{q,8}(PEDF)t{-}1_t + \varepsilon_t \end{aligned} \qquad (3.30)$$

$$\begin{aligned} Q_qPEDF_t = {} & \beta_0 + \beta_{q,1}PDND_t + \beta_{q,2}GROW_t + \beta_{q,3}INT_t \\ & + \beta_{q,4}MVL_t + \beta_{q,5}MIMSI_t + \beta_{q,6}(PEDF)t{-}1_t + \varepsilon_t \end{aligned} \qquad (3.31)$$

(c) Ordinary least square regression model for determinants that influence IPO underpricing during the regulatory changes

In statistics, the OLS regression model, commonly referred to as a constant coefficient model, is employed to estimate unknown parameters within a linear regression model. The multivariate OLS regression model assumes constancy in both the intercept and coefficients (Sahudin et al., 2011). The use of this model is justified by its ability to disregard individual and time effects (Shah and Khan, 2007), while also minimising the error between the estimated and observed points on the line (Hill et al., 2008). Moreover, the multiple regression model identifies the linear relationship between IPO underpricing and PE with changes to capital market structure and various independent variables.

The below equation provides the association between the IPO underpricing determinants and MAIR as dependent variable based on OLS regression model:

$$\begin{aligned} MAIR_{it} = {} & \beta_0 + \beta_1PEDF_{it} + \beta_2CAPR_{it} + \beta_3PRICE_{it} + \beta_4TIME_{it} + \beta_5OVER_{it} \\ & + \beta_6MAJOR_{it} + \beta_7ROE_{it} + \beta_8MVL_{it} + \beta_9\Delta CCI_{it} + \beta_{10}\Delta BCI_{it} \\ & + \beta_{11}TURN_{it} + \varepsilon_{it} \end{aligned} \qquad (3.32)$$

$$MAIR_{it} = \beta_0 + \beta_1 PEDF_{it} + \beta_2 CAPR_{it} + \beta_3 PRICE_{it} + \beta_4 TIME_{it} + \beta_5 OVER_{it} + \beta_6 MAJOR_{it} + \beta_7 ROE_{it} + \beta_8 MVL_{it} + \beta_9 MIMSI_{it} + \varepsilon_{it} \quad (3.33)$$

where, $MAIR_{it}$ is the market adjusted first-day initial returns of firm. $PEDF_{it}$ represents natural logarithm of price-earnings differential by computing the difference of PE ratio of IPO firm on the listing day minus industrial PE ratio. $CAPR_{it}$ represents capital raised and is the natural logarithm of firm size worth value raised in the IPO. $PRICE_{it}$ represents offer price is the price offer at the IPO. $TIME_{it}$ represents process time is the number of days from the end of offer date to the first listing day. $OVER_{it}$ represents oversubscription ratio is the shares issued over shares subscribed in the IPO subscription period. $MAJOR_{it}$ represents major ownership is the percentage shareholdings owned by major shareholders prior to IPO. ROE_{it} is the return on equity at the fiscal year end before the IPO. MVL_{it} represents market volatility is the standard deviation of the daily FTSE Bursa Malaysia KLCI percentage return for the first one month (30 calendar days) after the IPO.

The independent variables of sentiment factors for PE can be divided into 2 categories: (i) using single sentiment proxy such as consumer confidence index (ΔCCI_{it}) and taking their changes over time t-1 to t, business confidence index (ΔBCI_{it}) and taking their changes over time t-1 to t, and turnover ratio ($TURN_{it}$) as shown in Equation 3.30; and (ii) using the constructed MIMSI by applying PCA, sPCA and PLS methods as shown in Equation 3.31. Consumer Confidence Index (CCI) and Business Confidence Index (BCI) are the information on survey-based sentiment provided by MIER's reports. Consumer Confidence Index (CCI) is an indicator that reflects the strength of consumer confidence. Business Confidence Index (BCI) is an indicator of future developments in Malaysia. This index is built with the opinions taken during regular surveys asking about progress in production, sales, orders, and stocks of finished goods in the manufacturing sector of Malaysia. Turnover ratio ($TURN_{it}$) is natural logarithm of the ratio of trading volume to market capitalisation and represents market liquidity. The $MIMSI_{it}$ was constructed using PCA, sPCA, and PLS methods by employing sentiment proxies including share turnover, number of IPOs, first-day returns of IPOs, dividend premium, and equity shares in new issues, consumer confidence index, and business conditions index. β_0 is the intercept of the equation. ε_{it} is the error term of the equation.

3.10 Summary of research objectives and methodology applied

Table 3.16 provides the summary of research objectives and applied methodology of this research.

No.	Research objectives	Methodologies
(a)	To examine the short-run underpricing and long-run aftermarket share performance of Malaysian IPOs.	Short-run: Initial Returns (IR), and Market Adjusted Initial Returns (MAIR). Long-run: Cumulative Average Abnormal Returns (CAAR), Buy-and-Hold Abnormal Returns (BHAR), and Wealth Relative (WR).
(b)	To identify the key fundamental and sentiment factors that contribute to the short-run and long-run IPO share performance of Malaysian IPOs.	OLS regression model, interaction analysis, binary regression model, and marginal analysis.
(c)	To analyse the impact of regulatory changes in Malaysia's capital market structure on IPO share performance, particularly examining how PE and market sentiment shape IPO pricing in the evolving regulatory landscapes.	OLS regression model, quantile regression model, and ANOVA test.

Table 3.16 : Summary of the research objectives and methodologies applied

(Note: Table presents the research objectives and the corresponding methodologies applied in this study for each objective)

3.11 Summary

This chapter provides computational summary of the variables of market sentiment determinants. The dependent variables are: MAIR for short-run share performance of IPOs, and BHAR for long-run share performance of IPOs, both are calculated from the daily closing prices of IPO issuing firm and market indices. This research emphasizes on the non-financial IPOs listed on Bursa Malaysia during the period from January 2000 to December 2020. The selection and determination of suitable research method depends on the formulation of independent and dependent variables, the source of data, and finally on the model specification and its estimations. In this regard, this research uses cross-sectional data. To capture the dynamic behaviour of IPOs, this research employs the econometric analysis using multi firm's cross-sectional data, i.e., OLS regression model, and binary regression model. Also, this research examines the effect of market sentiment that can be decomposed into short-run and long-run components.

Measuring investor sentiment has long posed challenges in the field of behavioural finance. Although the PCA method is capable of extracting unique information from variables, it is not without limitations. The use of proxy indicators in synthetic principal component factors may introduce substantial bias unrelated to the true sentiment of investors, thereby reducing the accuracy of the model. To address this limitation, this research employs the sPCA and PLS methods to reconstruct MIMSI. The research aims to assess the robustness and explanatory power of the index in relation to short-run initial returns and long-run abnormal returns in the Malaysian IPO markets.

On the other hand, this research is to further study and examine this issue in modelling PE regression model. Firstly, this research examines the role of market sentiment in explaining PE and these results were robust to quantile regression model. It aims to examine the key determinants that influence PE from a combination of both fundamental and sentiment factors in the Malaysian IPO market. Secondly, this research also aims to examine how the changes in Malaysia's capital market structure affect the dynamic between the IPO underpricing towards PE and the underlying factors during the different sub-periods as the impacts could be different in each sub-period.

CHAPTER 4 : RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter presents the results of the analysis conducted to address the research objectives. The first section focuses on the construction of Malaysian IPO Market Sentiment Index (MIMSI) used to examine the influence of IPO market sentiment on the IPO phenomenon in the Malaysian stock market. To construct the index, this research has employed 3 different methods: Baker and Wurgler's (2007) PCA, Jiang et al.'s (2022) sPCA, and Huang et al.'s (2015) PLS methods. These approaches were used to construct an IPO market sentiment index specifically tailored for the Malaysian stock market. Firstly, this section provides a comprehensive statistical analysis of IPO's short-run share performance using various methods, including OLS regression model, interaction analysis, binary regression model, and marginal analysis. Secondly, it also presents a statistical analysis of IPO's long-run share performance using various methods, including OLS regression model, interaction analysis, binary regression model, and marginal analysis. Thirdly, it examines the influence of changes in Malaysia's capital market on the Malaysian IPO market (also known as regulatory changes), with focus on IPO underpricing, price-earnings (PE), and market sentiment using OLS regression model, quantile regression model, and ANOVA test.

4.2 The construction of Malaysian IPO market sentiment index

4.2.1 Explanations for the differences in the PCA, sPCA and PLS methods

The top-down approach was used by Baker and Wurgler (2007) to study the theoretical effects of investor sentiment on various types of firms, resulting in the creation of a seesaw sentiment with shares on the x-axis that corresponds to the difficulty of valuing and arbitraging shares, and the prices indicating the fundamental values on the y-axis. A seesaw sentiment was created with shares on the x-axis that corresponded to the difficulty of valuing and arbitraging shares, while the prices indicate the fundamental values on the y-axis. High sentiment was found to be associated with high share valuation, particularly for firms that are the most difficult to value and arbitrate, whereas low sentiment worked in the opposite direction.

Nonetheless, it should be noted that the PCA method has limitations in terms of measurements. It is a descending dimension method for unsupervised learning, and as such, the first principal component may contain a substantial amount of common approximation errors that are irrelevant for forecasting the target variable. To address this issue, the PLS method was found to be suitable for constructing an investor sentiment index in the American stock market, as demonstrated by Huang et al. (2015). They used the PLS method to develop a new sentiment index based on an extension of Baker and Wurgler approach that aimed to align the investor sentiment measure with the purpose of predicting future share returns. By eliminating a common noise component in sentiment proxies, Huang et al. (2015) argue that their new index has much greater predictive power than existing sentiment indices.

Jiang et al. (2022) employ sPCA method which improves the conventional PCA by scaling each predictor with its predictive slope on the target to be forecasted. Unlike the PCA that maximises the common variation of the predictors, the sPCA assigns more weights to those predictors with stronger forecasting power. In a general factor framework, it shows that under some appropriate conditions on data, the sPCA forecast beats the PCA forecast, and when these conditions break down, extensive simulations indicate that the sPCA still has a large chance to outperform the PCA. A real data example on macroeconomic forecasting shows that the sPCA has better performance in general.

The variations in the outcomes of employing the PCA, sPCA, and PLS methods as independent variables can be attributed to their underlying principles and the approach they take for dimensionality reduction.

- PCA is a linear dimensionality reduction technique that aims to identify the principal components, which are linear combinations of the original variables that capture the most significant variance in the data. The first principal component captures the highest variance, and subsequent components explain less variance. However, PCA does not consider the relationship between the original variables and the target variable here refers to 'initial return' in this research. Consequently, the PCA components might not be directly relevant for predicting the target variable, leading to different results.

- sPCA, as the name suggests, applies PCA to scaled data rather than standardised data. Scaling each feature to a specific range (similar to the target variable 'initial return') maintains the original data magnitude. The scaling process can influence the principal components, as it alters the range and distribution of the features. Consequently, sPCA may produce different principal components compared to standard PCA, depending on the dataset characteristics and the importance of the original data scale.

- PLS is a dimensionality reduction technique based on regression, aiming to find linear combinations of the original variables that are predictive of the target variable, i.e. initial return. PLS seeks a latent structure that explains the covariance between predictors and the target. By explicitly considering the correlation between the original variables and the target, PLS generates different results compared to other methods. It focuses on maximising the covariance between the predictors and the target variable, making it particularly effective when there are strong predictive relationships between them.

In conclusion, the diverse dimensionality reduction strategies used by PCA, sPCA, and PLS results in different outcomes. While PLS prioritises maximising covariance with the target variable, PCA emphasises variance, and sPCA takes data scaling into account. The choice of the most suitable method depends on the specific characteristics of the dataset and the task's predictive requirements.

4.2.2 The construction of Malaysian IPO market sentiment index for short-run effect

In this research, in order to construct MIMSI specifically tailored for the Malaysian stock market, this research has employed 3 different methods: Baker and Wurgler's (2007) PCA, Jiang et al.'s (2022) sPCA, and Huang et al.'s (2015) PLS methods.

PCA is a multivariate method in which several unified quantitative variables describing the observations are reduced to produce single variable via dimensionality reduction. PCA aims to find and extract the most significant information from the data by compressing the size and simplifying the data without losing the important information (Abdi and Williams, 2010). sPCA is a new dimension reduction technique for supervised learning proposed by Huang et al. (2022). This method scales each predictor with its predictability for the target variable. Compared with the conventional PCA method, sPCA method improves the predictability for the target variable by capturing the useful information inside the target variable. According to Huang et al. (2022), the sPCA method could screen out noisier forecasters and assign shrinking weights to them by letting the target variable be the guide in the dimension reduction. They provide evidence that sPCA method generally improves the predictability of index compared to index generated using conventional PCA method, similarly, forecasting performance of index in the context of Malaysian IPO markets can be improved by using sPCA method. According to Huang et al. (2015), and Kelly and Pruitt (2014), compared with the conventional PCA method, the PLS method could separate the common noises which are irrelevant to the target variable from proxies, thus, leading to a more effective predictor.

In this research, Baker and Wurgler sentiment indicators are adopted as baseline regression because it is extensively accepted in various empirical studies. This study follows the same market-based sentiment measure adopted by Baker and Wurgler (2007) to formulate IPO market sentiment index namely, natural log of share turnover (TURN) representing the ratio of the trading volume to the total share capital, number of IPOs (NIPO) representing the number of IPOs, first-day returns of IPOs (RIPO) representing the first-day returns of IPOs, dividend premium (PDND) in this research, due to the availability of data in Malaysia the dividend premium was calculated using the fraction of net income of an issuing firm pays to its shareholders in the form of dividends, instead of the firm's dividend premium payable into between payers and non-payers at the end of financial year as explained by Baker and Wurgler (2007), and natural log of equity shares in new issues (ESNI) representing total number of total equity and debt issues by all firms. The proxy of close-end fund discount rate (CEFD) has been excluded in this research because there is only one close-end fund company listed on Main Market of Bursa Malaysia. Therefore, it could create biasness to analysis results. According to Naik and Padhi (2016), survey-based sentiment measure are commonly used in combination with market-based sentiment measure. In this research, we have selected two survey-based sentiment measure namely, business confidence index (BCI), and consumer confidence index (CCI). The data of TURN, NIPO, RIPO, PDND, ESNI, BCI and CCI are compiled based on quarterly basis in accordance with an IPO firm's listing date.

However, the central issue revolves around the selection of sentiment proxy variables. Considering that the indices published by different countries vary and market rules differ, it becomes necessary for each country to adapt the set of proxy variables based on their specific conditions.

(a) Principal component analysis

In this research, a composite index is created that captures the common component in the 7 proxies while also accounting for the fact that certain variables take longer to convey similar attitude. PCA method is used to reduce the dimensionality of huge data sets by reducing a large set of variables into a smaller one that retains most of the information. It is a statistical procedure that, using orthogonal transformation, transform those variables into a set of values, named principal components.

In this study, the use of only the first principal component is aligned with established practices in the literature on sentiment index construction (Baker and Wurgler, 2006), where the first principal component is selected as it captures the largest share of common variation across sentiment proxies and reflects the dominant latent sentiment factor. Based on Table 4.1, the correlation matrix of the extracted principal components indicates that PC_1 is strongly correlated with C_1, supporting its role as the dominant component capturing common sentiment variation. The remaining principal components (PC_2 - PC_7) show weaker correlations, reinforcing the decision to retain only the first principal component for index construction. Including additional principal components dilutes the interpretability of the index as a cohesive measure of sentiment by combining orthogonal elements (Johnson and Wichern, 2007).

The primary objective in constructing a sentiment index is to extract the dominant sentiment factor that captures the common variation among proxies, rather than to maximise the total variance by inserting additional principal components as explained. Using only the PC_1 aligns with this goal, as it encapsulates the most meaningful and interpretable signal of market sentiment. Table 4.1 shows the descriptive statistics and correlation matrix for the 7 principal components used in constructing the MIMSI.

Variable	N	Mean	Median	Maximum	Minimum	Std. Dev.
Panel A: Descriptive statistics						
TURN_{t-1} (C_1)	83	-.00000000135	.3994	2.6291	-4.0405	1.6318
NIPO_t (C_2)	83	-.00000000411	.0578	3.0252	-3.0931	1.3012
RIPO_{t-1} (C_3)	83	-.00000000220	-.1094	3.9473	-2.0640	1.0213
P_t^{DND} (C_4)	83	.00000000268	-.0613	2.3850	-1.1971	.8151
ESNI_t (C_5)	83	-.00000000701	.0545	1.5495	-1.7372	.6857
BCI_{t-1} (C_6)	83	-.00000000581	.0364	1.6914	-1.6489	.5103
CCI_t (C_7)	83	-.00000000163	-.0181	1.1866	-1.0786	.4534

Panel B: Correlation matrix							
	C_1	C_2	C_3	C_4	C_5	C_6	C_7
PC_1	.9616	.1046	-.0077	-.0280	.0356	.0467	-.0941
PC_2	-.1042	.9316	-.0194	-.0291	.2737	-.0381	.0224
PC_3	.0108	.0982	.8110	.1984	-.3885	.1578	.1415
PC_4	.0183	-.1773	.1741	.4755	.7324	-.0232	-.0188
PC_5	-.0319	-.0295	-.0535	-.2683	.1686	.7797	.3223
PC_6	-.1027	-.0836	-.0103	-.0614	.0760	.0761	-.2939
PC_7	.0488	.0303	.1586	-.1077	.0674	-.0021	.0899

Table 4.1 : Descriptive statistics and correlation matrix of principal components

(Note: Table represents descriptive statistics of principal components in terms of total number of observations 'N', mean value, median value, minimum, maximum and standard deviation. It also shows the correlation matrix of principal components)

Additionally, the transformation is defined in such a way that the first principal component explains the most variation and each succeeding component accounts for the highest variance possible. In very beginning standardisation is necessary, since PCA is sensitive to initial variable variances. Therefore, if initial variable ranges differ substantially, larger ranges will prevail, resulting in biased outcomes. To avoid such biasness, it is necessary to standardise the initial variables used as proxy for the composition of index. The equation below is representing the method for the standardisation of each proxy variable:

$$\mathcal{S}_{\mathrm{t}} = \frac{\mathrm{I}_{\mathrm{t}} - \overline{\mathrm{X}}}{\mathrm{SD}} \tag{4.1}$$

Here, $\mathcal{S}_{\mathrm{t}}$ is representing standardised form of each proxy variable in time t, and I stand for the value of specific observation in time. While $\overline{\mathrm{X}}$ and SD are the mean and standard deviations of the variable under standardisation process. The index begins by estimating the first principal component PC_{t} via 7 standardised proxies using lag and level forms in first stage of index generation. As per Baker and Wurgler (2006), the rule is to select the representation of each variable (among lag and level) having maximum correlation with PC_{t} for optimal representation of each variable for second stage of index generation.

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	PC_t	$TURN_t$	$NIPO_t$	$RIPO_t$	P_t^{DND}	$ESNI_t$	BCI_t	CCI_t	$TURN_{t-1}$	$NIPO_{t-1}$	$RIPO_{t-1}$	P_{t-1}^{DND}	$ESNI_{t-1}$	BCI_{t-1}	CCI_{t-1}
PC_t	1.0000														
$TURN_t$	0.8692	1.0000													
$NIPO_t$	-0.6792	-0.5259	1.0000												
$RIPO_t$	-0.3419	-0.2296	0.1517	1.0000											
P_t^{DND}	0.7345	0.6557	-0.3575	-0.2061	1.0000										
$ESNI_t$	0.0318	0.0175	0.2795	-0.0819	0.1618	1.0000									
BCI_t	0.4238	0.4995	0.0615	-0.1308	0.4651	0.2166	1.0000								
CCI_t	-0.5257	-0.2809	0.4441	0.3402	-0.2065	0.0974	0.1506	1.0000							
$TURN_{t-1}$	0.9020	0.8709	-0.5526	-0.1133	0.7338	0.0820	0.4586	-0.3410	1.0000						
$NIPO_{t-1}$	-0.6567	-0.5499	0.7716	0.0773	-0.3142	0.1409	0.0287	0.4310	-0.5269	1.0000					
$RIPO_{t-1}$	-0.4133	-0.2166	0.1763	0.5440	-0.1513	-0.0672	-0.1560	0.3649	-0.2272	0.1506	1.0000				
P_{t-1}^{DND}	0.7265	0.6052	-0.3812	-0.2435	0.4634	0.1545	0.2763	-0.2788	0.6639	-0.3577	-0.2061	1.0000			
$ESNI_{t-1}$	-0.0072	-0.0132	0.0733	-0.1530	0.0531	0.2224	0.1170	0.1582	-0.0215	0.2972	-0.0760	0.1656	1.0000		
BCI_{t-1}	0.4715	0.4065	0.0821	-0.0921	0.5962	0.2966	0.7754	0.0995	0.4916	0.0660	-0.1280	0.4673	0.1985	1.0000	
CCI_{t-1}	-0.4944	-0.3051	0.4556	0.3092	-0.1367	0.1789	0.1499	0.7386	-0.2702	0.4427	0.3387	-0.2071	0.1237	0.1622	1.0000

Table 4.2: Correlation matrix of first principal component of $MIMSI^{PCA}$

(Note: Table presents the pairwise correlation among first principal component in first stage with their set of sentiment variables. Where, PC_t is the first principal component, $TURN_t$ is share turnover, $NIPO_t$ is number of IPOs, $RIPO_t$ is first-day returns of IPOs, P_t^{DND} is dividend premium, $ESNI_t$ is equity shares in new issues, BCI_t is business confidence index, CCI_t consumer confidence index. Additionally, t and t-1 represent level and lagged values of each variable)

The results of correlations of first stage principal component with sentiment proxy variables in Table 4.2 suggests to select lagged for of TURN, RIPO and BCI, and level form of other proxies i.e. NIPO, ESNI and CCI for the second stage of index generation. Table 4.3 represents the results of second stage principal component analysis. Specifically, Panel A represents the proportion of total variance of all the sentiment proxies captured in each principal component. Panel B is represents the part of variance of each sentiment proxy coming into each principal component. By following the study of Baker and Wurgler (2007), this research uses first principal component (C_1) as sentiment index $(\mathrm{MIMSI}_t^{\mathrm{PCA}})$. The first principal component accounts for 38.04% of the variance observed in the data set, leading researcher to infer that a single factor captures significant portion of the shared variation.

Baker and Wurgler (2006) developed a widely cited investor sentiment index using 6 proxies, where the first principal component alone explained approximately 40% of total variance. They argued that the first principal component best captured the common time-series variation driven by investor sentiment. The findings confirm that the first principal component is often used as a standalone sentiment index when it captures the most dominant sentiment signal.

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	Eigen values	Difference	Proportion Explained	Cumulative Proportion Explained
Panel A: Variance in principal components				
C_1	2.6628	0.9696	0.3804	0.3804
C_2	1.6932	0.6501	0.2419	0.6223
C_3	1.0431	0.3787	0.149	0.7713
C_4	0.6644	0.1941	0.0949	0.8662
C_5	0.4703	0.2098	0.0672	0.9334
C_6	0.2604	0.0549	0.0372	0.9706
C_7	0.2056	-	0.0294	1.0000

Panel B: Variance from variables							
Variable	C_1	C_2	C_3	C_4	C_5	C_6	C_7
$TURN_{t-1}$	0.5558	0.0407	0.1678	0.0900	-0.0853	-0.2558	0.7619
$NIPO_t$	-0.3814	0.4458	-0.2494	-0.2069	0.4980	0.2691	0.4800
$RIPO_{t-1}$	-0.2590	0.1400	0.7375	0.5016	0.3309	-0.0856	-0.0319
P_t^{DND}	0.5144	0.2153	0.2218	-0.0243	0.0400	0.7811	-0.1660
$ESNI_t$	0.0578	0.5126	-0.4433	0.6849	-0.2409	-0.0395	-0.0931
BCI_{t-1}	0.3418	0.5238	0.0553	-0.3585	0.3025	-0.4922	-0.3786
CCI_t	-0.3062	0.4434	0.3420	-0.3151	-0.6957	0.0279	0.0931

Table 4.3: Principal components of $MIMSI^{PCA}$

(Note: Table represents the results of PCA. Where, Panel A represents the eigen values, differences between current eigen value and next eigen value, the proportion of all the proxies explained by each principal component in percentage and cumulative percentage of explanation in components. Additionally, C_1 to C_7 represent the number of principal components)

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Finally, Equation 4.2 represents detailed portion, direction and representation of each variable used to generate parsimonious sentiment index by PCA method:

$$\begin{aligned}\mathrm{MIMSI}_t^{\mathrm{PCA}} = {} & 0.5558\ \mathrm{TURN}_{t-1} - 0.3814\ \mathrm{NIPO}_t - 0.2590\ \mathrm{RIPO}_{t-1} \\ & + 0.5144\ \mathrm{P}_t^{\mathrm{DND}} + 0.0578\ \mathrm{ESNI}_t + 0.3418\ \mathrm{BCI}_{t-1} \\ & - 0.3062\ \mathrm{CCI}_t\end{aligned} \tag{4.2}$$

Equation (4.2) represents the linear combination of standardised sentiment proxies weighted by the first principal component loadings obtained through PCA. It is used to construct the unscaled sentiment index ($\mathrm{MIMSI}^{\mathrm{PCA}}$) for the short-run analysis. It reflects the dominant sentiment component extracted from the co-movement among the 7 principal components from Table 4.3, which is in line with standard PCA-based sentiment index construction as seen in prior studies, following the standard method of deriving a principal component based index.

Here, $\mathrm{MIMSI}_t^{\mathrm{PCA}}$ is the sentiment index generated by PCA method, TURN_{t-1} is lag of share turnover, NIPO_t is number of IPOs, RIPO_{t-1} is lag of closing returns of IPOs day, $\mathrm{P}_t^{\mathrm{DND}}$ is dividend premium, ESNI_t is equity shares in new issues, BCI_{t-1} is lag of business confidence index, CCI_t consumer confidence index. Detailed correlation of each sentiment proxy with final sentiment index is represented in Table 4.4 below.

	$\mathrm{MIMSI}_t^{\mathrm{PCA}}$	TURN_{t-1}	NIPO_t	RIPO_{t-1}	$\mathrm{P}_t^{\mathrm{DND}}$	ESNI_t	BCI_{t-1}	CCI_t
$\mathrm{MIMSI}_t^{\mathrm{PCA}}$	1.0000							
TURN_{t-1}	0.9070	1.0000						
NIPO_t	-0.6224	-0.5526	1.0000					
RIPO_{t-1}	-0.4227	-0.2272	0.1763	1.0000				
$\mathrm{P}_t^{\mathrm{DND}}$	0.8393	0.7338	-0.3575	-0.1513	1.0000			
ESNI_t	0.0943	0.0820	0.2795	-0.0672	0.1618	1.0000		
BCI_{t-1}	0.5578	0.4916	0.0821	-0.1280	0.5962	0.2966	1.0000	
CCI_t	-0.4996	-0.3410	0.4441	0.3649	-0.2065	0.0974	0.0995	1.0000

Table 4.4: Correlation of $\mathrm{MIMSI}^{\mathrm{PCA}}$

(Note: Table represents detailed correlation of $SENT_t^{PCA}$ sentiment index generated by PCA method with $TURN_{t-1}$ lag of share turnover, $NIPO_t$ number of IPOs, $RIPO_{t-1}$ lag of closing returns of IPOs day, P_t^{DND} dividend premium, $ESNI_t$ equity shares in new issues, BCI_{t-1} lag of business confidence index and CCI_t consumer confidence index)

The results of correlation table depict that, $MIMSI_t^{PCA}$ has 90.7% correlation with lag of share turnover, -62.24% with number of IPOs, -42.27% with lag of closing returns of IPOs day, 83.93% with dividend premium, 9.43% with equity shares in new issues, 55.78% with lag of business confidence index and -49.96% with consumer confidence index. The correlation coefficient between the 14-terms first-stage index and index $MIMSI_t^{PCA}$ is 96.16%, indicating that there is minimal loss of information after excluding the seven terms with different time subscripts.

(b) Scaled principal component analysis

In this research, we extracts the sPCA factors in 2 steps. First, by running a predictive regression of the target on each predictor and scale the predictor with the regression slope. Second, by applying the PCA method to the scaled predictors to obtain principal components as the sPCA factors. In this way, the sPCA tends to down-weight those predictors with weak forecasting power, while overweight those with strong forecasting power. As a result, the sPCA factors are more likely to outperform the PCA factors for forecasting and estimation purposes. The details of each of two steps is as follows:

Step 1: Given N number of orthogonalise sentiment proxies to be $(X_1, X_2, \ldots, X_N)$, obtain a panel of scaled predictors $(\widehat{\delta_1}X_1, \widehat{\delta_2}X_2, \ldots, \widehat{\delta_N}X_N)$ by running N times time-series regressions. More specifically, the scaled coefficient $\widehat{\delta_i}$ is the estimated slope that comes from regressing the target variable (market adjusted initial returns (MAIR) in this research) on the i^{th} sentiment proxy as follows:

$$MAIR_{t+h} = \vartheta_i + \delta_i X_{i,t} + \varepsilon_{t+h}; \qquad \text{Where } i = 1,2,\ldots,N \tag{4.3}$$

Consequently, the relationship between the i^{th} sentiment proxy and unobserved $SENT^{sPCA}$ can be represented in Equation 4.4, and values of estimated slop $\widehat{\delta_i}$ for all the sentiment proxies is represented in Table 4.4 bellow.

$$\delta_i X_{i,t} = \theta_i SENT^{sPCA} + e_{i,t} \tag{4.4}$$

	$\mathrm{TURN_t}$	$\mathrm{NIPO_t}$	$\mathrm{RIPO_t}$	$\hat{\mathrm{P}}_t^{\mathrm{DND}}$	$\widehat{\mathrm{ESNI}}_t$	$\mathrm{BCI_t}$	$\mathrm{CCI_t}$
$\widehat{\delta_1}$	-0.0218	0.0184	0.0640	-0.0282	-0.0231	-0.0181	0.0347
	(-1.64)	(1.37)	(5.55)	(-2.14)	(-1.74)	(-1.35)	(2.67)
R^2(%)	3.17	2.25	27.27	5.28	3.57	2.18	8.02

Table 4.5: Estimated slopes of $\mathrm{MIMSI^{PCA}}$

(Note: Table represents results of estimated slopes to be used to scale each sentiment proxy X_1 to X_N. The dependent variable in all regression models in columns one day ahead market adjusted initial returns $MAIR$ (as target variable). Values in parenthesis are t-statistics and R-squared is represented in percentage)

Step 2: In the second step the author used scaled predictors ($\widehat{\delta_1}\mathrm{X}_1$, $\widehat{\delta_2}\mathrm{X}_2, \ldots, \widehat{\delta_N}\mathrm{X}_N$) obtained in Step 1 to generate sentiment index by sPCA method. Since, the second step of sPCA is dimensionality reduction, same as conventional PCA (Huang et al., 2022), so this begins by estimating the first principal component $\mathrm{sPC_t}$ by 7 standardised proxies scaled for target variable using lag and level forms. Followed by the selecting optimal representation for second step based on highest correlation among lag and level forms of each proxy. Consequently, Table 4.6 represents correlation of first scaled principal component $\mathrm{sPC_t}$ with each sentiment proxy variable.

The results of correlation table (in Table 4.6) depict that, after scaling for the target variable the direction of correlation with all the sentiment proxies changed to positive. Specifically, compared to correlation matrix of first principal component of basic PCA in Table 4.2 the direction of lagged and level form of $\mathrm{NIPO_t}$, $\mathrm{RIPO_t}$ and $\mathrm{CCI_t}$ is changed from negative to positive. However, the size of correlation is same since the data of standardised variables is same. Consequently, the optimal representation of sentiment proxies in second stage sPCA as per Baker and Wurgler (2007) is same. The equation 4.5 represents optimal representation of proxy variables.

$$\begin{aligned}\mathrm{MIMSI}_t^{\mathrm{sPCA}} = {} & 0.5558\, TURN_{t-1} + 0.3814\, NIPO_t + 0.2590\, RIPO_{t-1} \\ & + 0.5144\, P_t^{DND} + 0.0578\, ESNI_t + 0.3418\, BCI_{t-1} \\ & + 0.3062\, CCI_t\end{aligned} \tag{4.5}$$

Equation (4.5) mirrors the structural form of Equation (4.2) but applies sPCA method, where all sentiment proxies are pre-scaled, typically by their standard deviation, to equalise their influence and avoid dominance by high-variables with high variance. Although both equations use the same mathematical form, they are based on distinct input matrices and scaling procedures. Equation (4.5) thus yields a separate sentiment index ($\mathrm{MIMSI}^{\mathrm{sPCA}}$) that reflects the first principal component from the scaled input.

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	sPC_t	$TURN_t$	$NIPO_t$	$RIPO_t$	P_t^{DND}	$ESNI_t$	BCI_t	CCI_t	$TURN_{t-1}$	$NIPO_{t-1}$	$RIPO_{t-1}$	P_{t-1}^{DND}	$ESNI_{t-1}$	BCI_{t-1}	CCI_{t-1}
sPC_t	1.0000														
$TURN_t$	0.8692	1.0000													
$NIPO_t$	0.6792	0.5259	1.0000												
$RIPO_t$	0.3419	0.2296	0.1517	1.0000											
P_t^{DND}	0.7345	0.6557	0.3575	0.2061	1.0000										
$ESNI_t$	0.0318	0.0175	-0.2795	0.0819	0.1618	1.0000									
BCI_t	0.4238	0.4995	-0.0615	0.1308	0.4651	0.2166	1.0000								
CCI_t	0.5257	0.2809	0.4441	0.3402	0.2065	-0.0974	-0.1506	1.0000							
$TURN_{t-1}$	0.9020	0.8709	0.5526	0.1133	0.7338	0.082	0.4586	0.3410	1.0000						
$NIPO_{t-1}$	0.6567	0.5499	0.7716	0.0773	0.3142	-0.1409	-0.0287	0.4310	0.5269	1.0000					
$RIPO_{t-1}$	0.4133	0.2166	0.1763	0.5440	0.1513	0.0672	0.1560	0.3649	0.2272	0.1506	1.0000				
P_{t-1}^{DND}	0.7265	0.6052	0.3812	0.2435	0.4634	0.1545	0.2763	0.2788	0.6639	0.3577	0.2061	1.0000			
$ESNI_{t-1}$	-0.0072	-0.0132	-0.0733	0.1530	0.0531	0.2224	0.1170	-0.1582	-0.0215	-0.2972	0.076	0.1656	1.0000		
BCI_{t-1}	0.4715	0.4065	-0.0821	0.0921	0.5962	0.2966	0.7754	-0.0995	0.4916	-0.066	0.128	0.4673	0.1985	1.0000	
CCI_{t-1}	0.4944	0.3051	0.4556	0.3092	0.1367	-0.1789	-0.1499	0.7386	0.2702	0.4427	0.3387	0.2071	-0.1237	-0.1622	1.0000

Table 4.6: Correlation matrix of first principal component of $MIMSI^{sPCA}$

(Note: Table presents the pairwise correlation among first principal component in first stage with set of scaled sentiment variables. Where, sPC_t is first principal component , $TURN_t$ is share turnover, $NIPO_t$ is number of IPOs, $RIPO_t$ is first-day returns of IPOs, P_t^{DND} is dividend premium, $ESNI_t$ is equity shares in new issues, BCI_t is business confidence index, CCI_t consumer confidence index. Additionally, t and t-1 are representing level and lagged values of each variable)

	Eigen values	Difference	Proportion Explained	Cumulative Proportion Explained
Panel A: Variance in principal components				
sC_1	2.6628	0.9696	0.3804	0.3804
sC_2	1.6932	0.6501	0.2419	0.6223
sC_3	1.0431	0.3787	0.149	0.7713
sC_4	0.6644	0.1941	0.0949	0.8662
sC_5	0.4703	0.2098	0.0672	0.9334
sC_6	0.2604	0.0549	0.0372	0.9706
sC_7	0.2056	-	0.0294	1.0000

Panel B: Variance form variables							
Variable	sC_1	sC_2	sC_3	sC_4	sC_5	sC_6	sC_7
$TURN_{t-1}$	0.5558	0.0407	-0.1678	0.0900	0.0853	0.2558	-0.7619
$NIPO_t$	0.3814	-0.4458	-0.2494	0.2069	0.4980	0.2691	0.4800
$RIPO_{t-1}$	0.2590	-0.1400	0.7375	-0.5016	0.3309	-0.0856	-0.0319
P_t^{DND}	0.5144	0.2153	-0.2218	-0.0243	-0.0400	-0.7811	0.1660
$ESNI_t$	0.0578	0.5126	0.4433	0.6849	0.2409	0.0395	0.0931
BCI_{t-1}	0.3418	0.5238	-0.0553	-0.3585	-0.3025	0.4922	0.3786
CCI_t	0.3062	-0.4434	0.3420	0.3151	-0.6957	0.0279	0.0931

Table 4.7: Principal components of $MIMSI^{sPCA}$

(Note: Table represents the results of sPCA. Where, Panel A is representing the eigen values, differences between current eigen value and next eigen value, the proportion of all the proxies explained by each principal component in percentage and cumulative percentage of explanation in components. Additionally, sC_1 to sC_7 are representing the number of scaled principal components)

Table 4.7 represents the results of second stage of sPCA. Specifically, Panel A represents the proportion of total variance of all the sentiment proxies captured in each principal component. And, Panel B is representing the part of variance of each sentiment proxy coming into each principal component. Compared to the results of conventional PCA (in Table 4.2) the direction of explanation from sentiment proxies such as $NIPO_t$, $RIPO_{t-1}$ and CCI_t has changed from negative to positive.

Following the study by Baker and Wurgler (2006), first principal component (sC_1) generated by sPCA is used as IPO sentiment index ($MIMSI_t^{sPCA}$). The first principal component carries 38.04% of the explanation in the scaled proxy variables, leading author to conclude that first captures significant portion of the shared variation. Table 4.8 below is representative of correlation matrix, representing the correlation of $MIMSI^{sPCA}$ with proxies of sentiments. Where, all the proxies are positively correlated with $MIMSI^{sPCA}$ depicting that the index is explaining all the proxies in same direction instead of different directions compared to basic PCA index in Table 4.4.

	$MIMSI_t^{sPCA}$	$TURN_{t-1}$	$NIPO_t$	$RIPO_{t-1}$	P_t^{DND}	$ESNI_t$	BCI_{t-1}	CCI_t
$MIMSI_t^{sPCA}$	1.0000							
$TURN_{t-1}$	0.9070	1.0000						
$NIPO_t$	0.6224	0.5526	1.0000					
$RIPO_{t-1}$	0.4227	0.2272	0.1763	1.0000				
P_t^{DND}	0.8393	0.7338	0.3575	0.1513	1.0000			
$ESNI_t$	0.0943	0.0820	-0.2795	0.0672	0.1618	1.0000		
BCI_{t-1}	0.5578	0.4916	-0.0821	0.1280	0.5962	0.2966	1.0000	
CCI_t	0.4996	0.3410	0.4441	0.3649	0.2065	-0.0974	-0.0995	1.0000

Table 4.8: Correlation of $MIMSI^{sPCA}$

(Note: Table represents detailed correlation of $SENT_t^{sPCA}$ sentiment index generated by sPCA method with $TURN_{t-1}$ lag of share turnover, $NIPO_t$ number of IPOs, $RIPO_{t-1}$ lag of closing returns of IPOs day, P_t^{DND} dividend premium, $ESNI_t$ equity shares in new issues, BCI_{t-1} lag of business confidence index and CCI_t consumer confidence index)

(c) Partial least squares

Here, we used first lag of sentiment factor as dependent variables. We use the one-quarter-ahead of initial returns as the target variable and the orthogonalise sentiment proxies $(X_1, X_2, \dots, X_N)$ to construct market sentiment using PLS method are as follows:

Step 1 : Let $(X_{1,t}, X_{2,t}, \dots, X_{N,t})$ be the $T \times N$ matrix of orthogonalise sentiment proxies. The key idea is to use the PLS method to extract the unobservable IPO investor sentiment $MIMSI_t$ from the cross-section according to its covariance with future initial returns. In the first step, N time-series regressions are conducted.

$$X_{i,t-1} = \pi_{i,0} + \pi_i(MAIR_t) + \mu_{i,t-1}; \qquad \text{Where } i = 1,2,\dots,T \qquad (4.6)$$

the coefficient π_i presents how each sentiment measure.

	$TURN_t$	$NIPO_t$	$RIPO_t$	P_t^{DND}	$ESNI_t$	BCI_t	CCI_t
$\hat{\pi}_i$	0.2315	5.2514	3.0125	-6.0614	-1.2344	-18.9348	45.8383
	(0.87)	(0.95)	(5.48)	(-1.38)	(-0.27)	(-0.89)	(2.90)
R^2(%)	0.94	1.10	27.07	2.30	0.09	0.98	9.39

Table 4.9: Predictions for each sentiment proxy for PLS

(Note: Table represents the results of estimated slopes of MAIR as π_i. The dependent variable used in all regression models is lag of variables mentioned as columns header. Values in parenthesis are t-statistics and R-squared is represented in percentage)

Step 2 : We use the estimated loading from Step 1, and x_{it} to run T cross-sectional regressions: for each period t, we run a cross-sectional regression of x_{it} on the corresponding loading $\hat{\pi}_i$.

$$x_i = c_i + \hat{\pi}_i SENT^{PLS} + v_i; \qquad \text{Where } i = 1,2,\dots,N \qquad (4.7)$$

sentiment index we mentioned above. This approach uses time t+1 initial returns to extract $SENT^{PLS}$ from individual sentiment proxies, therefore, $SENT^{PLS}$ is only relevant for predicting initial returns and separated from the component that is irrelevant for predictions.

4.2.3 Robustness checks on construction of Malaysian IPO market sentiment index

The significance of robustness checks in this research is to maintain consistency in variable selection. Besides, the conduct robustness checks is to ensure the validity and robustness of results. Table 4.10 shows the robustness checks for the construction of MIMSI using PCA, sPCA and PLS methods.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	$TURN_t$	$NIPO_t$	$RIPO_t$	P_t^{DND}	$ESNI_t$	BCI_t	CCI_t
Panel A : Robustness for PCA							
Term	-1.2222***	-.1498***	-.9327***	.3299***	.3826***	.0335***	-.0645***
	(-4.67)	(-19.52)	(-8.54)	(38.29)	(4.48)	(12.38)	(-15.50)
Constant	-.8261***	.9200***	-.5524***	-4.0682***	-9.1795***	-4.0642***	5.9878***
	(-12.07)	(8.68)	(-7.39)	(-44.60)	(-4.94)	(-15.31)	(13.42)
Panel B : Robustness for sPCA							
Term	1.2222***	.1498***	.9327***	-.3299***	-.3826***	-.0335***	.0645***
	(4.67)	(19.52)	(8.54)	(-38.29)	(-4.48)	(-12.38)	(15.50)
Constant	.8261***	-.9200***	.5524***	4.0682***	9.1795***	4.0642***	-5.9878***
	(12.07)	(-8.68)	(7.39)	(44.60)	(4.94)	(15.31)	(-13.42)
Panel C : Robustness for PLS							
Term	-.1294	.0155***	.2152***	-.0411***	-.0859***	-.0086***	.0160***
	(-.25)	(8.69)	(10.56)	(-15.65)	(-5.27)	(-18.92)	(23.81)
Constant	.8488***	.6625***	-.7760***	1.2473***	2.7151***	1.6768***	-.8577***
	(63.29)	(26.74)	(55.61)	(44.87)	(7.65)	(37.26)	(-11.87)
N	564	564	564	564	564	564	564

Table 4.10: Robustness checks in the construction of Malaysian IPO market sentiment index using PCA, sPCA and PLS methods

(Note: Table presents the robustness checks for the MIMSI using PCA, sPCA, and PLS methods ensuring consistency in variable selection and validity of results)

4.2.4 Summary on construction of Malaysia IPO market sentiment index

This chapter reviews the related theories and concepts in behavioral finance and market sentiment. The characteristics of the sentiment index, and the principles of the PCA, sPCA and PLS methods are expounded and compared.

Overall, PLS method is able to extract as much as possible from the sentiment proxy variable and the initial returns rate-related part, rather than just eliminating the so-called ‘principal component’ like the PCA method, which is highly likely to include indices containing other components that are not related to market sentiment will inevitably lead to poor index accuracy and poor regression results. The index constructed by the PLS method well separates the part that is not related to the initial returns. As opposed to the conventional PCA method, sPCA improves the predictability for the target variable by capturing the useful information inside the target variable, this could screen out noisier forecasters and assign shrinking weights to them by letting the target variable be the guide in the dimension reduction.

4.3 Analysis of short-run share performance of IPOs (IPO underpricing)

This section describes the analysis of IPO's short-run share performance. Firstly, this section explains the aggregate IPO underpricing in Malaysia, descriptive statistics, and diagnostic test. Secondly, this section explains the determinants of IPO's short-run share performance based on OLS and binary regression models. Interaction analysis and margin probability analysis are also examined to explain IPO's short-run share performance.

4.3.1 Aggregate short-run share performance of IPOs

As discussed in Chapter 3, the short-run share performance of IPOs is measured based on the IR, and MAIR. IR is calculated as the difference between the closing price of FTSE Bursa Malaysia KLCI on the first day of trading and the offer price. However, MAIR is calculated as the difference between IPO's first day returns in corresponding to the total market return. In the IPO's short-run IPO share performance, MAIR is used as a dependent variable in this research to examine the underpricing phenomena of IPOs in Malaysia.

Table 4.11 provides the summary statistics of IPO underpricing of 571 IPOs listed on Bursa Malaysia from January 2000 to December 2020 and segmented into sub-periods.

	N	Mean	Median	Max	Min	Std. Dev
IR	571	.2852	.1500	8.6178	-.7069	.5927
– Pre-Changes	379	.3119	.1857	2.6363	-.6666	.4918
– Transitional	18	.3769	-.1265	8.6178	-.7069	2.0773
– Post-Changes	174	.2175	.0968	4.0416	-.4285	.4449
MAIR	571	.2848	.1392	8.6443	-.7363	.5897
– Pre-Changes	379	.3108	.1796	2.6403	-.6309	.4867
– Transitional	18	.4015	-.0334	8.6443	-.7363	2.0771
– Post-Changes	174	.2160	.1033	4.0342	-.3551	.4432

Table 4.11 : IPO underpricing segmentation by sub-periods

(Note: Table presents descriptive statistics for initial returns and market adjusted initial returns measure IPO underpricing for 571 Malaysian IPOs from January 2000 to December 2020. 'N' is the total number of firms, 'IR' is Initial Returns and 'MAIR' is Market Adjusted Initial Returns. Pre-Changes is from 1 January 2000 to 24 March 2008, Transitional is from 25 March 2008 to 3 August 2009, and Post-Changes is from 4 August 2009 to 31 December 2020. Full sample period is from 1 January 2000 to 31 December 2020)

Year	N	IR	t-stat	MAIR	t-stat
2000	38	.6077	8.0731***	.6367	8.4866***
2001	20	.1847	1.3827***	.2369	1.9658***
2002	51	.1840	3.8045***	.1840	3.9953***
2003	58	.4287	6.9561***	.4006	6.4846***
2004	72	.4111	6.5172***	.3974	6.3379***
2005	75	.1731	2.8036***	.1629	2.6466***
2006	35	.2249	3.6455***	.2487	3.8091***
2007	22	.3371	4.6192***	.3233	4.3943***
2008	23	.2244	0.5826***	.2578	0.6702***
2009	14	.1355	2.4184***	.1255	2.2059***
2010	27	.0969	1.5630***	.0852	1.3657***
2011	25	.2160	2.8856***	.2280	2.9759***
2012	14	.3657	1.2872***	.3525	1.2384***
2013	16	.2666	2.7653***	.2656	2.7523***
2014	13	.1839	2.5011***	.1983	2.7815***
2015	9	.3005	2.5268***	.3051	2.6257***
2016	11	.1891	4.996***	.1895	4.7333***
2017	10	.1517	4.1381***	.1466	3.7975***
2018	11	.3772	2.6177***	.3668	2.5991***
2019	15	.1607	1.6733***	.1590	1.6581***
2020	12	.3509	2.3206***	.3537	2.5165***
Overall	571	.2852	11.4971	.2848	11.5416

Table 4.12 : IPO underpricing segmentation by listing years

*(Note: Table represents the year distribution of IPO underpricing for 571 Malaysian IPOs from January 2000 to December 2020. 'N' is the total number of firms per years, 'IR' is initial returns and 'MAIR' is market adjusted initial returns. t-statistic is given with significance level as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level)*

It is observed from Table 4.10 that the mean IR is 28.52% while the mean MAIR is 28.48%. However, the median IR and MAIR are 15.00% and 13.92%, respectively. The highest returns based on IR and MAIR are 861.78% and 864.43%, respectively; and the lowest returns based on IR and MAIR are -70.69% and -73.63%, showing a large variability among returns as standard deviation is 59.27 and 58.97, respectively. Furthermore, Table 4.10 shows that the mean is greater than the median for both IR and MAIR, implying that the returns are positively skewed.

Besides, the mean values across the sub-periods reveal important insights into the dynamics of IPO underpricing in the Malaysian market. During the Pre-Changes period, the mean of IR is 31.19%, reflecting relatively high IPO underpricing. This figure increased further to 37.69% in the Transitional period, suggesting heightened uncertainty or speculative investor sentiment amid ongoing regulatory or capital market's structural adjustments. However, the mean IR declined to 21.75% in the Post-Changes period, indicating a moderation in IPO underpricing, which may be attributed to improved regulatory oversight and greater market efficiency.

A similar pattern is observed in the MAIR, where the mean value is 31.08% in the Pre-Changes period and rose to 40.15% during the Transitional phase. Subsequently, the mean MAIR dropped to 21.60% in the Post-Changes period. This consistent decline in both IR and MAIR from the Transitional to Post-Changes period suggests a shift from sentiment-driven to more fundamentally driven IPO pricing, reflecting the maturing of the Malaysian capital market following regulatory reforms.

Table 4.12 provides the year distribution of IPO's short-run share performance in Malaysia from January 2000 to December 2020. The findings show that the IPOs are underpriced across all the time periods from January 2000 to December 2020. This means that investors earned positive initial returns by investing in IPOs. The highest level of underpricing is recorded in 2000 where IPO's firm is on average underpriced at 63.67% in year 2000. The underpricing from year 2005 onwards shows a decreasing trend ranges from 8.52% to 36.68%. This implies that Malaysian investors could earn initial returns if they bought the IPO share at the IPO offer price and sell it on the market price at the first trading day. This evidence is consistent with the previous Malaysian studies (Dawson, 1987; Yong and Isa, 2003; Mohamed et al., 1994; Paudyal et al., 1998; Jelic et al., 2001). Nevertheless, the degree of IPO underpricing varies significantly across markets. Ritter (1998) evidence that the average initial return of new listings in 33 countries ranged from 13.60% to 388.00% in the developing market and 4.20%

to 54.40% in the developed market. Initial underpricing of new listings on Bursa Malaysia was ranked among the top 5 in the list. It highlights that a more developed market registers a lower level of underpricing than an emerging market.

Table 4.13 provides the listing board of short-run share performance of IPOs in Malaysia from January 2000 to December 2020.

Board listing	N	IR	t-stat	MAIR	t-stat
Main Market	364	.2462	8.3147***	.2467	8.3599***
ACE Market	207	.3538	8.0235***	.3518	8.0392***

Table 4.13 : IPO underpricing segmentation by board listing

*(Note: Table represents the board listing distribution of IPO underpricing for 571 Malaysian IPOs are shown from January 2000 to December 2020. 'N' is the total number of firms per year, 'IR' is initial returns and 'MAIR' is market adjusted initial returns. t-statistic is given with significance level as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level)*

From Table 4.13, it can be observed that the phenomenon of IPO underpricing is greater in the ACE Market compared to the Main Market with IR of 35.38% and 24.62%; and MAIR of 35.18% and 24.67%, respectively. This means that investors earned higher positive initial returns by investing in IPOs listed on ACE Market. MAIR and IR are not significantly different from each other. ACE market has recorded a MAIR of 35.18%, and Main Market has recorded a MAIR of 24.67%.

4.3.2 Descriptive statistics of the independent variables for short-run share performance of IPOs

Table 4.14 provides the descriptive summary of the independent variables of short-run share performance of IPOs.

Independent variables	N	Mean	Median	Max	Min	Std. Dev
Panel A : Behavioural Characteristics						
$MIMSI^{PCA-SR}$	504	.0656	.0656	.4506	-.3511	.1331
$MIMSI^{sPCA-SR}$	504	-.0656	-.0656	.3511	-.4506	.1331
$MIMSI^{PLS-SR}$	504	-.0165	-.0151	.1048	-.0893	.0377
Panel B : Issue Characteristics						
IPOP	571	14.3432	15.0000	30.0000	0	5.8175
PRICE	571	1.5238	.8500	23.0000	0	2.8287
OSIZE	571	17.2912	17.0379	23.2489	0	1.7113
ICOR	571	14.4692	20.0000	18.8450	0	1.8684
Panel C : Firm Characteristics						
BOOK	571	.6219	.5300	3.3400	0	.5365
FAGE	571	18.2644	16.0000	75.0000	0	11.1269
Panel D : Market Characteristics						
MVL	571	.7055	.6300	2.7000	.2100	.3612
OVER	571	27.9505	13.5900	377.9600	-78.00	43.3634

Table 4.14 : Descriptive summary of independent variables (short-run share performance of IPOs)

(*Note: Table provides descriptive summary of independent variables in terms of total number of observations 'N', mean value, median value, minimum, maximum and standard deviation. The dummy variables (i) underwriter reputation, (ii) hot issue market, and (iii) board listing are excluded from the table)*

Table 4.14 provides the overall summary of the behavioural, issue, firm, and market characteristics variables. The behavioural characteristic comprise a variable using 3 different methods in constructing MIMSI such as PCA, sPCA, and PLS methods. The issue characteristics variables comprise IPO period (IPOP), offer price (PRICE), offer size (OSIZE), and issue cost ratio (ICOR). The firm characteristics variables comprise book value per share (BOOK), and firm age (FAGE). The market characteristics variables comprise market volatility (MVL), and oversubscription ratio (OVER). The underwriter reputation (UREP), hot issue market (HOT), and board listing (BLIST) are not included in the descriptive summary as these are dummy variables.

Table 4.14 (Panel A) provides the descriptive summary of the behavioural characteristics variable. The behavioural characteristics variable comprise IPO market sentiment constructed using 3 different methods including PCA, sPCA and PLS methods. The descriptive summary about IPO market sentiment (using PCA method) illustrates that the mean and median $MIMSI^{PCA-SR}$ are 6.56% and 6.56%, respectively. The positive value of $MIMSI^{PCA-SR}$ shows that there is optimistic perception of investors towards Malaysian IPO market. The maximum market sentiment over the sample reaches to 45.06%, however, it drops to the lowest level of -35.11%, with a standard deviation of 13.31%. This indicates that in Malaysia there is some variations in terms of the market sentiment within IPO market. Similarly, the descriptive summary about IPO market sentiment (using sPCA method) illustrates that the mean and median $MIMSI^{sPCA-SR}$ are -6.56% and -6.56%, respectively. The negative value of $MIMSI^{sPCA-SR}$ shows that there is pessimistic perception of investors towards Malaysian IPO market. The maximum and minimum values are 35.11% and -45.06%, respectively with a standard deviation of 13.31%. This indicates that in Malaysia there is some variations in the market sentiment within IPO markets. On the other hand, the descriptive summary about IPO market sentiment (using PLS method) illustrates that the mean and median $MIMSI^{PLS-SR}$ are -1.65% and -1.51%, respectively. The negative value of $MIMSI^{PLS-SR}$ shows that there is pessimistic perception among investors towards Malaysian IPO market. The maximum and minimum values are 10.48% and -8.93%, respectively with a standard deviation of 3.77%.

Table 4.14 (Panel B) provides the descriptive summary of the issue characteristics variables. The issue characteristics variables include IPO period (IPOP), offer price (PRICE), offer size (OSIZE), and issue cost ratio (ICOR). The descriptive summary about IPO period (IPOP) illustrates that the mean and median IPO period (IPOP) are 14.3432 and 15, respectively. The maximum and minimum values are 30 and 0, respectively with a standard deviation of 5.8175. This indicates that in Malaysian IPO market the period of issue new IPO shares can take as long as 30 days. Similarly, the mean and median value of offer price (PRICE) are 1.5238 and 0.8500, respectively. The maximum value is 23 and minimum value is 0 with a standard deviation of 2.8287. The descriptive summary about offer size shows that the mean and median value of offer size (OSIZE) are 17.2912 and 17.0379, respectively. The maximum value is 23.2489 and minimum value is 0 with a standard deviation of 1.7113. On the other hand, the mean and median value of issue cost ratio (ICOR) are 14.4692 and 20, respectively. The maximum value is 18.8450 and minimum value is 0 with a standard deviation of 1.8684. The underwriter reputation is excluded from the descriptive summary as it is dummy variable.

Table 4.14 (Panel C) provides the descriptive summary of the firm characteristics variables. The firm characteristics variables include book value per share (BOOK), and firm age (FAGE). The mean and median value of book value per share (BOOK) in Malaysia is 0.6219 and 0.53, respectively. The maximum value is 3.34 and minimum value is 0 with a standard deviation of 0.5365. Similarly, the mean and median value of firm age (FAGE) in Malaysia is 18.2644 and 16 with maximum and minimum value of 75 and 0, respectively. The standard deviation of 11.1269 shows that there is some variation in the firm age of Malaysia.

Table 4.14 (Panel D) provides the descriptive summary of the market characteristics variables include market volatility (MVL), and oversubscription ratio (OVER). The data related market volatility (MVL) shows that the mean market volatility in Malaysia is 0.7055 and median is 0.63, respectively. The maximum and minimum value of the market volatility are 2.7 and 0.21, respectively with the standard deviation of 0.3612. This shows that in Malaysia market volatility remains stable at the time of public offerings during the period from January 2000 to December 2020. The data related oversubscription ratio (OVER) shows that the mean oversubscription ratio in Malaysia is 27.9505 and median is 13.59, respectively. The maximum and minimum value of the oversubscription ratio (OVER) are 377.96 and -78.00, respectively with the standard deviation of 43.3634. This shows that in Malaysia the IPO market oversubscription ratio are high at the time of public offerings during the period from January 2000 to December 2020. The hot market is excluded from the descriptive summary as it is dummy variable.

4.3.3 Diagnostic tests for regression analysis (short-run share performance of IPOs)

This research is based on quantitative analysis of secondary data by following different regression models. The data for regression models should fulfil these basic assumptions (a) collinearity, (b) homoscedasticity, and (c) normality. The following subsections explain the results of diagnostic tests used in this research for the regression analysis of short-run share performance of IPOs.

(a) Collinearity

The regression model is always exposed to one of the main problems of collinearity. The problem which commonly arises in all research, particularly in social science is that of multicollinearity. The multicollinearity issue is an outcome of very strong correlation between the variables despite of the fact that no innovative information is added to the regression model. The regression coefficients became imprecise whenever the variables are highly correlated to each other. Moreover, it becomes difficult to assign the change in the dependent variable precisely to one or the other of the explanatory variables. In general, researchers suggested that the correlation between variables should not be more than 70%. The correlation more than 70%, usually leads to the problem of multicollinearity. In order to examine the collinearity among variables, this research used correlation matrix and vector inflation factor (VIF) analysis. The result of the correlation matrix of all the variables is tabulated in Table 4.15.

The variables are Malaysian IPO market sentiment (MIMSI), IPO period (IPOP), IPO price (PRICE), offer size (OSIZE), issue cost ratio (ICOR), underwriter reputation (UREP), book value per share (BOOK), firm age (FAGE), market volatility (MVL), oversubscription ratio (OVER), hot issue market (HOT), and board listing (BLIST). The correlation coefficients are given with their significance level of 1% and 5%. The result indicates that there is no problem of multicollinearity among variables. The correlation coefficients of all the variables are less than 0.7 which entails that variables are not highly correlated to each other.

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	MIMSI^{PCA-SR}	MIMSI$^{sPCA-SR}$	MIMSI^{PLS-SR}	IPOP	PRICE	OSIZE	ICOR	UREP	BOOK	FAGE	MVL	OVER	HOT	BLIST
MIMSI	1.000	1.000	1.000											
IPOP	.0054	-.0054	-.0684	1.000										
PRICE	.2786	-.2786	-.0376	.0682	1.000									
OSIZE	-.0521	.0521	.1205	.0527	.1373	1.000								
ICOR	-.0291	.0291	.0946	.1318	.0480	.3972	1.000							
UREP	.0445	-.0445	-.0703	.0343	.0567	.2202	.0721	1.000						
BOOK	.0608	-.0608	-.0084	.0599	.1352	.1726	.1444	.3059	1.000					
FAGE	-.0596	.0596	.0993	-.0094	.0578	.1863	.2218	.0944	.1098	1.000				
MVL	.2715	-.2715	-.1233	-.0099	.3065	-.0732	-.0279	.0654	.3063	-.0457	1.000			
OVER	.1637	-.1637	-.1314	.0106	-.1471	-.2054	-.0205	-.0599	-.1292	-.1126	-.0148	1.000		
HOT	.0114	-.0114	-.1578	.0107	-.1246	-.1341	-.0886	.0090	.0380	-.1482	.0918	.3404	1.000	
BLIST	.0081	-.0081	-.0192	-.0213	.1523	.3029	.0196	.3049	.5939	.1995	.1758	-.2954	-.1014	1.000

Table 4.15 : Correlation matrix (short-run share performance of IPOs) with MIMSI^{PCA-SR}, MIMSI$^{sPCA-SR}$, MIMSI^{PLS-SR}

(Note: Table represents the Pearson correlation coefficients among variables with their significance. The variables are given as; IPO market sentiment (MIMSI), IPO period (IPOP), offer price (PRICE), offer size (OSIZE), issue cost ratio (ICOR), underwriter reputation (UREP), book value per share (BOOK), firm age (FAGE), market volatility (MVL), oversubscription ratio (OVER), hot issue market (HOT), and board listing (BLIST))

Secondly, this research applied VIF to test the collinearity among variables. The VIF value greater than '10' indicates high multicollinearity illustrating the problem described above. Table 4.16 provides the summary of VIF test result of all the 3 models used in this research to examine the IPO's short-run share performance. Model 1 includes behavioural characteristics, Model 2 includes behavioural-and-issue characteristics, Model 3 includes behavioural-issue-and-firm characteristics, Model 4 includes behavioural-issue-firm-and-market characteristics (overall).

The results indicate that all the VIF values are less than 10 which suggests low multicollinearity between variables. The result clarifies the issue of multicollinearity and enables the researcher to use the data for the analysis. In the event the data shows low multicollinearity, then it has a low reliability on results. It does not enable us to use the data as it causes biasness.

	Model 1	Model 2	Model 3	Model 4
Independent variables	(Behavioural)	(Behavioural-and-Issue)	(Behavioural-Issue-and-Firm)	(Behavioural-Issue-Firm-and-Market)
Vector Inflation Factor with $MIMSI^{PCA-SR}$				
$MIMSI^{PCA-SR}$	1.00	1.10	1.10	1.19
IPOP		1.02	1.03	1.03
PRICE		1.11	1.13	1.29
OSIZE		1.30	1.31	1.44
ICOR		1.21	1.26	1.34
UREP		1.06	1.13	1.21
BOOK			1.19	1.65
FAGE			1.10	1.14
MVL				1.86
OVER				1.31
HOT				1.19
BLIST				1.16
Mean VIF	1.00	1.13	1.16	1.32

(cont'd)

Independent variables	Model 1 (Behavioural)	Model 2 (Behavioural-and-Issue)	Model 3 (Behavioural-Issue-and-Firm)	Model 4 (Behavioural-Issue-Firm-and-Market)
Vector Inflation Factor with $MIMSI^{sPCA-SR}$				
$MIMSI^{sPCA-SR}$	1.00	1.10	1.10	1.19
IPOP		1.02	1.03	1.03
PRICE		1.11	1.13	1.29
OSIZE		1.28	1.31	1.44
ICOR		1.21	1.26	1.34
UREP		1.06	1.13	1.16
BOOK			1.19	1.65
FAGE			1.10	1.14
MVL				1.22
OVER				1.31
HOT				1.19
BLIST				1.86
Mean VIF	1.00	1.13	1.16	1.32
Vector Inflation Factor with $MIMSI^{PLS-SR}$				
$SENT^{PLS-SR}$	1.00	1.04	1.04	1.09
IPOP		1.03	1.03	1.04
PRICE		1.02	1.04	1.22
OSIZE		1.28	1.32	1.45
ICOR		1.21	1.26	1.34
UREP		1.07	1.14	1.16
BOOK			1.19	1.64
FAGE			1.10	1.14
MVL				1.19
OVER				1.26
HOT				1.20
BLIST				1.87
Mean VIF	1.00	1.11	1.14	1.30

Table 4.16 : Vector inflation factor for short-run share performance of IPOs

(Note: Table presents the result of VIF test of all the variables used to examine the short-run share performance of IPOs. Model 1 consist of behavioural characteristics, Model 2 consist of behavioural-and-issue characteristics, Model 3 consist of behavioural-issue-and-firm characteristics, Model 4 consist of behavioural-issue-firm-and-market characteristics (overall))

(b) Homoscedasticity test

The homoscedasticity assumption indicates that variance of the error terms is constant for each observation. In order to confirm that there is no heteroscedasticity in the residuals. This research used all the variables by adjusting the 'robust standard errors' by using the procedure described by White (1980). In addition, this research applied the White's tests to ensure the non-existence of heteroscedasticity in the data. The results of homoscedasticity tests are tabulated in Table 4.17. The results show that the computed chi-squared for the White's test is statistically insignificant as the p-values are greater than 0.05, entails to accept the null hypothesis that 'data are homoscedastic'. This confirms that there is no heteroscedasticity problem in the data. The result clarifies the data can be used for further analysis.

Test	Chi-squared (df)	p-value
White's test	399.15 (87)	0.0000

Table 4.17 : White's test for heteroscedasticity (short-run share performance of IPOs)

(Note: Table presents the results of the summary of homoscedasticity's tests. The White's test was performed by using built-in command in STATA to test the null hypothesis of: Residuals are homoscedastic, against the alternate hypothesis of: Residuals are heteroscedastic)

(c) Normality

The normality assumption is based on the normal distribution of data. In this research, the accuracy of results is highly dependent on the normal distribution of data. The researcher sought to test whether the dependent and independent variables follow a normal distribution by applying descriptive statistics. In order to avoid the problem of non-normality, this research utilises the logit and probit regression models that do not require the data normality assumption apart from the OLS regression parameter in analysing the data.

4.4 Regression models to explain the short-run share performance of IPOs

In this section, the cross-sectional regression models are estimated by using OLS regression model, interaction analysis, binary regression model, and marginal probability analysis to evaluate the significant determinants of short-run share performance of IPOs. The following subsections explain the determinants of IPO's short-run share performance.

4.4.1 Ordinary least square regression model to explain short-run share performance of IPOs

The OLS regression model is used to examine the linear relationship between short-run IPO share performance, measured by MAIR as the dependent variable, and its determinants, including behavioural, issue, firm, and market characteristics. Empirical studies have suggested using MAIR as the dependent variable since it has accounted for market adjustments.

The following equation provides the association between the behavioural, issue, firm, and market characteristics based on OLS regression model for the Malaysian IPO's short-run share performance. β_0 is the intercept of the equation. The dependent variable is MAIR, whereas, the independent variables are IPO investment sentiment index can be categorised into 3 types such as Malaysian IPO market sentiment constructed using PCA method according to Baker and Wurgler (2006), using sPCA method according to Jiang et al. (2022), and using PLS method according to Huang et al. (2015). The independent variables are IPO period (IPOP), offer price (PRICE), offer size (OSIZE), issue cost ratio (ICOR), underwriter reputation (UREP), book value per share (BOOK), firm age (FAGE), market volatility (MVL), oversubscription ratio (OVER), hot issue market (HOT), and board listing (BLIST). The regression equation is illustrated in Chapter 3.

Table 4.18, Model 4 (overall) provides the estimation of equation by using OLS regression model with $MIMSI^{PCA\text{-}SR}$. The R-squared is 0.4075, indicates that 40.75% of the total variance in the short-run share performance of IPOs is accounted by the independent variables. The F-statistics is 21.74 and result of the F-statistics shows that the overall model is significant at 1% and can be used for further analysis. The result shows that the offer price (PRICE), oversubscription ratio (OVER), hot issue market (HOT), and board listing (BLIST) are the significant factors that influence the IPO's short-run IPO share performance at issue and market characteristics. Offer price (PRICE) is negatively associated with short-run share performance of IPOs and statistically significant at 1%. Whereas, hot issue market (HOT) is positively associated with short-run share performance of IPOs and statistically significant at 1%. Oversubscription ratio (OVER) positively relates to the IPO's short-run share performance and is statistically significant at 10%. Whereas, board listing (BLIST) is negatively associated with short-run share performance of IPOs and statistically significant at 10%. The results show that IPO market sentiment (MIMSI), IPO period (IPOP), offer size (OSIZE), issue cost ratio (ICOR), underwriter reputation (UREP), book value per share (BOOK), firm age (FAGE), and market volatility (MVL) have no impact on the IPO's short-run performance and rejected the hypothesis.

Table 4.18, Model 4 (overall) provides the estimation of equation by using OLS regression with $MIMSI^{sPCA\text{-}SR}$. The R-squared is 0.4075, indicates that 40.75% of the total variance in the IPO's short-run share performance is accounted for by the independent variables. The F-statistics is 21.74 and result of the F-statistics shows that the overall model is significant at 1% and can be used for further analysis. The result shows that the offer price (PRICE), oversubscription ratio (OVER), hot issue market (HOT), and board listing (BLIST) are the significant factors that influence the IPO's short-run share performance at issue and market characteristics. As such, these variables are statistically significant and accepted the hypothesis. Offer price (PRICE) is negatively associated with short-run share performance of IPOs and statistically significant at 1%. Whereas, hot issue market (HOT) is positively associated with short-run share performance of IPOs and statistically significant at 1%. Oversubscription ratio (OVER) is positively relates to the IPO's short-run share performance and is statistically significant at 10%. Whereas, board listing (BLIST) is negatively associated with short-run share performance of IPOs and statistically significant at 10%. The results show that IPO market sentiment (MIMSI), IPO period (IPOP), offer size (OSIZE), issue cost ratio (ICOR), underwriter reputation (UREP), book value per share (BOOK), firm age (FAGE), and market volatility (MVL) have no impact on the IPO's short-run performance and rejected the hypotheses. Both $MIMSI^{PCA}$ and $MIMSI^{sPCA\text{-}SR}$ have the same coefficients. $MIMSI^{sPCA\text{-}SR}$ has adjusted for target variable, therefore the effects of $MIMSI^{sPCA\text{-}SR}$ towards initial returns show negative as compared to $MIMSI^{PCA}$.

Table 4.18, Model 4 (overall) provides the estimation of equation by using OLS regression model with $MIMSI^{PLS\text{-}SR}$. The R-squared is 0.4023, indicates that 40.23% of the total variance in the IPO's short-run share performance is accounted by the independent variables. The F-statistics is 22.31 and result of the F-statistics shows that the overall model is significant at 1% and can be used for further analysis. The result shows that the offer price (PRICE), oversubscription ratio (OVER), hot issue market (HOT), and board listing (BLIST) are the significant factors that influence the IPO's short-run share performance at issue and market characteristics. Offer price (PRICE) is negatively associated with short-run share performance of IPOs and statistically significant at 1%. Whereas, hot issue market (HOT) is positively associated with short-run share performance of IPOs and statistically significant at 1%. Oversubscription ratio (OVER) positively relates to the IPO's short-run share performance and is statistically significant at 10%. Whereas, board listing (BLIST) is negatively associated with short-run share performance of IPOs and statistically significant at 10%. The results show that IPO market sentiment (MIMSI), IPO period (IPOP), offer size (OSIZE), issue cost ratio (ICOR), underwriter reputation (UREP), book value per share (BOOK), firm age (FAGE), and market volatility (MVL) have no impact on the IPO's short-run share performance and rejected the hypothesis.

Table 4.18, Model 4 (overall) provides the estimation of equation at behavioural, issue, firm, and market characteristics for IPO's short-run share performance determinants based on OLS regression model. The coefficient of each variable is given along with t-statistic in the parentheses. The t-statistic are computed by robust standard errors. In OLS regression model, the F-statistics are used (instead of likelihood ratio (LR)) to evaluate the overall fitness of the models. The F-statistics result shows that OLS regression model as shown in Table 4.18, Model 4 (overall) are fit and significant at 1% level, which shows that all the models can be used for the analysis.

	PCA				sPCA				PLS			
	Dependent variable : MAIR				Dependent variable : MAIR				Dependent variable : MAIR			
	Model 1	Model 2	Model 3	Model 4 (Overall)	Model 1	Model 2	Model 3	Model 4 (Overall)	Model 1	Model 2	Model 3	Model 4 (Overall)
Independent variables	Behavioural	Behavioural-and-Issue	Behavioural-Issue-and-Firm	Behavioural-Issue-Firm-and-Market	Behavioural	Behavioural-and-Issue	Behavioural-Issue-and-Firm	Behavioural-Issue-Firm-and-Market	Behavioural	Behavioural-and-Issue	Behavioural-Issue-and-Firm	Behavioural-Issue-Firm-and-Market
MIMSI	.2967	.5539	.5512	.3812	-.2967	-.5539	-.5512	-.3812	-1.836*	-1.850***	-1.809*	-.4856
	(.87)	(1.52)	(1.52)	(1.13)	(-.87)	(1.52)	(-1.52)	(-1.13)	(-1.88)	(-1.98)	(-1.94)	(-.61)
IPOP		-.0004	-.0006	-.0018		-.0004	-.0006	-.0018		-.0014	-.0016	-.0020
		(-.09)	(-.15)	(-.46)		(-.09)	(-.15)	(-.46)		(-.31)	(-.35)	(-.50)
PRICE		-.0407***	-.0387***	-.0227***		-.0407***	-.0387***	-.0227***		-.03467***	-.0327***	-.0189***
		(-4.34)	(-4.28)	(-2.71)		(-4.34)	(-4.28)	(-2.71)		(-5.50)	(-5.41)	(-3.03)
OSIZE		.0449	.0504	.0700		.0449	.0504	.0700		-.0457	.0510	.0700
		(.78)	(.86)	(1.25)		(.78)	(.86)	(1.25)		(.79)	(.87)	(1.22)
ICOR		-.0792	-.0734	-.0748		-.0792	-.0734	-.0748		-.0771	-.0715	-.0750
		(-1.12)	(-1.05)	(-1.12)		(-1.12)	(-1.05)	(-1.12)		(-1.09)	(-1.03)	(-1.11)
UREP		-.0121	.0167	-.0122		-.0121	.0167	-.0122		-.0191	.0090	-.0106
		(-.18)	(.27)	(-.23)		(-.18)	(.27)	(-.23)		(-.27)	(.14)	(-.20)
BOOK			-.0991**	-.0252			-.0991**	-.0252			-.0951**	-.0179
			(-2.07)	(-.72)			(-2.07)	(-.72)			(-2.07)	(-.54)
FAGE			-.0028	.0009			-.0028	.0009			-.0028	.0008
			(-1.48)	(.62)			(-1.48)	(.62)			(-1.44)	(.53)
MVL				.0281				.0281				.0526
				(.46)				(.46)				(.82)
OVER				.0008*				.0008*				.0010**
				(1.66)				(1.66)				(2.40)
HOT				.6812***				.6812***				.6717***
				(10.68)				(10.68)				(11.49)
BLIST				-.0749*				-.0749*				-.0789*
				(-1.91)				(-1.91)				(-1.88)
Constant	.2411***	.6622***	.5788*	-.0405	.2411***	.6622***	.5788*	-.0405	.2303***	.6313*	.5530*	-.0402
	(10.65)	(2.03)	(1.94)	(-.23)	(10.65)	(2.03)	(1.94)	(-.23)	(10.390)	(1.81)	(1.73)	(-.22)
F-statistics	.7500	6.75***	5.29***	21.74***	.7500	6.75***	5.29***	21.74***	6.88***	7.53***	5.92***	22.31***
R-squared	.0044	.1008	.1088	.4075	.0044	.1008	.1088	.4075	.0135	.1001	.1076	.4023
Root mean squared error	.5951	.5689	.5675	.4646	.5951	.5689	.5675	.4646	.5924	.5691	.5679	.4667
Observations	504	503	503	503	504	503	503	503	503	503	503	503

Table 4.18 : Short-run share performance of IPOs determinants based on OLS regression model with MIMSI$^{PCA\text{-}SR}$, MIMSI$^{sPCA\text{-}SR}$, and MIMSI$^{PLS\text{-}SR}$

*(Note: Table presents the short-run share performance of IPOs at each level of behavioural-issue-firm-and-market characteristics by using OLS regression model. The above table consists of four models: Model 1 consist of behavioural characteristics, Model 2 consist of behavioural-and-issue characteristics, Model 3 consist of behavioural-issue-and-firm characteristics, Model 4 consist of behavioural-issue-firm-and-market characteristics (overall). The dependent variable dichotomous takes the value of '1' if the firm is underpriced and takes the value '0' if the firm is overpriced. t-statistic is given with significance level as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level)*

4.4.2 Interaction analysis to explain short-run share performance of IPOs

Table 4.19 presents the results of the interaction effects between market sentiment and offer price (MIMSI*PRICE) as well as board listing (MIMSI*BLIST) exhibit significant relationships under the PCA and sPCA methods, however, no such effects are observed under the PLS method. Particularly, the interaction between MIMSI*PRICE under the PCA method exhibits a positive and statistically significant at 5%. This finding indicates that heightened levels of market sentiment amplify the influence of offer price on IPO's short-run share performance. Similarly, the interaction between MIMSI*BLIST under the PCA method exhibits a positive and statistically significant at 5%. This suggests that market sentiment enhances the impact of the listing board on IPO's short-run share performance. This may reflect investor perceptions regarding the prestige, credibility, or risk characteristics associated with different listing boards.

While significant interactions are observed between market sentiment (MIMSI) and variables such as offer price (PRICE) and board listing (BLIST), no such effects are identified with oversubscription ratio (OVER) and hot issue market (HOT). This suggests that market sentiment does not significantly impact these variables. Oversubscription ratio which reflects market volatility, and hot issue market is the indicative of market activity, may be influenced by broader economic factors that are not captured by the sentiment measures.

Conversely, the PLS method does not identify significant interaction effects between market sentiment and any of the key determinants. This absence may be attributed to the PLS method's emphasis on maximising predictive accuracy rather than identifying underlying relationships. Given that market sentiment itself does not significantly explain the variance in MAIR, it is likely that the lack of interactions in the PLS method is due to market sentiment not being a strong predictor of IPO's short-run share performance in this context.

	PCA				sPCA				PLS			
	Dependent variable : MAIR				Dependent variable : MAIR				Dependent variable : MAIR			
Independent variables	Model 1 MIMSI*PRICE	Model 2 MIMSI*OVER	Model 3 MIMSI*HOT	Model 4 MIMSI*BLIST	Model 1 MIMSI*PRICE	Model 2 MIMSI*OVER	Model 3 MIMSI*HOT	Model 4 MIMSI*BLIST	Model 1 MIMSI*PRICE	Model 2 MIMSI*OVER	Model 3 MIMSI*HOT	Model 4 MIMSI*BLIST
MIMSI	.2742	.5736	.1380	-.2230	-.2742	-.5736	-.1380	.2230	-.3504	-.9986	-.3800	.1458
	(.85)	(1.36)	(.96)	(-1.01)	(-.85)	(-1.36)	(-.96)	(1.01)	(-.41)	(-.97)	(-1.07)	(.19)
IPOP	-.0019	-.0010	-.0014	-.0019	-.0019	-.0010	-.0014	-.0019	-.0021	-.0020	-.0021	-.0021
	(-.50)	(-.27)	(-.39)	(-.51)	(-.50)	(-.27)	(-.39)	(-.51)	(-.50)	(-.49)	(-.49)	(-.50)
PRICE	-.0443**	-.0243***	-.0206***	-.0208***	-.0443**	-.0243***	-.0206***	-.0208***	-.0214***	-.0192***	-.0187**	-.0191***
	(-2.82)	(-2.75)	(-2.99)	(-2.79)	(-2.82)	(-2.75)	(-2.99)	(-2.79)	(-3.23)	(-3.07)	(-3.23)	(-3.02)
OSIZE	.0733	.0707	.0677	.0687	.0733	.0707	.0677	.0687	.0705	.0708	.0697***	.0702
	(1.29)	(1.27)	(1.29)	(1.25)	(1.29)	(1.27)	(1.29)	(1.25)	(1.23)	(1.23)	(1.24)	(1.22)
ICOR	-.0760	-.0752	-.0725	-.0742	-.0760	-.0752	-.0725	-.0742	-.0752	-.0752	-.0747	-.0745
	(-1.14)	(-1.13)	(-1.15)	(-1.13)	(-1.14)	(-1.13)	(-1.15)	(-1.13)	(-1.11)	(-1.11)	(-1.13)	(-1.11)
UREP	-.0124	-.0148	-.0088	-.0042	-.0124	-.0148	-.0088	-.0042	-.0113	-.0082	-.0115	-.0092
	(-.23)	(-.27)	(-.18)	(-.08)	(-.23)	(-.27)	(-.18)	(-.08)	(-.21)	(-.15)	(-.20)	(-.17)
BOOK	-.0163	-.0278	-.0292	-.0400	-.0163	-.0278	-.0292	-.0400	-.0178	-.0180	-.0188	-.0215
	(-.46)	(-.77)	(-.80)	(-1.05)	(-.46)	(-.77)	(-.80)	(-1.05)	(-.54)	(-.54)	(-.56)	(-.64)
FAGE	.0008	.0010	.0005	.0004	.0008	.0010	.0005	.0004	.0007	.0009	.0008	.0007
	(.57)	(.71)	(.32)	(.27)	(.57)	(.71)	(.32)	(.27)	(.51)	(.58)	(.53)	(.44)
MVL	.0389	.0261	.0394	.0048	.0389	.0261	.0394	.0048	.0610	.0547	.0517	.0592
	(.63)	(.43)	(.59)	(.08)	(.63)	(.43)	(.59)	(.08)	(.96)	(.86)	(.84)	(.91)
OVER	.0008*	.0020**	.0007	.0010**	.0008*	.0020**	.0007	.0010**	.0010**	.0018**	.00101**	.0010**
	(1.73)	(2.12)	(1.20)	(2.11)	(1.73)	(2.12)	(1.20)	(2.11)	(2.41)	(2.37)	(2.23)	(2.46)
HOT	.6786***	.6711***	.6280***	.6775***	.6786***	.6711***	.6280***	.6775***	.6720***	.6720***	.6620***	.6704***
	(10.68)	(11.07)	(10.74)	(10.85)	(10.68)	(11.07)	(10.74)	(10.85)	(11.48)	(11.49)	(9.97)	(11.62)
BLIST	-.0702*	-.0642*	-.0747*	-.1200**	-.0702*	-.0642*	-.0747*	-.1200**	-.0781*	-.0755	-.0789*	-.0943*
	(-1.80)	(-1.68)	(-1.91)	(-2.39)	(-1.80)	(-1.68)	(-1.91)	(-2.39)	(-1.85)	(-1.79)	(-1.88)	(-1.83)
MIMSI*PRICE	.0843**				-.0843**				-.0766			
	(2.20)				(-2.20)				(-.83)			
MIMSI*OVER		-.0089				.0089				.0255		
		(-1.47)				(1.47)				(1.23)		
MIMSI*HOT			.8664	.			-.8664				-.4516	
			(1.03)				(-1.03)				(-.18)	
MIMSI*BLIST				.8908**				-.8908**				-1.0637
				(2.12)				(-2.12)				(-.81)

(cont'd)

Independent variables	PCA				sPCA				PLS			
	Dependent variable : MAIR				Dependent variable : MAIR				Dependent variable : MAIR			
	Model 1 MIMSI*PRICE	Model 2 MIMSI*OVER	Model 3 MIMSI*HOT	Model 4 MIMSI*BLIST	Model 1 MIMSI*PRICE	Model 2 MIMSI*OVER	Model 3 MIMSI*HOT	Model 4 MIMSI*BLIST	Model 1 MIMSI*PRICE	Model 2 MIMSI*OVER	Model 3 MIMSI*HOT	Model 4 MIMSI*BLIST
Constant	-.0698 (-.40)	-.0791 (-.45)	-.0242 (-.14)	.0310 (.17)	-.0698 (-.40)	-.0791 (-.45)	-.0242 (-.14)	.0310 (.17)	-.0470 (-.25)	-.0723*** (-.40)	-.0368 (-.20)	-.0424 (-.23)
F-statistics	20.35***	21.65***	19.15***	20.83***	20.35***	21.65***	19.15***	20.83***	20.86***	20.23***	20.75***	20.54***
R-squared	.4093	.4418	.4144	.4158	.4093	.4418	.4144	.4158	.4026	.4052	.4024	.4034
Root mean squared error	.4644	.4634	.4624	.4618	.4644	.4634	.4624	.4618	.4670	.4660	.4671	.4667
Observations	503	503	503	503	503	503	503	503	503	503	503	503

Table 4.19 : Short-run share performance of IPOs interaction analysis between MIMSI with PRICE, OVER, HOT, and BLIST

*(Note: Table shows the short-run share performance of IPOs interaction analysis between sentiment with key determinants short-run share performance of IPOs. The above table consists of four interactions: Model 1 consist of MIMSI*PRICE, Model 2 consist of MIMSI*OVER, Model 3 consist of MIMSI*HOT, and Model 4 consist of MIMSI*BLIST. t-statistic is given with significance level as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level)*

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4.4.3 Binary regression models to explain short-run share performance of IPOs

The binary logit and probit are multivariate regression models that are used to measure the probability of IPO underpricing against the occurrence of IPO overpricing in the short-run. The dependent variable of the binary models is dichotomous variable denotes as '1' and '0'. To determine the IPO underpricing by using binary regression models, this research segregates the returns into two categories i.e. positive returns and negative returns. The positive return indicates the IPO underpricing and coded as '1', while the negative return is coded '0' indicates IPO overpricing in the short-run.

The binary regression models have an advantage of being more realistic than OLS regression model because of its dichotomous in nature. Moreover, binary regression models do not assume the data normality assumption of regressions. Table 4.20 shows the frequency of dummy for short-run dependent variable, i.e. MAIR. In running the binary regression model, hot market (HOT) has been dropped from independent variables due to the lack of number of observations, which prevents the generation of meaningful binary results.

Dummy variable for IR	Observations (N)	
IPO underpricing denotes '1'	394	79.16%
IPO overpricing denotes '0'	109	20.84%
Total	503	100.00%
Dummy variable for MAIR	Observations (N)	
IPO underpricing denotes '1'	394	78.33%
IPO overpricing denotes '0'	109	21.67%
Total	503	100.00%

Table 4.20 : Frequency of dummy for short-run IPO underpricing

(Note: Table summarises the frequency and percentage distribution of IPOs classified as either IPO underpriced '1' or overpriced '0' based on 2 short-run return measures: IR and MAIR. The dummy variable equals '1' when the IPO is underpriced (positive return) and '0' when overpriced (negative return). The total number of IPO observations is 503 for each measure)

Based on OLS regression model, the key determinants such as offer price (PRICE), oversubscription ratio (OVER), hot issue market (HOT), and board listing (BLIST) are within the realm of IPOs as discussed in Table 4.18. Separately, in binary regression model, the significant key determinant are offer price (PRICE), offer size (OSIZE), issue cost ratio (ICOR), underwriter reputation (UREP), book value per share (BOOK), market volatility (MVL) and oversubscription ratio (OVER), distinct from the factors considered in an OLS regression model, influencing IPO underpricing in Malaysia. This means in the event of IPO underpricing, investors also examine the offer size (OSIZE), underwriter reputation (UREP), book value per share (BOOK), and market volatility (MVL).

The overall result of binary regression model in terms of *t*-statistic and significance level of each parameter are relatively better than the probit model. In binary regression, the likelihood ratio (LR) tests are used (instead of F-statistic) to evaluate the overall fitness of the models. The LR result shows that all the models (in Table 4.21 and Table 4.22) are fit and significant at 1% level, which shows that all the models can be used for the analysis.

(a) Result analysis on logit regression model

In Table 4.21, Model 4 (using PCA method) shows the association between IPO underpricing and overall (behavioural-issue-firm-market characteristics), the result of chi-squared is 92.15 indicates a significant chi-squared value, suggesting that IPO underpricing is well-explained by the overall determinants included in the logit regression model. Offer price (PRICE), offer size (OSIZE), issue cost ratio (ICOR), underwriter reputation (UREP), book value per share (BOOK), market volatility (MVL), and oversubscription ratio (OVER) are the significant determinants that influence IPO underpricing in Malaysia at issue, firm, and market characteristics. These significant variables accepted the hypothesis. On the other hand, IPO market sentiment ($MIMSI^{PCA}$) has insignificant influence on IPO underpricing in Malaysia. The oversubscription ratio (OVER) has positive influence on IPO underpricing at significant level of 1%, whereas, underwriter reputation (UREP), and book value per share (BOOK) have positive influence on IPO underpricing at significant level of 5%, and offer size (OSIZE) is positively significant of 10%. In logit regression model, offer price (PRICE) and issue cost ratio (ICOR) are negatively associated to IPO underpricing at significant level of 5% and 10%, respectively. Hot issue market (HOT) is too significant thus has been omitted to avoid biasness based on logit regression model.

In Table 4.21, Model 4 (using sPCA method) shows the association between IPO underpricing and overall (behavioural-issue-firm-market characteristics), the result of chi-squared is 92.15 indicates a significant chi-squared value, suggesting that IPO underpricing is well-explained by the overall determinants included in the logit regression model. Offer price (PRICE), offer size (OSIZE), issue cost ratio (ICOR), underwriter reputation (UREP), book value per share (BOOK), market volatility (MVL), and oversubscription ratio (OVER) are the significant determinants that influence IPO underpricing in Malaysia at issue, firm, and market characteristics. These significant variables accepted the hypothesis. On the other hand, IPO market sentiment ($MIMSI^{sPCA-SR}$) has insignificant influence on IPO underpricing in Malaysia. The oversubscription ratio (OVER) has positive influence on IPO underpricing at significant level of 1%, whereas, underwriter reputation (UREP), and book value per share (BOOK) have positive influence on IPO underpricing at significant level of 5%, and offer size (OSIZE) is positively significant of 10%. In logit regression model, offer price (PRICE), and issue cost ratio (ICOR) are negatively associated to IPO underpricing at significant level of 5% and 10%, respectively. Hot issue market (HOT) is too significant thus has been omitted to avoid biasness based on logit regression model.

In Table 4.21, Model 4 (using PLS method) shows the association between IPO underpricing and overall (behavioural-issue-firm-market characteristics), the result of chi-squared is 91.65 indicates a significant chi-squared value, suggesting that IPO underpricing is well-explained by the overall determinants included in the logit regression model. Offer price (PRICE), offer size (OSIZE), issue cost ratio (ICOR), underwriter reputation (UREP), book value per share (BOOK), and oversubscription ratio (OVER) are the significant determinants that influence IPO underpricing in Malaysia at issue, firm, and market characteristics. These significant variables accepted the hypothesis. On the other hand, IPO market sentiment ($MIMSI^{PLS-SR}$) has insignificant influence on IPO underpricing in Malaysia. The oversubscription ratio (OVER) has positive influence on IPO underpricing at significant level of 1%, whereas, underwriter reputation (UREP), and book value per share (BOOK) have positive influence on IPO underpricing at significant level of 5%, and offer size (OSIZE) is positively significant level of 10%. In logit regression model, offer price (PRICE), and issue cost ratio (ICOR) are negatively associated to IPO underpricing at significant level of 5% and 10%, respectively. Hot issue market (HOT) is too significant thus has been omitted to avoid biasness based on logit regression model.

Additionally, this research has compiled the results analysis showing the association between IPO underpricing and overall (behavioural-issue-firm-market characteristics) determinants based on probit regression model as shown in Table 4.22. In binary regression, the likelihood ratio (LR) tests are used (instead of F-statistics) to evaluate the overall fitness of the models. The LR result shows that all the models (refer to in Table 4.21) are fit and significant at 1% level, which shows that all the models can be used for the analysis. Both logit and probit regression model have similar or consistent results.

	PCA				sPCA				PLS			
	Probability occurrence : ln $(\frac{P_i}{1-P_i})$ MAIR				Probability occurrence : ln $(\frac{P_i}{1-P_i})$ MAIR				Probability occurrence : ln $(\frac{P_i}{1-P_i})$ MAIR			
Independent variables	Model 1 Behavioural	Model 2 Behavioural-and-Issue	Model 3 Behavioural-Issue-and-Firm	Model 4 (Overall) Behavioural-Issue-Firm-and-Market	Model 1 Behavioural	Model 2 Behavioural-and-Issue	Model 3 Behavioural-Issue-and-Firm	Model 4 (Overall) Behavioural-Issue-Firm-and-Market	Model 1 Behavioural	Model 2 Behavioural-and-Issue	Model 3 Behavioural-Issue-and-Firm	Model 4 (Overall) Behavioural-Issue-Firm-and-Market
MIMSI	-.1327	.8728	.8285	-.8075	-.1327	-.8728	-.8285	.8075	-4.0070	-4.1515*	-4.0317	-1.1580
	(-.16)	(1.00)	(.94)	(-.80)	(-.16)	(-1.00)	(-.94)	(.80)	(-1.41)	(-1.40)	(-1.35)	(-.37)
IPOP		.0255	.0249	.0319		.0255	.0249	.0319		.0229	.0225	.0316
		(1.37)	(1.34)	(1.59)		(1.37)	(1.34)	(1.59)		(1.23)	(1.21)	(1.57)
PRICE		-.1383***	-.1470***	-.1188**		-.1383***	-.1470***	-.1188**		-.1298***	-.1390***	-.1283**
		(-3.76)	(-3.81)	(-2.83)		(-3.76)	(-3.81)	(-2.83)		(-3.75)	(-3.82)	(-3.17)
OSIZE		.1221	.0917	.2036*		.1221	.0917	.2036*		.1276	.0967	.2099*
		(1.40)	(1.07)	(1.97)		(1.40)	(1.07)	(1.97)		(1.46)	(1.13)	(2.02)
ICOR		-0.1126	-.1187	-.2124*		-0.1126	-.1187	-.2124*		-.1070	-.1138	-.2134*
		(-1.14)	(-1.28)	(-1.72)		(-1.14)	(-1.28)	(-1.72)		(-1.09)	(-1.23)	(-1.73)
UREP		.7565**	.6142**	.7730**		.7565**	.6142**	.7730**		.7317**	.5869**	.7419**
		(2.54)	(2.01)	(2.43)		(2.54)	(2.01)	(2.43)		(2.45)	(1.91)	(2.33)
BOOK			.6689**	.8124**			.6689**	.8124**			.6705**	.8106**
			(2.16)	(2.12)			(2.16)	(2.12)			(2.16)	(2.11)
FAGE			-.0002	.0058			-.0002	.0058			-.0003	.0069
			(-.02)	(.52)			(-.02)	(.52)			(-.03)	(.62)
MVL				.7462*				.7462*				.6717
				(1.68)				(1.68)				(1.53)
OVER				.0486***				.0486***				.0477***
				(5.40)				(5.40)				(5.29)
HOT				-				-				-
BLIST				.1688				.1688				.1618
				(.53)				(.53)				(.50)
Constant	1.2963***	.4591	.8166	-1.4163	1.2963***	.4591	.8166	-1.4163	1.2279***	.3053	.6771	-1.4950
	(10.70)	(.40)	(.68)	(-1.13)	(10.70)	(.40)	(.68)	(-1.13)	(10.70)	(.26)	(.55)	(-1.18)
Likelihood ratio	-263.1484	-249.2252	-246.6845	-216.8404	-263.1484	-249.2252	-246.6845	-216.8404	-262.1706	-248.7468	-246.2069	-217.0935
Chi-squared	.0300	27.38***	32.47***	92.15***	.0300	27.38***	32.47***	92.15***	1.98	28.34***	33.42***	91.65***
Pseudo R2	.0001	.0521	.0617	.1753	.0001	.0521	.0617	.1753	.0038	.0539	.0636	.1743
Observations	504	503	503	503	504	503	503	503	504	503	503	503

Table 4.21 : Short-run share performance of IPOs determinants based on logit regression model with $MIMSI^{PCA\text{-}SR}$, $MIMSI^{sPCA\text{-}SR}$, and $MIMSI^{PLS\text{-}SR}$

*(Note: Table presents the IPO's short-run share performance at each level of behavioural-issue-firm-and-market characteristics by using logit regression model. The above table consists of four models: Model 1 consist of behavioural characteristics, Model 2 consist of behavioural-and-issue characteristics, Model 3 consist of behavioural-issue-and-firm characteristics, Model 4 consist of behavioural-issue-firm-and-market characteristics (overall). The dependent variable dichotomous takes the value of '1' if the firm is underpriced and takes the value '0' if the firm is overpriced. t-statistic is given with significance level as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level)*

(b) Result analysis on probit regression model

In Table 4.22, Model 4 (using PCA method) shows the association between IPO underpricing and overall (behavioural-issue-firm-market characteristics), the result of chi-squared is 93.71 indicates a significant chi-squared value, suggesting that IPO underpricing is well-explained by the overall determinants included in the probit regression model. Offer price (PRICE), offer size (OSIZE), issue cost ratio (ICOR), underwriter reputation (UREP), book value per share (BOOK), market volatility (MVL), and oversubscription ratio (OVER) are the significant determinants that influence IPO underpricing in Malaysia at issue, firm, and market characteristics. These significant variables accepted the hypothesis. On the other hand, IPO market sentiment ($MIMSI^{PCA\text{-}SR}$) has insignificant influence on IPO underpricing in Malaysia. The oversubscription ratio (OVER) has positive influence on IPO underpricing at significant level of 1%, whereas, underwriter reputation (UREP) and book value per share (BOOK) have positive influence on IPO underpricing at significant level of 5%. In probit regression model, offer price (PRICE), and issue cost ratio (ICOR) are negatively associated to IPO underpricing at significant level of 1% and 10%, respectively. Hot issue market (HOT) is too significant thus has been omitted to avoid biasness based on probit regression model.

In Table 4.22, Model 4 (using sPCA method) shows the association between IPO underpricing and overall (behavioural-issue-firm-market characteristics), the result of chi-squared is 93.71 indicates a significant chi-squared value, suggesting that IPO underpricing is well-explained by the overall determinants included in the probit regression model. Offer price (PRICE), offer size (OSIZE), issue cost ratio (ICOR), underwriter reputation (UREP), book value per share (BOOK), market volatility (MVL), and oversubscription ratio (OVER) are the significant determinants that influence IPO underpricing in Malaysia at issue, firm, and market characteristics. These significant variables accepted the hypothesis. On the other hand, IPO market sentiment ($MIMSI^{sPCA\text{-}SR}$) has insignificant influence on IPO underpricing in Malaysia. The oversubscription ratio (OVER) has positive influence on IPO underpricing at significant level of 1%, whereas, underwriter reputation (UREP) and book value per share (BOOK) have positive influence on IPO underpricing at significant level of 5%. In probit regression model, offer price (PRICE), and issue cost ratio (ICOR) are negatively associated to IPO underpricing at significant level of 1% and 10%, respectively. Hot issue market (HOT) is too significant thus has been omitted to avoid biasness based on probit regression model.

In Table 4.22, Model 4 (using PLS method) shows the association between IPO underpricing and overall (behavioural-issue-firm-market characteristics), the result of chi-squared is 93.02 indicates a significant chi-squared value, suggesting that IPO underpricing is well-explained by the overall determinants included in the probit regression model. In probit regression model, the offer price (PRICE), offer size (OSIZE), issue cost ratio (ICOR), underwriter reputation (UREP), book value per share (BOOK), and oversubscription ratio (OVER) are the significant determinants that influence IPO underpricing in Malaysia at issue, firm, and market characteristics. These significant variables accepted the hypothesis. On the other hand, IPO market sentiment ($MIMSI^{PLS\text{-}SR}$) has insignificant influence on IPO underpricing in Malaysia. The oversubscription ratio (OVER) has positive influence on IPO underpricing at significant level of 1%, whereas, underwriter reputation (UREP) and book value per share (BOOK) have positive influence on IPO underpricing at significant level of 5%. In probit regression model, offer price (PRICE) and issue cost ratio (ICOR) are negatively associated to IPO underpricing at significant level of 1% and 10%, respectively. Hot issue market (HOT) is too significant thus has been omitted to avoid biasness based on probit regression model.

In binary regression, the likelihood ratio (LR) tests are used (instead of F-statistics) to evaluate the overall fitness of the models. The LR result shows that all the models (refer to in Table 4.22) are fit and significant at 1% level, which shows that all the models can be used for the analysis. Both logit and probit regression model have similar or consistent results.

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	PCA				sPCA				PLS			
	Probability occurrence : P (MAIR)				Probability occurrence : P (MAIR)				Probability occurrence : P (MAIR)			
	Model 1	Model 2	Model 3	Model 4 (Overall)	Model 1	Model 2	Model 3	Model 4 (Overall)	Model 1	Model 2	Model 3	Model 4 (Overall)
Independent variables	Behavioural	Behavioural-and-Issue	Behavioural-Issue-and-Firm	Behavioural-Issue-Firm-and-Market	Behavioural	Behavioural-and-Issue	Behavioural-Issue-and-Firm	Behavioural-Issue-Firm-and-Market	Behavioural	Behavioural-and-Issue	Behavioural-Issue-and-Firm	Behavioural-Issue-Firm-and-Market
MIMSI	-.0757	.5251	.4958	-.5036	.0756	-.5251	-.4958	-.5036	-2.2725	-2.2864	-2.2407	-.4673
	(-.16)	(1.03)	(.97)	(-.87)	(.16)	(-1.03)	(-.97)	(-.87)	(-1.39)	(-1.34)	(-1.31)	(-.26)
IPOP		.0142	.0137	.0178		.0142	.0136	.0178		.0126	.0121	.0174
		(1.32)	(1.27)	(1.52)		(1.32)	(1.27)	(1.52)		(1.17)	(1.12)	(1.48)
PRICE		-.0828***	-.0886***	-.0706***		-.0827***	-.0886***	-.0706***		-.0776***	-.0838***	-.0766***
		(-3.89)	(-4.04)	(-2.99)		(-3.89)	(-4.04)	(-2.99)		(-3.84)	(-4.03)	(-3.37)
OSIZE		.0705	.0544	.1182**		.0704	.0544	.1182**		.0723	.0564	.1217*
		(1.45)	(1.13)	(2.06)		(1.45)	(1.13)	(2.06)		(1.49)	(1.18)	(2.09)
ICOR		-0.065	-.0704	-.1216*		-0.0648	-.0704	-.1216*		-.0609	-.0668	-1227*
		(-1.19)	(-1.36)	(-1.81)		(-1.19)	(-1.36)	(-1.81)		(-1.13)	(-1.30)	-1.82
UREP		.4265**	.3525**	.4545**		.4265**	.3525**	.4545**		.4117**	.3363**	.4406**
		(2.63)	(2.12)	(2.52)		(2.63)	(2.12)	(2.52)		(2.54)	(2.01)	(2.44)
BOOK			.3934**	.4878**			.3934**	.4878**			.3959**	.4845**
			(2.28)	(2.25)			(2.28)	(2.25)			(2.30)	(2.23)
FAGE			-.0002	.0042			.0002	.0042			.0001	.0049
			(-.03)	(.64)			(.03)	(.64)			(.01)	(.75)
MVL				.4360*				.4360*				.3912
				(1.71)				(1.71)				(1.54)
OVER				.0275***				.0275***				.0268***
				(5.68)				(5.68)				(5.58)
HOT				-				-				-
BLIST				.0994				.0994				.0925
				(.53)				(.53)				(.49)
Constant	.7899***	.3101	.5119	-.8318	.7898***	.3101	.5119	-.8318	.7502***	.2378	.4414	-.8621
	(11.31)	(.46)	(.76)	(-1.14)	(11.31)	(.46)	(.76)	(-1.14)	(11.18)	(.35)	(.65)	(-1.18)
Likelihood ratio	-263.1486	-249.1860	-246.4143	-216.0610	-263.1485	-249.1859	-246.4143	-216.0610	-262.1926	-248.8174	-246.0205	-216.4066
Chi-squared	.0300	27.46***	33.01***	93.71***	.0300	27.38***	33.01***	93.71***	1.94	28.20***	33.79***	93.02***
Pseudo R2	.0000	.0522	.0628	.1782	.0000	.0522	.0628	.1782	.0037	.0536	.0643	.1769
Observations	504	503	503	503	504	503	503	503	504	503	503	503

Table 4.22 : Short-run share performance of IPOs determinants based on probit regression model with $MIMSI^{PCA\text{-}SR}$, $MIMSI^{sPCA\text{-}SR}$, and $MIMSI^{PLS\text{-}SR}$

*(Note: Table presents the short-run share performance of IPOs at each level of behavioural-issue-firm-and-market characteristics by using probit regressions. The above table consists of four models: Model 1 consist of behavioural characteristics, Model 2 consist of behavioural-and-issue characteristics, Model 3 consist of behavioural-issue-and-firm characteristics, Model 4 consist of behavioural-issue-firm-and-market characteristics (overall). The dependent variable dichotomous takes the value of '1' if the firm is underpriced and takes the value '0' if the firm is overpriced. t-statistic is given with significance level as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level)*

4.4.4 Marginal probability analysis to explain short-run share performance of IPOs

Marginal analysis was used to identify the most important explanatory variables that contributed to the change in the short-run share performance of the Malaysian IPOs. Marginal analysis measures the likelihood of change in probability (Δp) associated with short-run share performance due to a change in the explanatory variables. Table 4.23 shows the calculated changes in probability associated with the IPO's short-run share performance based on probit regression model. For the logit regression model, no marginal probability analysis is present in this research because the result of probit regression model is similar or close to the result of logit regression model.

As shown in Table 4.23, there is no significant explanatory for market sentiment (MIMSI). The marginal analysis indicates that offer price (PRICE), and oversubscription ratio (OVER) are the most important explanatory variables (with 1% significance level) in Malaysian IPO market as compared with the others due to the highest probability associated with IPO underpricing used to measure the IPO's short-run share performance. The results are consistently apply in all models.

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(Overall) Behavioural-Issue-Firm-and-Market	Model 1		Model 2		Model 3	
	Change in probability	z	Change in probability	z	Change in probability	z
$MIMSI^{PCA-SR}$	-.1133	.80				
$MIMSI^{sPCA-SR}$			.1133	.80		
$MIMSI^{PLS-SR}$					-.1628	-.37
IPOP	.0044	1.61	.0044	1.61	.0044	1.58
PRICE	-.0166***	-2.92	-.0166***	-2.92	-.0180***	-3.31
OSIZE	.0285**	1.99	.0285**	1.99	.0295**	2.04
ICOR	-.0297*	-1.73	-.0297*	-1.73	-.0299*	-1.74
UREP	.1084**	2.47	.1084**	2.47	.1043**	2.37
BOOK	.1139**	2.15	.1139**	2.15	.1139**	2.13
FAGE	.0008	.52	.0008	.52	.0009	.62
MVL	.1047*	1.69	.1047*	1.69	.0944	1.54
OVER	.0068***	5.84	.0068***	5.84	.0067***	5.70
BLIST	.0237	.53	.0237	.53	.0227	.50

Table 4.23 : Marginal probability analysis based on logit regression model due to changes in explanatory variables (Δp) for short-run share performance of IPOs

*(Note: Table presents the marginal change in the probability of IPO underpricing (ΔP) in response to a one-unit change in each explanatory variable, based on marginal analysis across 3 models. Model 1 uses the sentiment index constructed via PCA ($MIMSI^{PCA-SR}$), Model 2 uses sPCA ($MIMSI^{sPCA-SR}$) and Model 3 uses PLS ($MIMSI^{PLS-SR}$). The figures under 'Change in probability' indicate the estimated marginal effects, while 'z' represents the associated z-statistics. p-values are given with significance levels as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level)*

As shown in Table 4.23, the significant explanatory variables are offer price (PRICE), offer size (OSIZE), issue cost ratio (ICOR), underwriter reputation (UREP), book value per share (BOOK), market volatility (MVL), and oversubscription ratio (OVER). Except for offer price (PRICE), and issue costs ratio (ICOR) all the explanatory variables have a positive sign, which indicates a direct relationship between the IPO's short-run share performance and explanatory variables. Hot issue market (HOT) is too significant thus has been omitted to avoid biasness based on binary regression model. Some of the relationship can be explained as follows:

1. The negative sign for offer price (PRICE) implies that, if offer price (PRICE) is increased by RM0.10, the probability of change to decrease in the level of IPO underpricing is 1.66% (Model 1), 1.66% (Model 2), and 1.80% (Model 3).
2. The positive sign for offer size (OSIZE) implies that, if offer size (OSIZE) is increased by 100,000 share, the probability of change to increase in the level of IPO underpricing is 2.85% (Model 1), 2.85% (Model 2), 2.95% (Model 3).
3. The negative sign for issue cost ratio (ICOR) implies that, if the issue cost ratio (ICOR) increases by 1 time, the probability of change to increase in the level of IPO underpricing is -2.97% (Model 1), -2.97% (Model 2), and -2.99% (Model 3).
4. The positive sign for underwriter reputation (UREP) implies that, when the lead underwriter includes one of the Tier 1 financial institutions, CIMB Bank, Maybank and RHB Bank the credit worthiness of issues is high where dummy equals '1' and '0' if otherwise, the probability of change to increase in the level of IPO underpricing is 10.84% (Model 1), 10.84% (Model 2), and 10.43% (Model 3).
5. The positive sign for book value per share (BOOK) implies that, if book value per share (BOOK) is increased by 1 time, the probability of change to increase in the level of IPO underpricing is 11.39% (Model 1), 11.39% (Model 2), 11.39% (Model 3).
6. The positive sign for market volatility (MVL) implies that, if the market volatility (MVL) increases by 0.10%, the probability of change to increase in the level of IPO underpricing is 10.47% (Model 1), 10.4726% (model 2), and 9.44% (Model 3).
7. The positive sign for oversubscription ratio (OVER) implies that, if the oversubscription ratio (OVER) increases by 1 time, the probability of change to increase in the level of IPO underpricing is 0.68% (Model 1), 0.68% (Model 2), and 0.67% (Model 3).

For the probit regression model, no marginal probability analysis presents in this research because the result of probit regression model is similar or close to the result of logit regression model, as explained above.

4.5 Summary of hypotheses for short-run share performance of IPOs

Short-run IPO share performance of IPOs are measured at behavioural, issue, firm and market characteristics by using OLS and binary (logit and probit) regression models. For OLS regression model, the dependent variable is short-run share performance of IPOs measured as MAIR. However, for binary (logit and probit) regression models, the dependent variables is dichotomous takes the value of '1' if the firm is IPO underpriced and takes the value '0' if the firm is IPO overpriced. The coefficients of each variable is given along with t-ratio in parentheses.

This section provides the summary of hypotheses that are developed to examine the short-run share performance of IPOs based on regression analysis. Those variables that shows significant relationship based on regression analysis are accepted (✓) the hypothesis. However, those variables that does not show any significance relationship based on regression analysis are rejected (×). Table 4.24 (a), Table 4.24 (b), and Table 4.24 (c) provide the summary of hypotheses of all the regression models that were undertaken to examine the short-run share performance of IPOs.

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	Dependent variable : MAIR				Dependent variable : MAIR							
	Model 1 : Behavioural	Model 2 : Behavioural-and-Issue	Model 3 : Behavioural-Issue-and-Firm	Model 4 : (Overall) Behavioural-Issue-Firm-and-Market	Model 1 : Behavioural		Model 2 : Behavioural-and-Issue		Model 3 : Behavioural-Issue-and-Firm		Model 4 : (Overall) Behavioural-Issue-Firm-and-Market	
	OLS	OLS	OLS	OLS	Logit	Probit	Logit	Probit	Logit	Probit	Logit	Probit
H_1	×	×	×	×	×	×	×	×	×	×	×	×
H2		×	×	×			×	×	×	×	×	×
H3		✓	✓	✓			✓	✓	✓	✓	✓	✓
H4		×	×	×			×	×	×	×	✓	✓
H5		×	×	×			×	×	×	×	×	×
H6		×	×	×			✓	✓	✓	✓	✓	✓
H7			✓	×					✓	✓	✓	✓
H8			×	×					×	×	×	×
H9				×							×	×
H10				✓							✓	✓
H11				✓							-	-
H12				✓							×	×

Table 4.24 (a) : Summary of hypotheses (short-run share performance of IPOs) with $MIMSI^{PCA\text{-}SR}$

	Dependent variable : MAIR				Dependent variable : MAIR							
	Model 1 : Behavioural	Model 2 : Behavioural-and-Issue	Model 3 : Behavioural-Issue-and-Firm	Model 4 : (Overall) Behavioural-Issue-Firm-and-Market	Model 1 : Behavioural		Model 2 : Behavioural-and-Issue		Model 3 : Behavioural-Issue-and-Firm		Model 4 : (Overall) Behavioural-Issue-Firm-and-Market	
	OLS	OLS	OLS	OLS	Logit	Probit	Logit	Probit	Logit	Probit	Logit	Probit
H_1	×	×	×	×	×	×	×	×	×	×	×	×
H2		×	×	×			×	×	×	×	×	×
H3		✓	✓	✓			✓	✓	✓	✓	✓	✓
H4		×	×	×			×	×	×	×	✓	✓
H5		×	×	×			×	×	×	×	×	×
H6		×	×	×			✓	✓	✓	✓	✓	✓
H7			✓	×					✓	✓	✓	✓
H8			×	×					×	×	×	×
H9				×							×	×
H10				✓							✓	✓
H11				✓							-	-
H12				✓							×	×

Table 4.24 (b) : Summary of hypotheses (short-run share performance of IPOs) with $MIMSI^{sPCA\text{-}SR}$

	Dependent variable : MAIR				Dependent variable : MAIR							
	Model 1 : Behavioural	Model 2 : Behavioural-and-Issue	Model 3 : Behavioural-Issue-and-Firm	Model 4 : (Overall) Behavioural-Issue-Firm-and-Market	Model 1 : Behavioural		Model 2 : Behavioural-and-Issue		Model 3 : Behavioural-Issue-and-Firm		Model 4 : (Overall) Behavioural-Issue-Firm-and-Market	
	OLS	OLS	OLS	OLS	Logit	Probit	Logit	Probit	Logit	Probit	Logit	Probit
H_1	✓	✓	✓	×	×	×	×	×	×	×	×	×
H2		×	×	×			×	×	×	×	×	×
H3		✓	✓	✓			✓	✓	✓	✓	✓	✓
H4		×	×	×			×	×	×	×	✓	✓
H5		×	×	×			×	×	×	×	×	×
H6		×	×	×			✓	✓	✓	✓	✓	✓
H7			✓	×					✓	✓	✓	✓
H8			×	×					×	×	×	×
H9				×							×	×
H10				✓							✓	✓
H11				✓							-	-
H12				✓							×	×

Table 4.24 (c) : Summary of hypotheses (short-run share performance of IPOs) with MIMSI^{PLS-SR}

(Note: Tables summarise hypotheses of short-run share performance of IPOs undertaken by this research. The hypothesis is either accepted or rejected on the basis of regression analysis. Denotes: √~Accepted ; X~Rejected)

4.6 Analysis of long-run share performance of IPOs (aftermarket performance)

This section describes the analysis of IPO's long-run IPO share performance. Firstly, this section explains the aggregate aftermarket underperformance in Malaysia, descriptive statistics, and diagnostic test. Secondly, this section explains the determinants of long-run IPO share performance based on OLS and binary regression models. Interaction analysis and margin probability analysis are also examined to explain long-run share performance of IPOs. Additionally, in addressing the IPO's long-run share performance, the current research measures returns up to 4 years post-listing, an additional 1 year compared to the findings of most previous studies, which have typically followed the example of Ritter (1991) using 3 years post-listing, in order to examine there are any differences.

4.6.1 Aggregate long-run share performance of IPOs

As discussed in Chapter 3, the IPO's long-run share performance is measured based on cumulative average abnormal returns (CAAR), buy-and-hold abnormal returns (BHAR), and wealth relative (WR). This research calculated all the 3 returns by using the equally weighted (EW) and value weighted (VW) schemes. An equally weighted (EW) index weighs each firms equally regardless of its market capitalisation or size of the firm. The value weighted (VW) computed as the market capitalisation of the firm at offer price immediately after the listing, divided by the total market capitalisation of the entire IPO sample. The following subsections explain the long-run share performance of IPOs as measured by CAAR, BHAR, and WR based on EW and VW schemes.

(a) Cumulative average abnormal returns

As explained in Chapter 3, CAAR are calculated for 2 distinct periods: (i) the initial returns period; and (ii) the aftermarket returns period. The initial returns period, referred to as 'month 0', captures the first-day returns immediately following the listing of an IPO, specifically the closing price on the first day. On the other hand, the aftermarket returns period spans 'month 1 to 48', encompassing a 4-year period after the IPO listing date, and represents the cumulative returns during this extended period.

Table 4.25 presents the CAAR over a span of 4 years (48 months) for Malaysian firms that conducted IPOs from January 2000 to December 2020. The CAAR for a portfolio consisting of 'N' firms during the event period 'month 1 to 48' are calculated as the arithmetic mean of the market-adjusted returns. The monthly average returns, expressed in percentage, are accompanied by corresponding t-statistics and indicators of statistical significance. Here, 'N' represents the total number of firms included in the portfolio for each respective month. In the entire sample, only 469 firms completed their 4-year anniversary after the listing with complete data. The monthly count of firms is lower than the total sample of 571 firms due to various reasons such as the unavailability of share price data and missing data for other independent variables.

		Equally Weighted			Value Weighted		
Month	N	CAAR	t-statistics	p-value	CAAR	t-statistics	p-value
1	525	0.1752	4.1030***	0.0000	-0.0010	-5.3745***	0.0000
2	525	0.3950	4.1120***	0.0000	-0.0021	-7.7930***	0.0000
3	525	1.0629	3.0970***	0.0021	-0.0029	-8.5830***	0.0000
4	521	0.5653	3.8040***	0.0002	-0.0039	-10.6380***	0.0000
5	521	0.8843	3.3090***	0.0010	-0.0045	-10.4115***	0.0000
6	520	1.2099	3.0740***	0.0022	-0.0059	-12.2910***	0.0000
7	517	0.7364	3.6950***	0.0002	-0.0071	-14.1260***	0.0000
8	517	0.8595	3.6810***	0.0003	-0.0081	-15.9185***	0.0000
9	517	1.0322	3.7230***	0.0002	-0.0089	-17.0945***	0.0000
10	516	1.3512	3.4570***	0.0006	-0.0097	-17.9610***	0.0000
11	515	1.4207	3.4650***	0.0006	-0.0107	-19.1655***	0.0000
12	514	1.4998	3.5060***	0.0005	-0.0116	-19.9425***	0.0000
13	512	1.4568	3.7210***	0.0002	-0.0128	-20.6765***	0.0000
14	512	1.8877	3.4610***	0.0006	-0.0140	-21.1710***	0.0000
15	510	1.6681	3.3720***	0.0008	-0.0151	-22.8715***	0.0000
16	509	1.7235	3.3740***	0.0008	-0.0155	-23.7195***	0.0000
17	508	1.7702	3.3480***	0.0009	-0.0163	-24.6260***	0.0000
18	506	2.0531	3.1750***	0.0016	-0.0173	-25.4260***	0.0000
19	503	1.6573	2.7480***	0.0062	-0.0185	-27.2735***	0.0000
20	500	0.9605	2.4210***	0.0158	-0.0200	-29.7880***	0.0000
21	499	0.7636	2.7280***	0.0066	-0.0214	-31.4930***	0.0000
22	499	0.8702	2.7950***	0.0054	-0.0228	-33.0500***	0.0000
23	499	1.0157	2.8500***	0.0046	-0.0239	-34.8185***	0.0000
24	499	1.4124	2.6620***	0.0080	-0.0251	-35.5890***	0.0000
25	497	1.0451	2.5260***	0.0119	-0.0267	-38.6270***	0.0000
26	496	0.8371	2.7840***	0.0056	-0.0284	-40.7810***	0.0000
27	496	1.0261	2.9420***	0.0034	-0.0296	-42.1715***	0.0000
28	495	1.1740	3.0310***	0.0026	-0.0308	-43.4300***	0.0000

(cont'd)

		Equally Weighted			Value Weighted		
Month	N	CAAR	t-statistics	p-value	CAAR	t-statistics	p-value
29	495	1.3681	3.1050***	0.0020	-0.0321	-43.9170***	0.0000
30	495	1.9570	2.9920***	0.0029	-0.0334	-43.5805***	0.0000
31	491	1.3093	2.7380***	0.0064	-0.0348	-44.2205***	0.0000
32	490	1.2503	2.6770***	0.0077	-0.0363	-45.8565***	0.0000
33	487	1.1299	2.8620***	0.0044	-0.0376	-45.2670***	0.0000
34	486	1.6411	2.6630***	0.0080	-0.0383	-44.9985***	0.0000
35	483	0.8359	2.7390***	0.0064	-0.0397	-47.1110***	0.0000
36	483	1.1068	2.5990***	0.0096	-0.0407	-47.5325***	0.0000
37	482	0.9408	2.9640***	0.0032	-0.0419	-47.7280***	0.0000
38	482	1.2276	2.7790***	0.0057	-0.0434	-48.4890***	0.0000
39	481	1.0860	3.1820***	0.0016	-0.0447	-49.5495***	0.0000
40	481	1.2775	3.3250***	0.0010	-0.0459	-50.9680***	0.0000
41	479	1.5071	3.4220***	0.0007	-0.0473	-50.6785***	0.0000
42	479	2.0004	3.2580***	0.0012	-0.0492	-50.3975***	0.0000
43	477	1.5429	3.3920***	0.0008	-0.0507	-51.2050***	0.0000
44	476	2.0851	3.2870***	0.0011	-0.0518	-51.3770***	0.0000
45	474	1.8764	3.0910***	0.0021	-0.0534	-51.4745***	0.0000
46	472	1.4043	3.2100***	0.0014	-0.0549	-53.6190***	0.0000
47	471	1.7445	3.1300***	0.0019	-0.0561	-55.9120***	0.0000
48	469	1.8810	3.0080***	0.0028	-0.0575	-56.8450***	0.0000

Table 4.25 : Cumulative average abnormal returns

*(Note: Table represents the CAAR given in percentage, along with t- statistics for the 48 months after listing, CAAR is given based on EW and VW schemes. The significance level of t-statistics as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level)*

Table 4.25 indicates that IPOs generated positive returns (overperformance) for CAAR (EW) and negative returns (underperformance) for CAAR (VW) from month 1 to 48 relative to the benchmark. The result as given in Table 4.25 are statistically significant under EW scheme the highest overperformance under CAAR (EW) is 208.50% in the 44-month period, while the lowest overperformance is 17.52% in the 1-month after listing. On the other hand, the highest underperformance under CAAR (VW) is -5.75% in the 48-month period, while the lowest underperformance is -0.10% in the 1-month after listing.

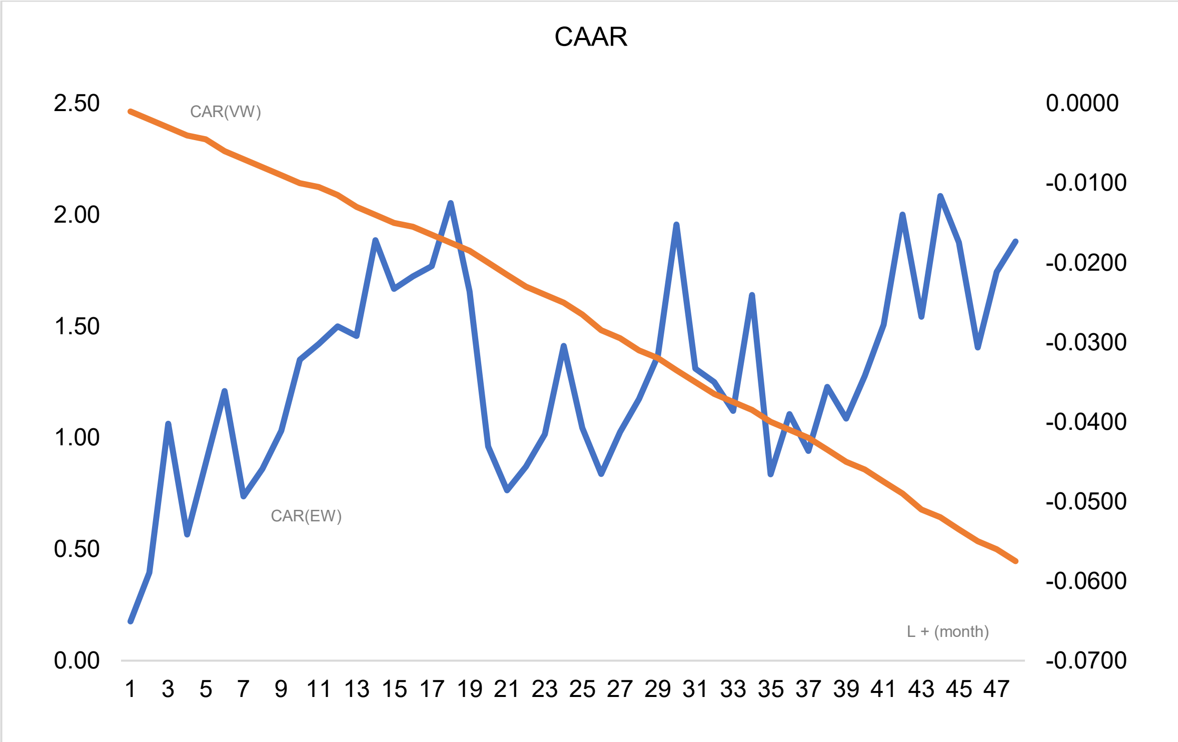

Figure 4.1 : Cumulative average abnormal returns

Unlike the EW scheme, the result of VW shows that the IPOs generate a lower negative returns during the first 48 months after listing. The decreasing trend in the CAAR based on VW can be observed from Figure 4.1. In the first 12 months underperformance is -1.15%, in the 1-month (-0.10%), 3-month (-0.29%), 6-month (-0.59%), and 9-month (-0.89%) all the results are statistically significant at 1% level.

Besides, Table 4.25 shows that the underperformance based on CAAR under EW scheme is less pronounced (i.e. 188.10% in the 48th month) than the CAAR under VW scheme (i.e. -5.75%) in the 48-month. This indicates that the larger IPO firms performed well in the longer horizon as compared to the smaller IPOs.

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The overall CAAR of IPOs in Malaysia for 4 years after listing are show in Table 4.26.

Period (months)	N	Equally Weighted			Value Weighted		
		CAAR	t-statistics	p-value	CAAR	t-statistics	p-value
1 month (0, 1)	525	0.1752	4.1027***	0.0000	-.0010	-5.3757***	0.0000
3 months (0, 3)	1,575	0.5444	4.5382***	0.0000	-.0020	-12.6704***	0.0000
6 months (0, 6)	3,137	0.7146	6.9838***	0.0000	-.0034	-22.6748***	0.0000
12 months (0, 12)	6,233	0.9396	10.9105***	0.0000	-.0063	-46.0014***	0.0000
24 months (0, 24)	12,289	1.1815	14.6032***	0.0000	-.0123	-93.1202***	0.0000
36 months (0, 36)	18,183	1.1949	17.3447***	0.0000	-.0194	-139.6410***	0.0000
48 months (0, 48)	23,906	1.2789	20.3894***	0.0000	-.0266	-176.3988***	0.0000

Table 4.26 : Summary of the cumulative average abnormal returns of IPOs in Malaysia

*(Note: Table presents the CAAR of Malaysian IPOs over different post-listing periods using both EW and VW schemes. The significance level of t-statistics as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level)*

(b) Buy-and-Hold abnormal returns

As discussed in Chapter 3, the BHAR strategy involves purchasing a share at its first closing market price after going public and holding it until a specified time 'T'. In this research, the IPO's long-run share performance is measured over a period of up to 4 years, with 'T' spanning from 'month 1 to 48'. Table 4.27 presents evidence of the IPO's long-run share performance in Malaysia based on BHAR. The average BHAR for a portfolio consisting of 'N' firms during the event 'month 1 to 48' are calculated as the arithmetic mean of the market abnormal returns. The monthly average returns, expressed in percentage, are provided along with conventional t-statistics. However, it is important to note that Barber and Lyon (1997) evidence that BHAR often exhibits a positive skew, which can lead to conventional t-statistics yielding overstated significance levels.

Month	N	Equally Weighted			Value Weighted		
		BHAR	t-statistics	p-value	BHAR	t-statistics	p-value
1	525	-0.1424	-16.7010***	0.0000	-0.0205	-2.5410***	0.0114
2	525	-0.1428	-16.4640***	0.0000	-0.0250	-2.2830***	0.0228
3	525	-0.1444	-16.6920***	0.0000	-0.0207	-3.1820***	0.0016
4	521	-0.1517	-18.6660***	0.0000	-0.0193	-3.3990***	0.0007

(cont'd)

		Equally Weighted			Value Weighted		
Month	N	BHAR	t-statistics	p-value	BHAR	t-statistics	p-value
5	521	-0.1525	-18.5260***	0.0000	-0.0178	-3.6170***	0.0003
6	520	-0.1568	-18.9620***	0.0000	-0.0177	-2.5070***	0.0125
7	517	-0.1620	-20.3670***	0.0000	-0.0183	-3.7290***	0.0002
8	517	-0.1650	-20.7290***	0.0000	-0.0157	-3.5420***	0.0004
9	517	-0.1656	-20.8310***	0.0000	-0.0195	-3.7410***	0.0002
10	516	-0.1669	-20.2300***	0.0000	-0.0194	-3.3410***	0.0009
11	515	-0.1695	-20.3390***	0.0000	-0.0156	-3.0090***	0.0027
12	514	-0.1683	-20.3630***	0.0000	-0.0182	-3.4930***	0.0005
13	512	-0.1678	-19.7090***	0.0000	-0.0240	-2.9040***	0.0038
14	512	-0.1688	-19.4280***	0.0000	-0.0131	-3.5780***	0.0004
15	510	-0.1729	-19.9500***	0.0000	-0.0192	-3.0820***	0.0022
16	509	-0.1687	-18.8900***	0.0000	-0.0129	-2.5900***	0.0099
17	508	-0.1705	-18.5110***	0.0000	-0.0164	-2.9310***	0.0035
18	506	-0.1726	-18.4480***	0.0000	-0.0083	-2.6430***	0.0085
19	503	-0.1788	-19.3020***	0.0000	-0.0156	-2.8040***	0.0052
20	500	-0.1883	-20.8720***	0.0000	-0.0167	-2.6250***	0.0089
21	499	-0.1921	-22.0330***	0.0000	-0.0181	-2.9010***	0.0039
22	499	-0.1970	-22.8180***	0.0000	-0.0186	-3.0990***	0.0020
23	499	-0.2011	-23.1620***	0.0000	-0.0165	-2.9330***	0.0035
24	499	-0.2035	-23.5960***	0.0000	-0.0160	-2.5900***	0.0099
25	497	-0.2097	-24.9860***	0.0000	-0.0160	-2.4800***	0.0135
26	496	-0.2148	-25.4070***	0.0000	-0.0169	-3.3610***	0.0008
27	496	-0.2182	-25.8780***	0.0000	-0.0262	-3.1880***	0.0015
28	495	-0.2172	-24.9660***	0.0000	-0.0143	-2.6410***	0.0085
29	495	-0.2168	-23.9340***	0.0000	-0.0171	-3.2430***	0.0013
30	495	-0.2162	-23.1110***	0.0000	-0.0170	-2.9940***	0.0029
31	491	-0.2232	-24.9510***	0.0000	-0.0165	-3.0340***	0.0025
32	490	-0.2232	-25.3160***	0.0000	-0.0133	-3.2320***	0.0013
33	487	-0.2235	-25.2770***	0.0000	-0.0163	-3.2880***	0.0011
34	486	-0.2237	-24.1200***	0.0000	-0.0204	-2.7340***	0.0065
35	483	-0.2296	-25.4440***	0.0000	-0.0196	-3.0900***	0.0021
36	483	-0.2292	-24.8410***	0.0000	-0.0187	-3.1910***	0.0015
37	482	-0.2275	-24.2100***	0.0000	-0.0188	-2.8170***	0.0050
38	482	-0.2277	-23.8120***	0.0000	-0.0207	-2.8770***	0.0042
39	481	-0.2242	-23.4770***	0.0000	-0.0092	-2.8930***	0.0040
40	481	-0.2211	-22.6740***	0.0000	-0.0186	-3.3850***	0.0008
41	479	-0.2198	-21.9320***	0.0000	-0.0118	-2.9730***	0.0031
42	479	-0.2183	-21.7180***	0.0000	-0.0129	-2.7770***	0.0057
43	477	-0.2201	-22.4000***	0.0000	-0.0125	-2.7300***	0.0066
44	476	-0.2152	-21.1350***	0.0000	-0.0101	-1.9270***	0.0546

(cont'd)

		Equally Weighted			Value Weighted		
Month	N	BHAR	t-statistics	p-value	BHAR	t-statistics	p-value
45	474	-0.2132	-21.1980***	0.0000	-0.0134	-1.9030***	0.0576
46	472	-0.2181	-22.2040***	0.0000	-0.0086	-1.7660***	0.0780
47	471	-0.2161	-21.4040***	0.0000	-0.0150	-3.5430***	0.0004
48	469	-0.2152	-21.1570***	0.0000	-0.0125	-2.6620***	0.0080

Table 4.27 : Buy-and-Hold abnormal returns

*(Note: Table represents the average BHAR given in percentage, along with t-statistics for the 48 months after listing. BHAR is given based on the EW and VW schemes. The significance level of t-statistics are as follow: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level)*

Table 4.27 reveals a significant underperformance of IPOs, leading to negative returns, during the 48 months following their listing under the BHAR (EW) scheme. Figure 4.2 also displays a decreasing trend in underperformance based on BHAR (EW). In the 1st year (12 months) after listing, IPOs exhibits an underperformance of -16.87%. This underperformance escalates to -20.35% in the 2nd year (24 months), reaching -22.92% in the 3rd year (36 months), and -21.52% in the 4th year (48 months). The underperformance of IPOs persists throughout the entire sample period of 4 years and was statistically significant at the 1% level. The highest underperformance (-22.96%), based on BHAR (EW), observes at the 35th month, while the lowest underperformance is 14.24% in the 1st month.

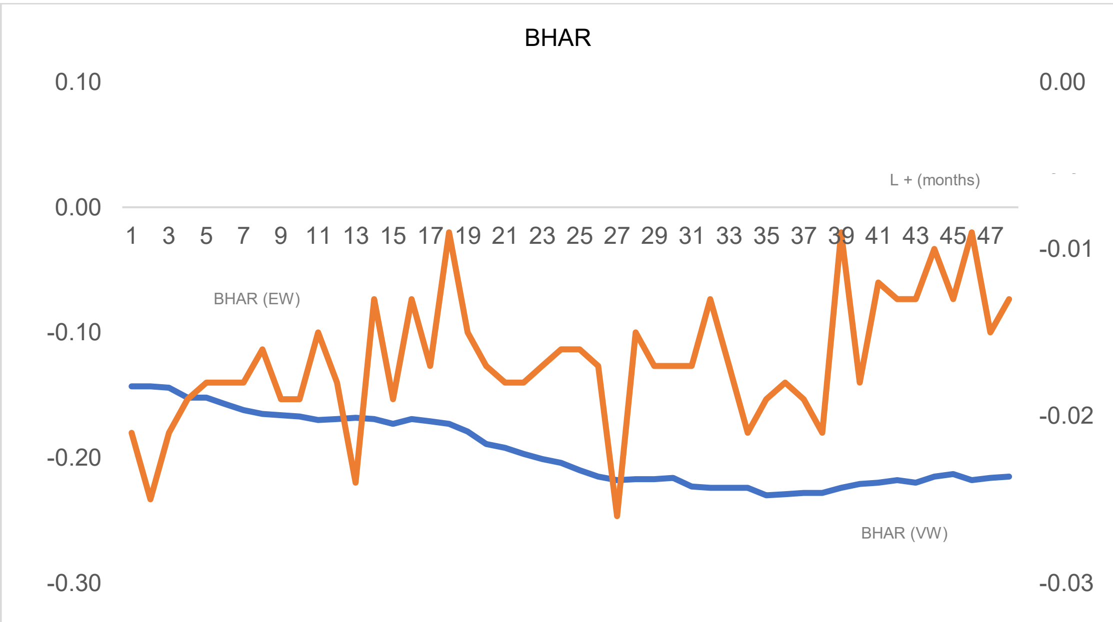

Figure 4.2 : Buy-and-Hold abnormal returns

The result of BHAR under VW scheme indicates that there is persistent underperformance from ‘month 1 to 48’. Table 4.27 provides insights into the underperformance of IPOs based on BHAR (VW). In the 1st year (12 months) following the IPO listing, the underperformance is recorded at -1.82%. This underperformance increased to -1.60% in the 2nd year (24 months), and further escalated to -1.87% in the 3rd year (36 months), and -1.25% in the 4th year (48 months). It is noteworthy that all BHAR returns under the VW scheme are statistically significant at 1%. The highest underperformance, based on BHAR (VW), is observed at -2.62% in the 27th month, while the lowest underperformance is -0.86% in the 46th month.

The overall average BHAR of IPOs in Malaysia for 4 years after listing are shown in Table 4.28.

Period (months)	N	Equally Weighted			Value Weighted		
		BHAR	t-statistics	p-value	BHAR	t-statistics	p-value
1 month (0, 1)	525	-0.1424	-16.7003***	0.0114	-0.0205	-2.5404***	0.0114
3 months (0, 3)	1,575	-0.1432	-28.8012***	0.0000	-0.0221	-4.3926***	0.0000
6 months (0, 6)	3,137	-0.1484	-43.2040***	0.0000	-0.0202	-6.6209***	0.0000
12 months (0, 12)	6,233	-0.1573	-65.8216***	0.0000	-0.0190	-10.2414***	0.0000
24 months (0, 24)	12,289	-0.1693	-96.5598***	0.0000	-0.0176	-14.1240***	0.0000
36 months (0, 36)	18,183	-0.1859	-127.4990***	0.0000	-0.0177	-17.4622***	0.0000
48 months (0, 48)	23,906	-0.1940	-148.6330***	0.0000	-0.0167	-19.6180***	0.0000

Table 4.28 : Summary of Buy-and-Hold abnormal returns of IPOs in Malaysia

*(Note: Table presents the BHAR of Malaysian IPOs over different post-listing periods using both EW and VW schemes. The significance level of t-statistics as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level)*

(c) Wealth relative

Ritter (1991) introduces the concept of wealth relatives, which is the ratio of the end-of-period wealth generated from holding a portfolio of IPO issuers to the end-of-period wealth generated from holding a portfolio of matched companies or benchmarks. A WR is greater than 1 indicates that IPOs outperformed the market benchmarks over the long-run. However, a WR of less than 1 indicates that IPOs underperform relative to the benchmark. Average WR is calculated based on EW and VW schemes.

According to the data presented in Table 4.29, there is evidence of long-run underperformance in IPOs from ‘month 1 to 48’, as indicated by the WR (EW) values being less than 1.

Equally Weighted					Value Weighted				
Month	N	WR	t-statistics	p-value	Month	N	WR	t-statistics	p-value
1	525	0.8795	117.6441***	0.0000	1	525	0.001588	5.9037***	0.0000
2	525	0.8788	114.7801***	0.0000	2	525	0.001610	5.8658***	0.0000
3	525	0.8758	114.0851***	0.0000	3	525	0.001621	5.8152***	0.0000
4	521	0.8684	121.5546***	0.0000	4	521	0.001544	5.7354***	0.0000
5	521	0.8668	118.9710***	0.0000	5	521	0.001553	5.6913***	0.0000
6	520	0.8634	117.8217***	0.0000	6	520	0.001541	5.6913***	0.0000
7	517	0.8584	122.5445***	0.0000	7	517	0.001546	5.7207***	0.0000
8	517	0.8561	122.3749***	0.0000	8	517	0.001548	5.7310***	0.0000
9	517	0.8557	122.8314***	0.0000	9	517	0.001555	5.6820***	0.0000
10	516	0.8550	117.9511***	0.0000	10	516	0.001559	5.6710***	0.0000
11	515	0.8529	116.3470***	0.0000	11	515	0.001553	5.6901***	0.0000
12	514	0.8547	116.8898***	0.0000	12	514	0.001582	5.6722***	0.0000
13	512	0.8570	113.5068***	0.0000	13	512	0.001579	5.6893***	0.0000
14	512	0.8565	110.6241***	0.0000	14	512	0.001592	5.7011***	0.0000
15	510	0.8541	111.7031***	0.0000	15	510	0.001609	5.6137***	0.0000
16	509	0.8595	109.1409***	0.0000	16	509	0.001641	5.5820***	0.0000
17	508	0.8586	106.0790***	0.0000	17	508	0.001676	5.5344***	0.0000
18	506	0.8568	104.4768***	0.0000	18	506	0.001682	5.5557***	0.0000
19	503	0.8522	106.3662***	0.0000	19	503	0.001671	5.6062***	0.0000
20	500	0.8441	108.6882***	0.0000	20	500	0.001676	5.5529***	0.0000
21	499	0.8405	112.6630***	0.0000	21	499	0.001669	5.4011***	0.0000
22	499	0.8368	114.1332***	0.0000	22	499	0.001679	5.3906***	0.0000
23	499	0.8333	112.3274***	0.0000	23	499	0.001674	5.4039***	0.0000
24	499	0.8316	112.3512***	0.0000	24	499	0.001680	5.3971***	0.0000
25	497	0.8260	116.0309***	0.0000	25	497	0.001677	5.3828***	0.0000
26	496	0.8226	114.8782***	0.0000	26	496	0.001672	5.3802***	0.0000
27	496	0.8212	115.6065***	0.0000	27	496	0.001679	5.3386***	0.0000
28	495	0.8236	112.7481***	0.0000	28	495	0.001697	5.3716***	0.0000
29	495	0.8245	108.2213***	0.0000	29	495	0.001700	5.3893***	0.0000
30	495	0.8258	104.1769***	0.0000	30	495	0.001692	5.4513***	0.0000
31	491	0.8195	109.5879***	0.0000	31	491	0.001709	5.3714***	0.0000
32	490	0.8182	110.3141***	0.0000	32	490	0.001713	5.2890***	0.0000
33	487	0.8171	109.4642***	0.0000	33	487	0.001731	5.2111***	0.0000
34	486	0.8180	104.0292***	0.0000	34	486	0.001745	5.2063***	0.0000
35	483	0.8124	107.7452***	0.0000	35	483	0.001754	5.1458***	0.0000
36	483	0.8132	105.4173***	0.0000	36	483	0.001780	5.0801***	0.0000
37	482	0.8148	103.5025***	0.0000	37	482	0.001791	5.0594***	0.0000
38	482	0.8142	100.5028***	0.0000	38	482	0.001774	5.1321***	0.0000

(cont'd)

		Equally Weighted					Value Weighted		
Month	N	WR	t-statistics	p-value	Month	N	WR	t-statistics	p-value
39	481	0.8159	100.7731***	0.0000	39	481	0.001784	5.1106***	0.0000
40	481	0.8188	97.8057***	0.0000	40	481	0.001800	5.0799***	0.0000
41	479	0.8202	94.5564***	0.0000	41	479	0.001841	4.9891***	0.0000
42	479	0.8209	94.3602***	0.0000	42	479	0.001853	4.9874***	0.0000
43	477	0.8189	96.1365***	0.0000	43	477	0.001791	4.8308***	0.0000
44	476	0.8233	92.4932***	0.0000	44	476	0.001798	4.8104***	0.0000
45	474	0.8241	93.4560***	0.0000	45	474	0.001827	4.7968***	0.0000
46	472	0.8196	96.1133***	0.0000	46	472	0.001828	4.7448***	0.0000
47	471	0.8207	92.8971***	0.0000	47	471	0.001826	4.7387***	0.0000
48	469	0.8215	92.4911***	0.0000	48	469	0.001810	4.7081***	0.0000

Table 4.29 : Wealth relative

*(Note: Table represents the WR given in percentage, along with t-statistics for the 48 months after listing. BHAR is given based on the EW and VW schemes. The significance level of t-statistics are as follow: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level)*

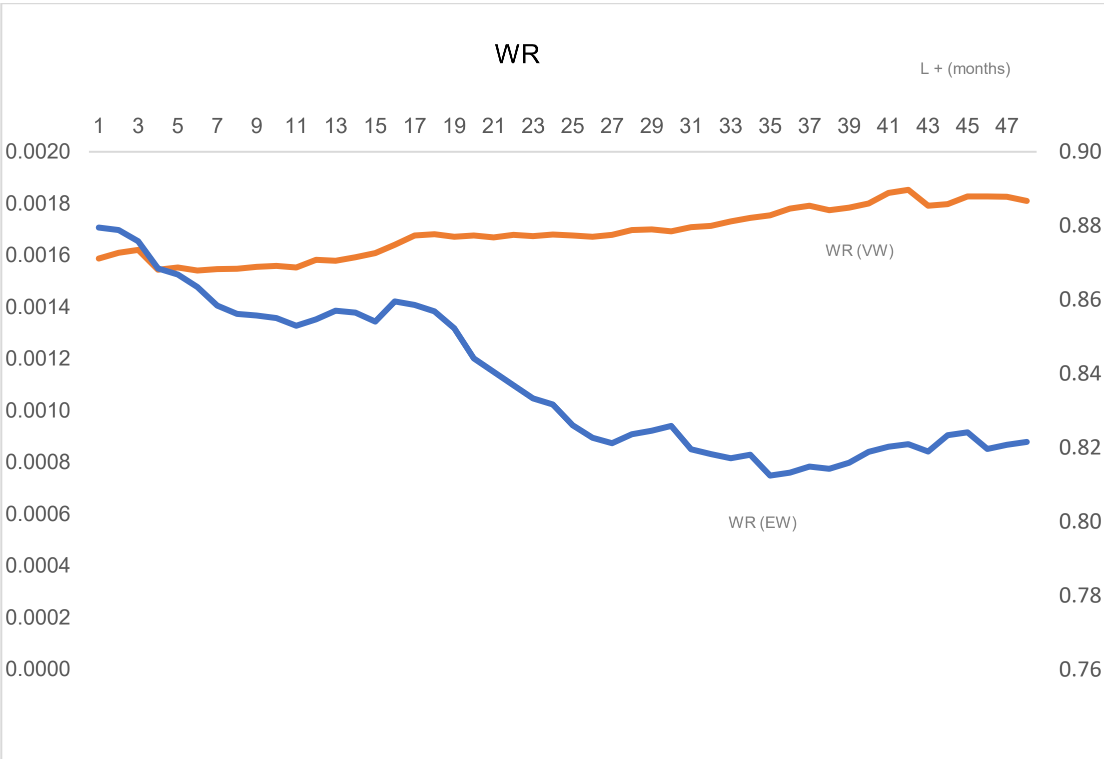

Figure 4.3 : Wealth relative

The overall WR of IPOs in Malaysia for 4 years after listing are shown in Table 4.30.

Period (months)	N	Equally Weighted			Value Weighted		
		WR	t-statistics	p-value	WR	t-statistics	p-value
1 month (0, 1)	525	0.8795	117.6441***	0.0000	0.001588	5.9037***	0.0000
3 months (0, 3)	1,575	0.8781	200.1302***	0.0000	0.001606	10.1570***	0.0000
6 months (0, 6)	3,137	0.8722	287.4895***	0.0000	0.001576	14.1775***	0.0000
12 months (0, 12)	6,233	0.8639	410.1014***	0.0000	0.001566	19.8978***	0.0000
24 months (0, 24)	12,289	0.8563	558.2492***	0.0000	0.001608	27.5997***	0.0000
36 months (0, 36)	18,183	0.8446	672.0575***	0.0000	0.001642	33.0750***	0.0000
48 months (0, 48)	23,906	0.8386	745.5269***	0.0000	0.001682	36.9395***	0.0000

Table 4.30 : Summary of wealth relative of IPOs in Malaysia

*(Note: Table presents the WR of Malaysian IPOs over different post-listing periods using both EW and VW schemes. The significance level of t-statistics as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level)*

4.6.2 The construction of Malaysian IPO market sentiment index for long-run effect

This research following the study done by Ding et al. (2019) to decompose the original investor sentiment index into short-run effect and long-run effect. The long-run market sentiment was computed using moving average of the original sentiment index as a crude yet intuitive measure for the long-run sentiment component. More specifically, at each time t, the long-run sentiment component ($\rho_{LR,t}$) is the moving average of the original sentiment index over a 24-month period between $[t-25, t-2]$. While the choice to use a 24-month period might seem random, it is partially motivated by the observation that times of high or low sentiment in the stock market often last about 24 months. For example, in the United States stock market, there was a lot of excitement about new stocks from 1961 to 1962, high investor sentiment for firms with strong growth potential between 1967 to 1968, and a lot of excitement about gambling-related stocks in 1977 and 1978. When there are bubbles or market crashes, it usually takes about 24 months for share prices to return to normal. After the high-tech bubble in the early 1980s, for example, investors' demand shifted to stocks that pay dividends from 1987 to 1988.

4.6.3 Descriptive statistics of the independent variables for long-run share performance of IPOs

Table 4.31 provides the descriptive summary of the independent variables of long-run IPO share performance. The summary consists of total number of observation ‘N’, mean value, median value, maximum value, minimum value, and standard deviation of each independent variable.

In this research, the IPO’s long-run share performance is measured up to 4 years after listing. In addition, firms that went IPOs from January 2000 to December 2001 are excluded from the sample of research because in constructing MIMSI this research uses moving average with 2 years lag period for long-run sentiment effect based on the short-run sentiment of PCA, sPCA and PLS methods computed in the earlier research objective. Hence, for the IPO’s long-run IPO share performance, this research analysed 469 IPO firms listed on Bursa Malaysia from January 2002 to December 2020. The total number of observations used in this research is the monthly data available for all the IPO firms listed on Bursa Malaysia from January 2002 to December 2020.

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Dependent variables	N	Mean	Median	Maximum	Minimum	Standard deviation
BHAR (VW)	16,149	-.0162	-.0023	.0358	-.2732	.1278
Independent variables	N	Mean	Median	Maximum	Minimum	Standard deviation
Panel A : Behavioural Characteristics						
IPO market sentiment ($MIMSI^{PCA-LR}$)	15,932	.1510	.1803	1.5424	-2.5855	1.2456
IPO market sentiment ($MIMSI^{sPCA-LR}$)	15,932	.1510	.1803	2.5855	-1.5424	1.2456
IPO market sentiment ($MIMSI^{PLS-LR}$)	15,932	.7498	.7928	1.2887	.2597	.1929
Panel B : Issue Characteristics						
Initial return (IR)	16,149	.2543	.1133	2.4642	-.4270	.4960
Offer size (OSIZE)	16,101	17.3358	17.0443	21.6726	15.4530	1.3156
Panel C : Firm Characteristics						
Firm age (FAGE)	16,149	21.4390	20.0000	59.0000	4.0000	11.3234
Board size (BSIZE)	16,149	7.3238	7.0000	13.0000	4.0000	1.9317
Major shareholder ownership (MAJOR)	16,149	57.2986	59.7300	79.7700	14.6940	13.8881
Panel D : Market Characteristics						
Market volatility (MVL)	16,149	.0072	.0060	.0159	.0030	.0031
Oversubscription ratio (OVER)	16,149	25.7769	13.1100	212.5900	.0000	37.5694

Table 4.31 : Descriptive summary of independent variables (long-run share performance of IPOs)

(Note: Table represents descriptive summary of independent variables in terms of total number of observations 'N', mean value, median value, minimum, maximum and standard deviation. The dummy variables (i) underwriter reputation, (ii) hot issue market, and (iii) board listing are excluded from the table)

Table 4.31 provides the overall summary of the behavioural, issue, firm, and market characteristics variables. The behavioural characteristic consist of 1 variable using 3 different methods in constructing MIMSI using PCA, sPCA and PLS methods. The issue characteristics variables consist of initial return (IR), and offer size (OSIZE). The firm characteristics variables consist of firm age (FAGE), board size (BSIZE), and major shareholder ownership (MAJOR). The market characteristics variables consist of market volatility (MVL), and oversubscription ratio (OVER). The underwriter reputation (UREP), hot issue market (HOT), and board listing (BLIST) are not included in the summary as these are dummy variables.

The dependent variable of BHAR (VW) illustrates that the mean and median BHAR (VW) are -1.62% and -0.23%, respectively. The negative value of BHAR (VW) shows that the investment underperformed the benchmark during the specified period. In other words, the investment did not generate returns as high as it would have been expected based on the benchmark's performance. The maximum BHAR (VW) over the sample reaches to 3.58%, however, it drops to the lowest level of -27.32%, with a standard deviation of 12.78%. This indicates that in Malaysia there is some variations in terms of the abnormal returns within IPO market after listing.

Table 4.31 (Panel A) provides the descriptive summary of the behavioural characteristics variable. The behavioural characteristics consist of IPO market sentiment (MIMSI) constructed using 3 different methods including PCA, sPCA and PLS methods. The descriptive summary about MIMSI (using PCA method) illustrates that the mean and median $MIMSI^{PCA\text{-}LR}$ are 15.10% and 18.03%, respectively. The positive value of $MIMSI^{PCA\text{-}LR}$ shows that there is optimistic perception of investors towards Malaysian IPO market sentiment. This implies that in Malaysia the overall market sentiment remains positive (optimism). The maximum market sentiment over the sample reaches to 154.24%, however, it drops to the lowest level of -258.55%, with a standard deviation of 124.56%. This indicates that in Malaysia there is some variations in terms of the market sentiment within IPO market. Similarly, the descriptive summary about IPO market sentiment (using sPCA method) illustrates that the mean and median $MIMSI^{sPCA\text{-}LR}$ are 15.10% and 18.03%, respectively. The positive value of $MIMSI^{sPCA\text{-}LR}$ shows that there is optimistic perception of investors towards Malaysian IPO market. The maximum and minimum values are 258.55% and -154.24%, respectively, with a standard deviation of 124.56%. This indicates that in Malaysia there is some variations in the market sentiment within IPO markets. Both $MIMSI^{PCA\text{-}LR}$ and $MIMSI^{sPCA\text{-}LR}$ have reported positive value of market sentiment which shows that there is optimistic perception of investors towards Malaysian IPO market. In contrast, the descriptive summary about IPO market sentiment (using PLS method) illustrates that the mean and median $MIMSI^{PLS-LR}$ are 74.98% and 79.28%, respectively. The positive value of $MIMSI^{PLS-LR}$ shows that there is optimistic perception among investors towards Malaysian IPO market. The maximum and minimum values are 128.87% and 25.97%, respectively, with a standard deviation of 19.29%.

Table 4.31 (Panel B) provides the descriptive summary of the issue characteristics variables. The issue characteristics variables consist of initial return (IR), and offer size (OSIZE). The descriptive summary about initial return (IR) illustrates, that the mean and median initial return (IR) is 25.43% and 11.33%, respectively. The maximum and minimum values are 246.24% and -42.70%, respectively, with a standard deviation of 49.60%. This indicates that in Malaysian IPO market the initial returns (IR) from subscription of IPO shares can vary up to 49.60%. Similarly, the descriptive summary about offer size (OSIZE) shows that the mean and median value of offer size (OSIZE) is 17.33 and 17.04, respectively. The maximum value is 21.67 and minimum value is 15.45 with a standard deviation of 1.31. The underwriter reputation (UREP) is excluded from the summary as it is dummy variable.

Table 4.31 (Panel C) provides the descriptive summary of the firm characteristics variables. The firm characteristics variables include firm age (FAGE), board size (BSIZE), and major shareholder ownership (MAJOR). The mean and median value of firm age (FAGE) in Malaysia is 21.43 and 20.00, respectively with maximum and minimum value of 59 and 4, respectively. The standard deviation of 11.32 shows that there is some variation in the firm age of Malaysia. The mean and median value of board size (BSIZE) in Malaysia is 7.32 and 7, respectively. The maximum value is 13 and minimum value is 4 with a standard deviation of 1.93. The mean and median value of major shareholder ownership (MAJOR) in Malaysia is 57.29 and 59.73, respectively. The maximum value is 79.77 and minimum value is 14.69 with a standard deviation of 13.88. This indicates that the major shareholder of IPO firm can hold up to 79.77% shareholding ownership in a firm.

Table 4.31 (Panel D) provides the descriptive summary of the market characteristics variables including market volatility (MVL), and oversubscription ratio (OVER). The data related market volatility (MVL) shows that the mean market volatility in Malaysia is 0.72% and median is 0.60%, respectively. The maximum and minimum value of the market volatility is 1.59% and 0.30%, respectively, with the standard deviation of 0.31%. This shows that in Malaysia market volatility remains stable after listing from January 2002 to December 2020. The data related oversubscription ratio (OVER) shows that the mean oversubscription ratio in Malaysia is 25.77 and median is 13.11, respectively. The maximum and minimum value of the oversubscription ratio (OVER) is 212.59 and 0, respectively, with the standard deviation of 37.56. The hot issue market (HOT) is excluded from the summary as it is dummy variable.

4.6.4 Diagnostic tests for regression analysis (long-run share performance of IPOs)

The following subsections explain the results of diagnostic tests used in this research for the regression analysis of long-run share performance of IPOs.

(a) Collinearity

To assess the collinearity among variables in this research, a correlation matrix and the analysis of the VIF were employed. The result of the correlation matrix of all the variables is tabulated in Table 4.32.

The variables are IPO market sentiment (MIMSI), initial return (IR), offer size (OSIZE), underwriter reputation (UREP), firm age (FAGE), board size (BSIZE), major shareholder ownership (MAJOR), market volatility (MVL), oversubscription ratio (OVER), hot issue market (HOT), and board listing (BLIST). The correlation coefficients, along with their significance levels of 1% and 5%, were examined. However, as shown in Table 4.32 hot issue market (HOT) has high correlation of 0.6920 therefore, this independent variable will be excluded from the results analysis.

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The results indicate that there is no issue of multicollinearity among the variables. All the correlation coefficients between the variables are below 0.7, indicating that there is no high correlation observed between them.

	$MIMSI^{PCA-LR}$	$MIMSI^{sPCA-LR}$	$MIMSI^{PLS-LR}$	IR	OSIZE	UREP	FAGE	BSIZE	MAJOR	MVL	OVER	HOT	BLIST
MIMSI	1.000	1.000	1.000										
IR	-0.1369	0.1369	0.0897	1.000									
OSIZE	0.2488	-0.2488	-0.1991	-0.1772	1.000								
UREP	-0.1217	0.1217	0.0818	0.0242	0.3067	1.000							
FAGE	0.2206	-0.2206	-0.2017	-0.0826	0.2899	0.0577	1.000						
BSIZE	-0.0509	0.0509	0.0396	-0.0191	0.2435	0.1888	0.2512	1.000					
MAJOR	0.0699	-0.0699	-0.0007	-0.1367	0.1929	0.1119	0.0838	0.0587	1.000				
MVL	0.1690	-0.1690	0.0252	0.0135	-0.1108	-0.0153	-0.0427	-0.0061	0.0052	1.000			
OVER	-0.0488	0.0488	0.0049	0.3010	-0.2797	-0.0751	-0.1165	-0.0661	-0.0603	0.0589	1.000		
HOT	-0.1618	0.1618	0.0856	0.6920	-0.1830	-0.0069	-0.1198	-0.0167	-0.1570	0.0149	0.3573	1.000	
BLIST	-0.1308	0.1308	0.1400	-0.1417	0.4308	0.2731	0.2466	0.2237	0.1422	-0.0747	-0.3255	-0.1462	1.000

Table 4.32 : Correlation matrix (long-run share performance of IPOs) with $MIMSI^{PCA-LR}$, $MIMSI^{sPCA-LR}$, $MIMSI^{PLS-LR}$

(Note: Table presents the Pearson correlation coefficients among variables with their significance. The variables are given as: IPO market sentiment (MIMSI), initial return (IR), offer size (OSIZE), underwriter reputation (UREP), firm age (FAGE), board size (BSIZE), major shareholder ownership (MAJOR), market volatility (MVL), oversubscription ratio (OVER), hot issue market (HOT), and board listing (BLIST))

Table 4.33 provides the summary of VIF test result of all the 3 models used in this research to examine the long-run IPO share performance. The results indicate that all the VIF values are less than 10 which suggests low multicollinearity between variables.

Independent variables	Model 1 (Behavioural)	Model 2 (Behavioural-and-Issue)	Model 3 (Behavioural-Issue-and-Firm)	Model 4 (Behavioural-Issue-Firm-and-Market)
Vector Inflation Factor with $MIMSI^{PCA\text{-}LR}$				
IPO market sentiment ($MIMSI^{PCA\text{-}LR}$)	1.00	1.13	1.17	1.33
Initial return (IR)		1.05	1.06	1.15
Offer size (OSIZE)		1.25	1.38	1.65
Underwriter reputation (UREP)		1.17	1.18	1.20
Firm age (FAGE)			1.18	1.22
Board size (BSIZE)			1.15	1.15
Major shareholder ownership (MAJOR)			1.06	1.06
Market volatility (MVL)				1.06
Oversubscription ratio (OVER)				1.23
Board listing (BLIST)				1.51
Mean VIF	1.00	1.15	1.17	1.26
White's test (Chi^2 (df), p-value)	96.95 (4) 0.0000	6,098.14 (18) 0.0000	6,337.82 (42) 0.0000	6,491.18 (74) 0.0000
Vector Inflation Factor with $MIMSI^{sPCA\text{-}LR}$				
IPO market sentiment ($MIMSI^{sPCA\text{-}LR}$)	1.00	1.13	1.17	1.33
Initial return (IR)		1.05	1.06	1.15
Offer size (OSIZE)		1.25	1.38	1.65
Underwriter reputation (UREP)		1.17	1.18	1.20
Firm age (FAGE)			1.18	1.22
Board size (BSIZE)			1.15	1.15
Major shareholder ownership (MAJOR)			1.06	1.06
Market volatility (MVL)				1.06
Oversubscription ratio (OVER)				1.23
Board listing (BLIST)				1.51
Mean VIF	1.00	1.15	1.17	1.26
White's test (Chi^2 (df), p-value)	96.95 (4) 0.0000	6,089.14 (18) 0.0000	6,337.82 (42) 0.0000	6,491.18 (74) 0.0000

(cont'd)

Independent variables	Model 1 (Behavioural)	Model 2 (Behavioural-and-Issue)	Model 3 (Behavioural-Issue-and-Firm)	Model 4 (Behavioural-Issue-Firm-and-Market)
	Vector Inflation Factor with $MIMSI^{PLS-LR}$			
IPO market sentiment ($MIMSI^{PLS-LR}$)	1.00	1.07	1.11	1.19
Initial return (IR)		1.04	1.06	1.14
Offer size (OSIZE)		1.21	1.35	1.57
Underwriter reputation (UREP)		1.14	1.16	1.18
Firm age (FAGE)			1.17	1.22
Board size (BSIZE)			1.14	1.15
Major shareholder ownership (MAJOR)			1.06	1.07
Market volatility (MVL)				1.02
Oversubscription ratio (OVER)				1.23
Board listing (BLIST)				1.50
Mean VIF	1.00	1.12	1.15	1.23
White's test (Chi^2 (df), p-value)	77.82 (4) 0.0000	6,082.24 (18) 0.0000	6,313.20 (42) 0.0000	6,473.23 (74) 0.0000

Table 4.33 : Vector inflation factor for long-run share performance of IPOs

(Note: Table represents the result of VIF test of all the variables used to examine the long-run share performance of IPOs. Model 1 includes behavioural characteristics, Model 2 includes behavioural-and-issue characteristics, Model 3 includes behavioural-issue-and-firm characteristics, Model 4 includes behavioural-issue-firm-and-market characteristics (overall))

(b) Homoscedasticity test

The results of homoscedasticity tests are tabulated in Table 4.33. The result shows that the computed chi-squared for the White's test is statistically insignificant as the p-values are greater than 0.05, entails to accept the null hypothesis that 'data are homoscedastic'. This confirms that there is no heteroscedasticity problem in the data. The result clarifies the data can be used for further analysis.

White's test for heteroscedasticity (long-run share performance of IPOs) as shown in Table 4.33 presents the results of the summary of homoscedasticity's tests. The White's test was performed to test the null hypothesis of: Residuals are homoscedastic, against the alternate hypothesis of: Residuals are heteroscedastic.

(c) Normality

In order to avoid the problem of non-normality, this research uses the logit and probit regression models that do not require the data normality assumption apart from the OLS regression parameter in analysing the data.

4.7 Regression models to explain long-run share performance of IPOs

The following subsections explain the determinants of long-run IPO share performance based on OLS regression model, interaction analysis, binary regression model, and marginal probability analysis.

4.7.1 Ordinary least square regression model to explain long-run share performance of IPOs

In this research, we have used the data for full window period. The following equation provides the association between the behavioural, issue, firm, and market characteristics based on OLS regression model for the Malaysian IPO's long-run share performance. β_0 is the intercept of the equation. The dependent variable is BHAR (VW), whereas, the independent variables are IPO investment sentiment index can be categorised into 3 types such as IPO market sentiment (MIMSI) constructed using PCA method according to Baker and Wurgler (2006), using sPCA method according to Jiang et al. (2022), and using PLS method according to Huang et al. (2015). The independent variables are initial return (IR), offer size (OSIZE), underwriter reputation (UREP), firm age (FAGE), board size (BSIZE), major shareholder ownership (MAJOR), market volatility (MVL), oversubscription ratio (OVER), hot issue market (HOT), and board listing (BLIST). The OLS regression model's equation is illustrated in Equation 3.17. However, hot issue market (HOT) has been excluded from the regression results due to high correlation as shown in Table 4.32.

The OLS regression model's results are reported in Table 4.34. The coefficient of each variable is given along with t-statistics in parentheses as computed by robust standard errors. The model fitness is determined from the R-squared and F-statistics.

Table 4.34, Model 4 (overall) provides the estimation of equation by using OLS regression model with $\text{MIMSI}^{\text{PCA-LR}}$. The R-squared is 0.1423 indicates that 14.23% of the total variance in the IPO's long-run share performance is accounted by the independent variables. The F-statistics is 31.77 and the result of F-statistics shows that the overall model is significant. The result shows that the IPO market sentiment (MIMSI), initial return (IR), offer size (OSIZE), underwriter reputation (UREP), firm age (FAGE), market volatility (MVL), oversubscription ratio (OVER), and board listing (BLIST) are statistically significant at 1%. Board size (BSIZE) is statistically significant at 10%. These variables are the significant factors that influence the IPO's long-run share performance. As such, these variables are statistically significant and accepted the hypotheses. The result shows that major shareholder ownership (MAJOR) has no impact on the IPO's long-run share performance and rejected the hypotheses.

Table 4.34, Model 4 (overall) provides the estimation of equation by using OLS regression model with $MIMSI^{sPCA\text{-}LR}$. The R-squared is 0.1423 indicates that 14.23% of the total variance in the IPO's long-run share performance is accounted for by the independent variables. The F-statistics is 31.77 and the result of F-statistics shows that the overall model is significant. The result shows that the IPO market sentiment (MIMSI), initial return (IR), offer size (OSIZE), underwriter reputation (UREP), firm age (FAGE), market volatility (MVL), oversubscription ratio (OVER), and board listing (BLIST) are statistically significant at 1%. Board size (BSIZE) is statistically significant at 10%. These variables are the significant factors that influence the long-run IPO share performance. As such, these variables are statistically significant and accepted the hypotheses. The result shows that major shareholder ownership (MAJOR) has no impact on the IPO's long-run share performance and rejected the hypotheses.

Table 4.34, Model 4 (overall) provides the estimation of equation by using OLS regression model with $MIMSI^{PLS\text{-}LR}$. The R-squared is 0.1454 indicates that 14.54% of the total variance in the IPO's long-run share performance is accounted for by the independent variables. The F-statistics is 32.97 and result of the F-statistics shows that the overall model is significant. The result shows that the IPO market sentiment (MIMSI), initial return (IR), offer size (OSIZE), underwriter reputation (UREP), firm age (FAGE), market volatility (MVL), oversubscription ratio (OVER), and board listing (BLIST) are statistically significant at 1%. Board size (BSIZE) is statistically significant at 5%. These variables are the significant factors that influence the IPO's long-run share performance. As such, these variables are statistically significant and accepted the hypotheses. The result shows that major shareholder ownership (MAJOR) has no impact on the IPO's long-run share performance and rejected the hypotheses.

	PCA				sPCA				PLS			
	Dependent variable: BHAR (VW)				Dependent variable: BHAR (VW)				Dependent variable: BHAR (VW)			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Independent variables	Behavioural	Behavioural-and-Issue	Behavioural-Issue-and-Firm	(Overall) Behavioural-Issue-Firm-and-Market	Behavioural	Behavioural-and-Issue	Behavioural-Issue-and-Firm	(Overall) Behavioural-Issue-Firm-and-Market	Behavioural	Behavioural-and-Issue	Behavioural-Issue-and-Firm	(Overall) Behavioural-Issue-Firm-and-Market
MIMSI	.0004	.0116***	.0106***	.0142***	-.0004	-.0116***	-.0106***	-.0142***	-.0289***	-.0852***	-.0796***	-.0961***
	(.84)	(12.40)	(12.16)	(12.60)	(-.84)	(-12.40)	(-12.16)	(-12.60)	(-10.38)	(-12.41)	(-12.12)	(-12.00)
IR		-.0125***	-.0123***	-.0085***		-.0125***	-.0123***	-.0085***		-.0134***	-.0128***	-.0089***
		(-11.64)	(-11.13)	(-10.83)		(-11.64)	(-11.13)	(-10.83)		(-11.79)	(-11.27)	(-10.96)
OSIZE		-.0394***	-.0404***	-.0450***		-.0394***	-.0404***	-.0450***		-.0391***	-.0402***	-.0443***
		(-11.08)	(-11.21)	(-11.35)		(-11.08)	(-11.21)	(-11.35)		(-11.07)	(-11.21)	(-11.28)
UREP		.0320***	.0324***	.0302***		.0320***	.0324***	.0302***		.0308***	.0312***	.0280***
		(7.11)	(7.07)	(6.95)		(7.11)	(7.07)	(6.95)		(6.92)	(6.90)	(6.61)
FAGE			.0006***	.0004***			.0006***	.0004***			.0005***	.0003***
			(5.71)	(3.99)			(5.71)	(3.99)			(5.42)	(3.82)
BSIZE			-.0008	-.0009*			-.0008	-.0009*			-.0008	-.0011**
			(-1.59)	(-1.91)			(-1.59)	(-1.91)			(-1.61)	(-2.23)
MAJOR			-.00001	-.00004			-.00001	-.00004			.00004	.00002
			(-.32)	(-.81)			(-.32)	(-.81)			(.77)	(.46)
MVL				-1.5970***				-1.5970***				-.4503***
				(-8.04)				(-8.04)				(-2.35)
OVER				-.00006***				-.00006***				-.00007***
				(-6.95)				(-6.95)				(-8.13)
BLIST				.0250***				.0250***				.0253***
				(9.95)				(9.95)				(9.78)
Constant	-.0164***	.6631***	.6739***	.7590***	-.0164***	.6632***	.6740***	.7590***	.0051***	.7202***	-.7258***	.8051***
	(-15.56)	(11.05)	(10.96)	(11.25)	(-15.56)	(11.05)	(10.96)	(11.25)	(2.69)	(11.24)	(11.17)	(11.32)
F-statistics	.7000	57.34	34.99	31.77	.7000	57.34	34.99	31.77	107.66	61.00	35.73	32.97
R-squared	.0000	.1314	.1339	.1423	.0000	.1314	.1339	.1423	.0019	.1354	.1377	.1454
Root mean squared error	.1287	.1201	.1200	.1194	.1287	.1201	.1200	.1194	.1286	.1199	.1197	.1192
Observations	15,932	15,884	15,884	15,884	15,932	15,884	15,884	15,884	15,932	15,884	15,884	15,884

Table 4.34 : Long-run share performance of IPOs determinants based on OLS regression model with $MIMSI^{PCA\text{-}LR}$, $MIMSI^{sPCA\text{-}LR}$, and $MIMSI^{PLS\text{-}LR}$

*(Note: Table represents the long-run share performance of IPOs at each level of behavioural-issue-firm-and-market characteristics by using OLS regression model. The above table consists of 4 models: Model 1 consist of behavioural characteristics, Model 2 consist of behavioural-and-issue characteristics, Model 3 consist of behavioural-issue-and-firm characteristics, Model 4 consist of behavioural-issue-firm-and-market characteristics (overall). The dependent variable dichotomous takes the value of '1' if the firm is overperformance and takes the value '0' if the firm is underperformance. t-statistic is given with significance level as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level)*

Results based on OLS regression model with window periods T+1 month, T+3 month, T+6 month, T+9 month, T+12 month, T+24 month, T+36 month, and T+48 month

Additionally, we have also extended the results to include different window periods to examine the trend of abnormal returns and influences of market sentiment after listing. Appendix I provides the results of IPO's long-run share performance determinants based on OLS regression models with window periods: T+1 month (BHAR VW_1), T+3 month (BHAR VW_3), T+6 month (BHAR VW_6), T+9 month (BHAR VW_9), T+12 month (BHAR VW_12), T+24 month (BHAR VW_24), T+36 month (BHAR VW_36), and T+48 month (BHAR VW_48).

In summary, the results show in Table 4.35 indicate that, within the window periods from T+9 month to T+36 month, IPO investors predominantly focus on IPO market sentiment (MIMSI), initial returns (IR), offer size (OSIZE), major shareholder ownership (MAJOR), oversubscription ratio (OVER), and board listing (BLIST) are the fundamental key determinants that investors consider at different window periods after listing. Lastly, the results evidence that market volatility (MVL) becomes the primary factor investors focus on after 4 years of listing.

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Window periods	Summary of results for (Overall) Behavioural-Issue-Firm-and-Market Dependent variable: BHAR (VW)		
T+1 month	PCA (i) BSIZE (10%)	sPCA (i) BSIZE (10%)	PLS (i) BSIZE (10%)
T+3 month	PCA (i) OSIZE (10%) (ii) OVER (10%) (iii) BLIST (10%)	sPCA (i) OSIZE (10%) (ii) OVER (10%) (iii) BLIST (10%)	PLS (i) OSIZE (10%) (ii) OVER (10%) (iii) BLIST (10%)
T+6 month	PCA -	sPCA -	PLS (i) MIMSI (10%)
T+9 month	PCA (i) MIMSI (1%) (ii) OSIZE (5%) (iii) MAJOR (5%) (iv) BLIST (5%) (v) IR (10%) (vi) OVER (10%)	sPCA (i) MIMSI (1%) (ii) OSIZE (1%) (iii) MAJOR (5%) (iv) BLIST (5%) (v) IR (10%) (vi) OVER (10%)	PLS (i) MIMSI (1%) (ii) OSIZE (1%) (iii) MAJOR (10%) (iv) BLIST (5%) - (v) OVER (5%)
T+12 month	PCA (i) IR (5%) (ii) OSIZE (5%) (iii) BLIST (10%) (iv) MIMSI (10%)	sPCA (i) IR (5%) (ii) OSIZE (5%) (iii) UREP (10%) (iv) MIMSI (10%)	PLS (i) IR (5%) (ii) OSIZE (5%) (iii) BLIST (10%) (iv) OSIZE (10%)
T+ 24 month	PCA (i) MIMSI (5%) (ii) IR (10%)	sPCA (i) MIMSI (5%) (ii) IR (10%)	PLS - (i) IR (10%)
T+36 month	PCA (i) MIMSI (5%) (ii) OSIZE (5%) (iii) BLIST (10%)	sPCA (i) MIMSI (5%) (ii) OSIZE (5%) (iii) BLIST (10%)	PLS (i) MIMSI (5%) (ii) OSIZE (5%) (iii) BLIST (10%)
T+48 month	PCA (i) MVL (1%)	sPCA (i) MVL (1%)	PLS (i) MVL (10%)

Table 4.35 : A summary of results for long-run share performance of IPOs based on window periods from T+1 month to T+48 month

(Note: Table summarises the key determinants influencing long-run share performance of IPOs across different window periods. Investor focus shifts over time with MIMSI, IR, OSIZE, MAJOR, OVER, and BLIST influencing early stages, while MVL dominates after 4 years)

4.7.2 Interaction analysis to explain long-run share performance of IPOs

Table 4.36 shows there is significant interactions between market sentiment (MIMSI) and all the key determinants that are significant to long-run underperformance based on results show in Table 4.34. These variables include initial returns (IR), offer size (OSIZE), underwriter reputation (UREP), firm age (FAGE), board size (BSIZE), market volatility (MVL), oversubscription ratio (OVER), and board listing (BLIST).

For the interaction between market sentiment and initial returns (MIMSI*IR), a positive interaction indicates that higher sentiment strengthen the IR-BHAR relationship, prolonging long-term returns and reinforcing overvaluation. Conversely, a negative interaction means that higher sentiment weakens this relationship, resulting in sharper corrections as fundamental factors become more dominant.

For the interaction between market sentiment and offer size (MIMSI*OSIZE), a positive interaction indicates that favourable market sentiment enhances the performance of larger firms, resulting in higher BHAR. In contrast, a negative interaction suggests that heightened sentiment drives overvaluation of larger firms, leading to a sharp decline in performance as inflated expectations are corrected. This underscores the increased sensitivity of large-cap IPOs to sentiment-driven market dynamics.

For the interaction between market sentiment and underwriter reputation (MIMSI*UREP), a positive interaction suggests that reputable underwriters effectively leverage heightened sentiment, maintaining higher BHAR. In contrast, a negative interaction indicates that underwriter reputation alone cannot offset the negative impact of sentiment-driven overvaluation, with long-term performance still declining in optimistic market conditions.

For the interaction between market sentiment and firm age (MIMSI*FAGE), a positive interaction suggests that older firms, with their established track records, benefit from heightened market sentiment, resulting in stronger BHAR. In contrast, a negative interaction indicates that younger firms are favoured in high-sentiment markets, as investors perceive them to offer greater growth potential, leaving older firms with weaker performance under such conditions.

For the interaction between market sentiment and board size (MIMSI*BSIZE), a positive interaction suggests that firms with larger boards benefit more from high market sentiment, leveraging their extensive governance structures to achieve higher BHAR. On the other hand, a negative interaction indicates that larger boards may struggle to capitalise on optimistic market sentiment, leading to weaker long-term performance.

For the interaction between market sentiment and market volatility (MIMSI*MVL), a positive interaction means that during periods of high sentiment and market volatility, investor optimism can temporarily boost performance. In contrast, a negative interaction shows that high volatility amplifies sentiment-driven overvaluation, leading to sharper corrections and lower BHAR.

For the interaction between market sentiment and oversubscription ratios (MIMSI*OVER), a positive interaction indicates that oversubscribed IPOs in optimistic markets deliver stronger long-term returns, driven by increased investor demand. However, a negative interaction suggests that overvaluation in high-sentiment markets leads to subsequent corrections, resulting in lower BHAR.

For the interaction between market sentiment and board listing (MIMSI*BLIST), a positive interaction suggests that firms with well-established board listings benefit more from high market sentiment, as investors viewing them as more trustworthy, resulting in stronger performance. In contrast, a negative interaction implies that, during periods of high market sentiment, the advantages of a well-established board listing may be overshadowed by overvaluation, leading to lower performance as the market corrects.

Overall, these findings underscore the significant and nuanced influence of market sentiment across key IPO determinants, revealing how market sentiment shapes long-run performance in various contexts.

Independent variables	PCA							
	Dependent variable: BHAR (VW)							
	Model 1 MIMSI*IR	Model 2 MIMSI*OSIZE	Model 3 MIMSI*UREP	Model 4 MIMSI*FAGE	Model 5 MIMSI*BSIZE	Model 6 MIMSI*MVL	Model 7 MIMSI*OVER	Model 8 MIMSI*BLIST
MIMSI	.0145***	-.1105***	.0088***	.0090***	.0103***	.0260***	.0163***	.0105***
	(12.85)	(-4.07)	(12.94)	(7.12)	(3.62)	(12.95)	(12.64)	(12.13)
IR	-.0089***	-.0103***	-.0076***	-.0086***	-.0088***	-.00899***	-.0088***	-.0088***
	(-12.36)	(-13.52)	(-10.16)	(-10.88)	(-11.43)	(-11.31)	(-11.13)	(-11.03)
OSIZE	-.0450***	-.0458***	-.0462***	-.0452***	-.0451***	-.0453***	-.0453***	-.0453***
	(-11.35)	(-11.62)	(-11.43)	(-11.37)	(-11.41)	(-11.40)	(-11.40)	(-11.38)
UREP	.0301***	.0294***	.0368***	.0299***	.0300***	.0304***	.0300***	.0305***
	(13.01)	(6.63)	(7.57)	(6.92)	(6.88)	(6.99)	(6.91)	(7.00)
FAGE	.0004***	.0003***	.0004***	.0004***	.0004***	.0004***	.0004***	.0004***
	(3.96)	(3.68)	(3.79)	(3.91)	(3.98)	(4.01)	(4.03)	(3.96)
BSIZE	-.0009*	-.0011**	-.0014***	-.0009*	-.0008*	-.0009*	-.0009*	-.0009*
	(-1.84)	(-2.19)	(-2.65)	(-1.72)	(-1.66)	(-1.91)	(-1.84)	(-1.89)
MAJOR	-.00004	-.00006	-.00006	-.00008	-.00005	-.00005	-.00004	-.00006
	(-.77)	(-1.02)	(-.94)	(-1.25)	(-.83)	(-.78)	(-.64)	(-.98)
MVL	-1.5992***	-1.1990***	-1.5685***	-1.5490***	-1.5934***	-.9218***	-1.514***	-1.5075***
	(-8.04)	(-6.09)	(-7.85)	(-7.81)	(-8.03)	(-4.43)	(-7.66)	(-7.64)
OVER	-.00006**	-.00006**	-.00006**	-.00006**	-.00006**	-.00006**	-.00009***	-.00006**
	(-7.05)	(-6.32)	(-6.77)	(-7.13)	(-6.98)	(-6.80)	(-9.51)	(-7.20)
BLIST	.0249***	.0243***	.0259***	.0250***	.0249***	.0243***	.0245***	.0255***
	(9.92)	(9.56)	(10.02)	(9.96)	(9.95)	(9.75)	(9.86)	(10.03)

(cont'd)

	PCA							
	Dependent variable: BHAR (VW)							
Independent variables	Model 1 MIMSI*IR	Model 2 MIMSI*OSIZE	Model 3 MIMSI*UREP	Model 4 MIMSI*FAGE	Model 5 MIMSI*BSIZE	Model 6 MIMSI*MVL	Model 7 MIMSI*OVER	Model 8 MIMSI*BLIST
MIMSI*IR	-.0009* (-1.71)							
MIMSI*OSIZE		.0072*** (4.56)						
MIMSI*UREP			.0185*** (9.13)					
MIMSI*FAGE				.0003*** (5.86)				
MIMSI*BSIZE					.0005* (1.69)			
MIMSI*MVL						-1.7550*** (-8.85)		
MIMSI*OVER							-.00009*** (-8.43)	
MIMSI*BLIST								.0055*** (6.56)
Constant	.7588*** (11.24)	.7692*** (11.46)	.7818*** (11.33)	.7621*** (11.27)	.7599*** (11.28)	.7593*** (11.26)	.7635*** (11.29)	.7638*** (11.28)
F-statistics	29.34***	28.91***	28.64***	31.10***	28.87	30.52	29.14	29.94***
R-squared	.1423	.1488	.1489	.1430	.1424	.1437	.1431	.1429
Root mean squared error	.1194	.1189	.1189	.1193	.1193	.1193	.1194	.1194
Observations	15,884	15,884	15,884	15,884	15,884	15,884	15,884	15,884

Table 4.36 (a): Long-run share performance of IPOs interaction analysis between MIMSI$^{PCA\text{-}LR}$ with IR, OSIZE, UREP, FAGE, BSIZE, MVL, OVER and BLIST

Independent variables	sPCA							
	Dependent variable: BHAR (VW)							
	Model 1 MIMSI*IR	Model 2 MIMSI*OSIZE	Model 3 MIMSI*UREP	Model 4 MIMSI*FAGE	Model 5 MIMSI*BSIZE	Model 6 MIMSI*MVL	Model 7 MIMSI*OVER	Model 8 MIMSI*BLIST
MIMSI	-.0145*** (-12.85)	.1105*** (4.07)	-.0088*** (-12.94)	-.0090*** (-7.12)	-.0103*** (-3.62)	-.0260*** (-12.95)	-.0163*** (-12.64)	-.0105*** (-12.13)
IR	-.0089*** (-12.36)	-.0103*** (-13.52)	-.0076*** (-10.16)	-.0086*** (-10.88)	-.0088*** (-11.43)	-.00899*** (-11.31)	-.0088*** (-11.13)	-.0088*** (-11.03)
OSIZE	-.0450*** (-11.35)	-.0458*** (-11.62)	-.0462*** (-11.43)	-.0452*** (-11.37)	-.0451*** (-11.41)	-.0453*** (-11.40)	-.0453*** (-11.40)	-.0453*** (-11.38)
UREP	.0301*** (13.01)	.0294*** (6.63)	.0368*** (7.57)	.0299*** (6.92)	.0300*** (6.88)	.0304*** (6.99)	.0300*** (6.91)	.0305*** (7.00)
FAGE	.0004*** (3.96)	.0003*** (3.68)	.0004*** (3.79)	.0004*** (3.91)	.0004*** (3.98)	.0004*** (4.01)	.0004*** (4.03)	.0004*** (3.96)
BSIZE	-.0009* (-1.84)	-.0011** (-2.19)	-.0014*** (-2.65)	-.0009* (-1.72)	-.0008* (-1.66)	-.0009* (-1.91)	-.0009* (-1.84)	-.0009* (-1.89)
MAJOR	-.00004 (-.77)	-.00006 (-1.02)	-.00006 (-.94)	-.00008 (-1.25)	-.00005 (-.83)	-.00005 (-.78)	-.00004 (-.75)	-.00006 (-.98)
MVL	-1.5992*** (-8.04)	-1.1990*** (-6.09)	-1.5685*** (-7.85)	-1.5490*** (-7.81)	-1.5934*** (-8.03)	-.9218*** (-4.43)	-1.514*** (-7.66)	-1.5075*** (-7.64)
OVER	-.00006** (-7.05)	-.00006** (-6.32)	-.00006** (-6.77)	-.00006** (-7.13)	-.00006** (-6.98)	-.00006** (-6.80)	-.00009*** (-9.51)	-.00006** (-7.20)
BLIST	.0249*** (9.92)	.0243*** (9.56)	.0259*** (10.02)	.0250*** (9.96)	.0249*** (9.95)	.0243*** (9.75)	.0245*** (9.86)	.0255*** (10.03)

(cont'd)

	sPCA							
	Dependent variable: BHAR (VW)							
Independent variables	Model 1 MIMSI*IR	Model 2 MIMSI*OSIZE	Model 3 MIMSI*UREP	Model 4 MIMSI*FAGE	Model 5 MIMSI*BSIZE	Model 6 MIMSI*MVL	Model 7 MIMSI*OVER	Model 8 MIMSI*BLIST
MIMSI*IR	.0009* (1.71)							
MIMSI*OSIZE		-.0072*** (-4.56)						
MIMSI*UREP			-.0185*** (-9.13)					
MIMSI*FAGE				-.0003*** (-5.86)				
MIMSI*BSIZE					-.0005* (-1.69)			
MIMSI*MVL						1.7550*** (8.85)		
MIMSI*OVER							.00009*** (8.43)	
MIMSI*BLIST								-.0055*** (-6.56)
Constant	.7588*** (11.24)	.7692*** (11.46)	.7818*** (11.33)	.7621*** (11.27)	.7599*** (11.28)	.7593*** (11.26)	.7635*** (11.29)	.7638*** (11.28)
F-statistics	29.34***	28.91***	28.64***	31.10***	28.87	30.52	29.14	29.94***
R-squared	.1423	.1488	.1489	.1430	.1424	.1437	.1431	.1429
Root mean squared error	.1194	.1189	.1189	.1193	.1194	.1193	.1194	.1194
Observations	15,884	15,884	15,884	15,884	15,884	15,884	15,884	15,884

Table 4.36 (b): Long-run share performance of IPOs interaction analysis between MIMSI$^{sPCA-LR}$ with IR, OSIZE, UREP, FAGE, BSIZE, MVL, OVER and BLIST

Independent variables	PLS							
	Dependent variable: BHAR (VW)							
	Model 1 MIMSI*IR	Model 2 MIMSI*OSIZE	Model 3 MIMSI*UREP	Model 4 MIMSI*FAGE	Model 5 MIMSI*BSIZE	Model 6 MIMSI*MVL	Model 7 MIMSI*OVER	Model 8 MIMSI*BLIST
MIMSI	-.1022***	1.3290***	-.0715***	-.0387***	.0354*	-.1242***	-.1168***	-.0691***
	(-12.15)	(9.53)	(-10.36)	(-5.88)	(1.78)	(-9.43)	(-12.07)	(-11.89)
IR	-.0269***	-.0115***	-.0086***	-.00931***	-.0101***	-.0091***	-.0094***	-.0089***
	(-8.68)	(-12.65)	(-10.63)	(-11.16)	(-12.04)	(-11.60)	(-11.47)	(-11.00)
OSIZE	-.00443***	.0164***	-.0449***	-.0443***	-.0445***	-.0442***	-.0444***	-.0444***
	(-11.28)	(2.85)	(-11.35)	(-11.29)	(-11.35)	(-11.28)	(-11.31)	(-11.29)
UREP	.0278***	.0241***	.0887***	.0277***	.0276***	.0278***	.0274***	.0281***
	(6.56)	(5.86)	(9.39)	(6.59)	(6.53)	(6.58)	(6.51)	(6.63)
FAGE	.0004***	.0004***	.0004***	.0022***	.0004***	.0004***	.0004***	.0004***
	(3.74)	(3.86)	(3.85)	(9.15)	(3.95)	(3.86)	(3.90)	(3.79)
BSIZE	-.0010*	-.0012**	-.00123**	-.0009*	.0125***	-.0012**	-.0010*	-.0011**
	(-1.97)	(-2.43)	(-2.40)	(-1.80)	(5.28)	(-2.26)	(-1.99)	(-2.17)
MAJOR	.00003	.00005	.00004	-.00002	.00003	-.00003	.00003	.00002
	(.50)	(.80)	(.61)	(-.25)	(.52)	(.52)	(.64)	(.40)
MVL	-.4580**	-.1476	-.4251**	-.380*	(-.4402)**	-3.5554***	-.4511	-.4228**
	(-2.40)	(-.76)	(-2.22)	(-1.97)	(-2.30)	(-3.98)	(-2.36)	(-2.20)
OVER	-.00008***	-.00007***	-.00008***	-.00008***	-.00008***	-.00008***	-.0008***	-.00008***
	(-8.16)	(-7.36)	(-7.97)	(-8.25)	(-8.30)	(-8.20)	(-9.78)	(-8.29)
BLIST	.0250***	.0201***	.0255***	.0247***	.0249***	.0249***	.0243***	.0529***
	(9.68)	(8.63)	(9.80)	(9.72)	(9.67)	(9.73)	(9.25)	(9.20)

(cont'd)

Independent variables	PLS							
	Dependent variable: BHAR (VW)							
	Model 1 MIMSI*IR	Model 2 MIMSI*OSIZE	Model 3 MIMSI*UREP	Model 4 MIMSI*FAGE	Model 5 MIMSI*BSIZE	Model 6 MIMSI*MVL	Model 7 MIMSI*OVER	Model 8 MIMSI*BLIST
MIMSI*IR	.0226*** (5.92)							
MIMSI*OSIZE		-.0808*** (-9.83)						
MIMSI*UREP			-.0787*** (-8.67)					
MIMSI*FAGE				-.0026*** (-7.80)				
MIMSI*BSIZE					-.0177*** (-6.45)			
MIMSI*MVL						4.380*** (3.29)		
MIMSI*OVER							.0009*** (9.25)	
MIMSI*BLIST								-.0377*** (-6.90)
Constant	.8092*** (11.37)	-.2667*** (-2.64)	.7974*** (11.29)	.7634*** (11.23)	.7094*** (10.05)	.8240*** (11.35)	.8241*** (11.45)	.7877*** (11.26)
F-statistics	30.26***	29.72***	29.39***	31.25***	29.91	30.08***	30.18***	31.60***
R-squared	.1457	.1701	.1484	.1474	.1477	.1457	.1468	.1461
Root mean squared error	.1192	.1175	.1190	.1190	.1191	.1192	.1191	.1192
Observations	15,884	15,884	15,884	15,884	15,884	15,884	15,884	15,884

Table 4.36 (c): Long-run share performance of IPOs interaction analysis between $MIMSI^{PLS\text{-}LR}$ with IR, OSIZE, UREP, FAGE, BSIZE, MVL, OVER, and BLIST

*(Note: Table presents the long-run share performance of IPOs interaction analysis between sentiment with key determinants long-run share performance of IPOs. t-statistic is given with significance level as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level)*

4.7.3 Binary regression models to explain long-run share performance of IPOs

The binary regression model is a multivariate regression model that is used to measure the probability of aftermarket underperformance against the occurrence of aftermarket share performance. The dependent variable of the binary models is dichotomous variable denotes as '1' and '0'. To determine the long-run aftermarket underperformance by using binary regression model, this research segregates the returns into 2 categories i.e., positive returns and negative returns. The positive return indicates the aftermarket overperformance and coded as '1', while the negative return is coded '0' indicates aftermarket underperformance in the long-run. Table 4.37 shows the frequency of dummy for aftermarket underperformance in the long-run.

As discussed in Chapter 3, the following equation provides the association between the aftermarket underperformance and its determinants at behavioural, issue, firm, and market characteristics based on binary regression model. The binary regression models is illustrated in Equation 3.23 and 3.24, respectively.

Dummy variable for BHAR	Observations (N)	
Aftermarket underperformance denotes '0'	13,155	81.46%
Aftermarket overperformance denotes '1'	2,994	18.54%
Total	16,149	100.00%

Table 4.37 : Frequency of dummy for long-run share performance of IPOs

(Note: Table summarises the frequency distribution of the binary classification for IPOs' long-run aftermarket performance using BHAR. IPOs with positive abnormal returns are coded as overperformance '1' while those with negative returns are coded as underperformance '0'

(a) Result analysis on logit regression model

In Table 4.38, Model 4 (using PCA method) shows the association between aftermarket underperformance and overall (behavioural-issue-firm-market characteristics), the result of chi-squared is 1,043.14 indicates a significant chi-squared value, suggesting that aftermarket underperformance is well-explained by the overall determinants included in the logit regression model. In logit regression model, the IPO market sentiment (MIMSI), initial return (IR), offer size (OSIZE), firm age (FAGE), board size (BSIZE), major shareholder ownership (MAJOR), market volatility (MVL), oversubscription ratio (OVER), and board listing (BLIST) are the significant determinant that influence aftermarket underperformance in Malaysia. These significant variables accepted the hypothesis and have influenced on aftermarket underperformance at significant level of 1%, whereas board size (BSIZE) and board listing (BLIST) are statistically significant at 10%. Underwriter reputation (UREP) is insignificant in this analysis.

In Table 4.38, Model 4 (using sPCA method) shows the association between aftermarket underperformance and overall (behavioural-issue-firm-market characteristics), the result of chi-squared is 1,043.14 indicates a significant chi-squared value, suggesting that aftermarket underperformance is well-explained by the overall determinants included in the logit regression model. In logit regression model, the IPO market sentiment (MIMSI), initial return (IR), offer size (OSIZE), firm age (FAGE), board size (BSIZE), major shareholder ownership (MAJOR), market volatility (MVL), oversubscription ratio (OVER), and board listing (BLIST) are the significant determinant that influence aftermarket underperformance in Malaysia. These significant variables accepted the hypothesis and have influenced on aftermarket underperformance at significant level of 1%, whereas board size (BSIZE) and board listing (BLIST) are statistically significant at 10%. Underwriter reputation (UREP) is insignificant in this analysis.

In Table 4.38, Model 4 (using PLS method) shows the association between aftermarket underperformance and overall (behavioural-issue-firm-market characteristics), the result of chi-squared is 1,349.68 indicates a significant chi-squared value, suggesting that aftermarket underperformance is well-explained by the overall determinants included in the logit regression model. In logit regression model, the IPO market sentiment (MIMSI), initial return (IR), offer size (OSIZE), underwriter reputation (UREP), firm age (FAGE), board size (BSIZE), market volatility (MVL), and oversubscription ratio (OVER) are the significant determinant that influence aftermarket underperformance in Malaysia. These significant variables accepted the hypothesis and have influenced on aftermarket overperformance at significant level of 1%, whereas underwriter reputation (UREP) and board size (BSIZE) are statistically significant at 5% and 10%, respectively. Major shareholder ownership (MAJOR) and board listing (BLIST) are insignificant in this analysis.

In binary regression model, the Likelihood Ratio (LR) tests are used (instead of F-statistics) to evaluate the overall fitness of the models. The LR results show that all the models based on logit regression model (refer to in Table 4.38) have high probability occurrences, which shows that all the models can be used for the analysis. Additionally, this research has compiled the results analysis based on probit regression model as shown in Table 4.39.

Independent variables	PCA				sPCA				PLS			
	Probability occurrence : $\ln\left(\frac{P_i}{1-P_i}\right)$ (BHAR) (VW)				Probability occurrence : $\ln\left(\frac{P_i}{1-P_i}\right)$ (BHAR) (VW)				Probability occurrence : $\ln\left(\frac{P_i}{1-P_i}\right)$ (BHAR) (VW)			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
	Behavioural	Behavioural-and-Issue	Behavioural-Issue-and-Firm	(Overall) Behavioural-Issue-Firm-and-Market	Behavioural	Behavioural-and-Issue	Behavioural-Issue-and-Firm	(Overall) Behavioural-Issue-Firm-and-Market	Behavioural	Behavioural-and-Issue	Behavioural-Issue-and-Firm	(Overall) Behavioural-Issue-Firm-and-Market
MIMSI	.4305***	.3695***	.3552***	.3895***	-.4305***	-.3695***	-.3552***	-.3895***	-3.4150***	-3.1050***	-3.0393***	-2.978***
	(22.80)	(18.75)	(17.74)	(18.69)	(-22.80)	(-18.75)	(-17.74)	(-18.69)	(-31.07)	(-27.63)	(-26.63)	(-25.55)
IR		.2251***	.2215***	.2462***		.2251***	.2215***	.2462***		.2118***	.21410***	.2549***
		(5.26)	(5.13)	(5.50)		(5.26)	(5.13)	(5.50)		(4.79)	(4.80)	(5.54)
OSIZE		.2396***	.2425***	.2016***		.2396***	.2425***	.2016***		.2387***	.2397***	.2114***
		(14.72)	(14.06)	(10.57)		(14.72)	(14.06)	(10.57)		(14.51)	(13.70)	(11.18)
UREP		-.1064**	-.0828*	-.0448		-.1064**	-.0828*	-.0448		-.1246**	-.1081**	-.1025**
		(-2.05)	(-1.59)	(-.85)		(-2.05)	(-1.59)	(-.85)		(-2.39)	(-2.06)	(-1.94)
FAGE			.0079***	.0074***			.0079***	.0074***			.0053***	.0054***
			(4.14)	(3.80)			(4.14)	(3.80)			(2.73)	(2.73)
BSIZE			-.0300**	-.0208*			-.0300**	-.0208*			-.0249**	-.02110*
			(-2.56)	(-1.76)			(-2.56)	(-1.76)			(-2.08)	(-1.76)
MAJOR			-.0046***	-.0040***			-.0046***	-.0040***			-.0020	-.0014
			(-2.99)	(-2.61)			(-2.99)	(-2.61)			(-1.25)	(-.88)
MVL				-94.0674***				-94.0674***				-62.8350***
				(-12.90)				(-12.90)				(-8.64)
OVER				-.0025***				-.0025***				-.0033***
				(-3.37)				(-3.37)				(-4.25)
BLIST				-.0964*				-.0964*				-.0586
				(-1.78)				(-1.78)				(-1.08)
Constant	-1.5170***	-5.7290***	-5.4790***	-4.0927***	-1.5166***	-5.7290***	-5.4790***	-4.0927***	.9410***	-3.4711***	-3.3682***	-2.435***
	(-71.00)	(-20.24)	(-19.01)	(-12.54)	(-71.00)	(-20.24)	(-19.01)	(-12.54)	(12.08)	(-11.19)	(-10.75)	(-7.05)
Likelihood ratio	-7,299.46	-7,167.01	-7,153.19	-7,052.04	-7,299.46	-7,167.01	-7,153.19	-7,052.04	-7,081.49	-6,957.79	-6,952.32	-6,902.81
Chi-squared	584.80***	821.28***	848.91***	1,043.14***	584.80***	821.28***	848.91***	1,043.14***	1,020.74***	1,239.72***	1,250.66***	1,349.68***
Pseudo R^2	.0385	.0542	.0560	.0688	.0385	.0542	.0560	.0688	.0672	.0818	.0825	.0893
Observations	15,932	15,884	15,884	15,884	15,932	15,884	15,884	15,884	15,932	15,884	15,884	15,884

Table 4.38 : Long-run share performance of IPOs determinants based on logit regression model with $MIMSI^{PCA\text{-}LR}$, $MIMSI^{sPCA\text{-}LR}$, and $MIMSI^{PLS\text{-}LR}$

*(Note: Table represents BHAR (VW) from listing date. The tables show the long-run share performance of IPOs at each level of behavioural-issue-firm-and-market characteristics by using logit regression model. The above table consists of four models: Model 1 consist of behavioural characteristics, Model 2 consist of behavioural-and-issue characteristics, Model 3 consist of behavioural-issue-and-firm characteristics, Model 4 consist of behavioural-issue-firm-and-market characteristics (overall). The dependent variable dichotomous takes the value of '1' if the firm is overperformed after listing and takes the value '0' if the firm is underperformed after listing. t-statistic is given with significance level as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level)*

(b) Result analysis on probit regression model

In Table 4.39, Model 4 (using PCA method) shows the association between aftermarket underperformance and overall (behavioural-issue-firm-market characteristics), the result of chi-squared is 960.79 indicates a significant chi-squared value, suggesting that aftermarket underperformance is well-explained by the overall determinants included in the probit regression model. In probit regression model, the IPO market sentiment (MIMSI), initial return (IR), offer size (OSIZE), firm age (FAGE), board size (BSIZE), major shareholder ownership (MAJOR), market volatility (MVL), oversubscription ratio (OVER), and board listing (BLIST) are the significant determinant that influence aftermarket underperformance in Malaysia. These significant variables accepted the hypothesis and have influenced on aftermarket overperformance at significant level of 1%, whereas major shareholder ownership (MAJOR) is statistically significant at 5%. Board size (BSIZE) and board listing (BLIST) are statistically significant at 10%. Underwriter reputation (UREP) is insignificant in this analysis.

In Table 4.39, Model 4 (using sPCA method) shows the association between aftermarket underperformance and overall (behavioural-issue-firm-market characteristics), the result of chi-squared is 960.79 indicates a significant chi-squared value, suggesting that aftermarket underperformance is well-explained by the overall determinants included in the probit regression model. In probit regression model, the IPO market sentiment (MIMSI), initial return (IR), offer size (OSIZE), firm age (FAGE), board size (BSIZE), major shareholder ownership (MAJOR), market volatility (MVL), oversubscription ratio (OVER), and board listing (BLIST) are the significant determinant that influence aftermarket underperformance in Malaysia. These significant variables accepted the hypothesis and have influenced on aftermarket overperformance at significant level of 1%, whereas major shareholder ownership (MAJOR) is statistically significant at 5%. Board size (BSIZE) and board listing (BLIST) are statistically significant at 10%. Underwriter reputation (UREP) is insignificant in this analysis.

In Table 4.39, Model 4 (using PLS method) shows the association between aftermarket underperformance and overall (behavioural-issue-firm-market characteristics), the result of chi-squared is 1,219.58 indicates a significant chi-squared value, suggesting that aftermarket underperformance is well-explained by the overall determinants included in the probit regression model. In probit regression model, the IPO market sentiment (MIMSI), initial return (IR), offer size (OSIZE), underwriter reputation (UREP), firm age (FAGE), board size (BSIZE), market volatility (MVL), and oversubscription ratio (OVER) are the significant determinant that influence aftermarket underperformance in Malaysia. These significant variables accepted the hypothesis and have influenced on aftermarket overperformance at significant level of 1%, whereas firm age (FAGE) and underwriter reputation (UREP) are statistically significant at 5% and 10%, respectively. Major shareholder ownership (MAJOR) and board listing (BLIST) are insignificant in this analysis.

Overall, the LR result shows that all the models based on probit regression model (refer to in Table 4.39) have high probability occurrences, which shows that all the models can be used for the analysis.

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	PCA				sPCA				PLS			
	Probability occurrence : P (BHAR) (VW)				Probability occurrence : P (BHAR) (VW)				Probability occurrence : P (BHAR) (VW)			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Independent variables	Behavioural	Behavioural-and-Issue	Behavioural-Issue-and-Firm	(Overall) Behavioural-Issue-Firm-and-Market	Behavioural	Behavioural-and-Issue	Behavioural-Issue-and-Firm	(Overall) Behavioural-Issue-Firm-and-Market	Behavioural	Behavioural-and-Issue	Behavioural-Issue-and-Firm	(Overall) Behavioural-Issue-Firm-and-Market
MIMSI	.2093*** (22.45)	.1725*** (17.33)	.1635*** (16.07)	.1777*** (16.54)	-.2093*** (-22.45)	-.1725*** (-17.33)	-.1635*** (-16.07)	-.1777*** (-16.54)	-1.6580*** (-29.03)	-1.4760*** (-24.95)	-1.4380*** (-23.82)	-1.4366*** (-22.87)
IR		.1242*** (5.07)	.1210*** (4.91)	.1432*** (5.58)		.1242*** (5.07)	.1210*** (4.91)	.1432*** (5.58)		.1180*** (4.74)	.1175*** (4.71)	.14813*** (5.71)
OSIZE		.1433*** (14.92)	.1436*** (14.17)	.1220*** (11.00)		.1430*** (14.92)	.1436*** (14.17)	.1220*** (11.00)		.1384*** (14.47)	.1379*** (13.62)	.1186*** (10.87)
UREP		-.0622** (-2.14)	-.0516* (-1.77)	-.0334 (-1.13)		-.0622** (-2.14)	-.0516* (-1.77)	-.0334 (-1.13)		-.0601** (-2.08)	-.0522** (-1.80)	-.0507* (-1.73)
FAGE			.0044*** (4.02)	.0042*** (3.78)			.0044*** (4.02)	.0042*** (3.78)			.0030** (2.66)	.0029** (2.56)
BSIZE			-.0150** (-2.29)	-.0113* (-1.70)			-.0150** (-2.29)	-.0113* (-1.70)			-.0116* (-1.76)	-.0103* (-1.55)
MAJOR			-.0021** (-2.44)	-.0018** (-2.00)			-.0021** (-2.44)	-.0018** (-2.00)			-.0009 (-1.06)	-.0006 (-.69)
MVL				-49.55*** (-12.33)				-49.55*** (-12.33)				-36.9882*** (-9.18)
OVER				-.0016*** (-4.03)				-.0016*** (-4.03)				-.0021*** (-4.75)
BLIST				-.0518* (-1.71)				-.0518* (-1.71)				-.0141 (-.46)
Constant	-.9000*** (-76.59)	-3.4150*** (-20.49)	-3.289*** (-19.39)	-2.5455*** (-13.41)	-.9000*** (-76.59)	-3.4150*** (-20.49)	-3.2890*** (-19.39)	-2.5455*** (-13.41)	.3025*** (7.07)	-2.2580*** (-12.49)	-2.2056*** (-12.09)	-1.5889*** (-7.90)
Likelihood ratio	-7,331.57	-7,196.54	-7,184.84	-7,097.26	-7,331.57	-7,196.54	-7,184.84	-7,097.26	-7,154.94	-7,028.86	-7,024.13	-6,967.86
Chi-squared	520.58***	762.21***	785.61***	960.79***	520.58***	762.21***	785.61***	960.79***	873.83***	1,097.58***	1,107.03***	1,219.58***
Pseudo R^2	.0343	.0503	.0518	.0638	.0343	.0503	.0518	.0638	.0576	.0724	.0730	.0805
Observations	15,932	15,884	15,884	15,884	15,932	15,884	15,884	15,884	15,932	15,884	15,884	15,884

Table 4.39 : Long-run share performance of IPOs determinants based on probit regression model with $MIMSI^{PCA\text{-}LR}$, $MIMSI^{sPCA\text{-}LR}$, and $MIMSI^{PLS\text{-}LR}$

*(Note: Table represents BHAR (VW) from listing date. The tables show the long-run share performance of IPOs at each level of behavioural-issue-firm-and-market characteristics by using probit regression model. The above table consists of four models: Model 1 consist of behavioural characteristics, Model 2 consist of behavioural-and-issue characteristics, Model 3 consist of behavioural-issue-and-firm characteristics, Model 4 consist of behavioural-issue-firm-and-market characteristics (overall). The dependent variable dichotomous takes the value of '1' if the firm is overperformed after listing and takes the value '0' if the firm is underperformed after listing. t-statistic is given with significance level as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level)*

4.7.4 Marginal probability analysis to explain long-run share performance of IPOs

Table 4.40 shows the calculated changes in probability associated with the long-run share performance of IPOs.

(Overall) Behavioural-Issue-Firm-and-Market	Model 1		Model 2		Model 3	
	Change in probability	z	Change in probability	z	Change in probability	z
$MIMSI^{PCA\text{-}LR}$	.0544***	19.05				
$MIMSI^{sPCA\text{-}LR}$			-.0544***	-19.05		
$MIMSI^{PLS\text{-}LR}$					-.4041***	-27.06
IR	.0343***	5.51	.0343***	5.51	.0346***	5.55
OSIZE	.0281***	10.67	.0281***	10.67	.0287***	11.27
UREP	-.0063	-.85	-.0063	-.85	-.0139*	-1.94
FAGE	.0010***	3.80	.0010***	3.80	.0007**	2.73
BSIZE	-.0029*	-1.76	-.0029*	-1.76	-.0028*	-1.76
MAJOR	-.0005***	-2.61	-.0005***	-2.61	-.0002	-.88
MVL	-13.1401***	-13.05	-13.1401***	-13.05	-8.5278***	-8.68
OVER	-.0003***	-3.37	-.0003***	-3.37	-.0004***	-4.25
BLIST	-.0134*	-1.78	-.0134*	-1.78	-.0080	-1.08

Table 4.40 : Marginal probability analysis based on logit regression model due to changes in explanatory variables (Δp) for long-run share performance of IPOs

*(Note: Table represents the marginal change in the probability of aftermarket underperformance (ΔP) in response to a one-unit change in each explanatory variable, based on marginal analysis across 3 models. Model 1 uses the sentiment index constructed via PCA ($MIMSI^{PCA\text{-}LR}$), Model 2 uses sPCA ($MIMSI^{sPCA\text{-}LR}$), and Model 3 uses PLS ($MIMSI^{PLS\text{-}LR}$). The figures under 'Change in probability' indicate the estimated marginal effects, while 'z' represents the associated z-statistics. p-value is given with significance level as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level)*

As shown in Table 4.40, the significant explanatory variable are IPO market sentiment (MIMSI), initial return (IR), offer size (OSIZE), underwriter reputation (UREP), firm age (FAGE), board size (BSIZE), major shareholder ownership (MAJOR), market volatility (MVL), oversubscription ratio (OVER), and board listing (BLIST). Except for IPO market sentiment (MIMSI), initial return (IR), offer size (OSIZE), and firm age (FAGE), all the explanatory variables have a negative sign, which indicates an inverse relationship between the aftermarket underperformance and explanatory variables. For example, the positive sign for offer size (OSIZE) implies that, if offer size (OSIZE) is increased by 1,000,000 new shares to be issued, the probability of change to increase in the level of aftermarket underperformance of approximately 2.81%.

The above marginal analysis indicates that these variables are the most important explanatory variable in Malaysian IPO market as compared with the others due to the highest probability associated with aftermarket underperformance used to measure the IPO's long-run share performance. An increase (decrease) of these explanatory variables support aftermarket underperformance.

For the probit regression model, no marginal probability analysis presents in this research because the result of probit regression model is similar or close to the result of logit regression model.

4.8 Summary of hypotheses for long-run share performance of IPOs

Long-run IPO share performance are measured at behavioural, issue, firm and market characteristics by using OLS and binary (logit and probit) regression models. For OLS regression model, the dependent variable is long-run IPO share performance measured as BHAR (VW). However, for binary (logit and probit) regression model, the dependent variable is dichotomous. It takes the value of '1' if the firm is aftermarket overperformance and takes the value '0' if the firm is aftermarket underperformance. The coefficients of each variable is given along with t-ratio in parentheses. The t-statistics are computed by robust standard errors.

This section provides the summary of hypotheses that are developed to examine the long-run share performance of IPOs based on regression analysis. The hypothesis is either rejected or accepted on the basis of regression results. Those variables that shows significant relationship based on regression analysis are accepted (✓) the hypotheses. However, those variables that does not show any significance relationship based on regression analysis are rejected (×). Table 4.41 (a), Table 4.41 (b), and Table 4.41 (c) provide the summary of hypotheses of all the regression models that were undertaken to examine the long-run share performance of IPOs.

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	Dependent variable: BHAR (VW)											
	Model 1 : Behavioural			Model 2 : Behavioural-and-Issue			Model 3 : Behavioural-Issue-and-Firm			Model 4 : (Overall) Behavioural-Issue-Firm-and-Market		
OLS	PCA	sPCA	PLS	PCA	sPCA	PLS	PCA	sPCA	PLS	PCA	sPCA	PLS
H_1	×	×	×	✓	✓	✓	✓	✓	✓	✓	✓	✓
H2				✓	✓	✓	✓	✓	✓	✓	✓	✓
H3				✓	✓	✓	✓	✓	✓	✓	✓	✓
H4				✓	✓	✓	✓	✓	✓	✓	✓	✓
H5							✓	✓	✓	✓	✓	✓
H6							×	×	×	✓	✓	✓
H7							×	×	×	×	×	×
H8										✓	✓	✓
H9										✓	✓	✓
H10										✓	✓	✓

Table 4.41 (a) : Summary of hypotheses (long-run share performance of IPOs) based on OLS regression model with $MIMSI^{PCA\text{-}LR}$, $MIMSI^{sPCA\text{-}LR}$, and $MIMSI^{PLS\text{-}LR}$

	Probability occurrence : $\ln\left(\frac{P_i}{1-P_i}\right)$ / P (BHAR) (VW)							
	Model 1 : Behavioural		Model 2 : Behavioural-and-Issue		Model 3 : Behavioural-Issue-and-Firm		Model 4 : (Overall) Behavioural-Issue-Firm-and-Market	
Binary	Logit	Probit	Logit	Probit	Logit	Probit	Logit	Probit
H_1	✓	✓	✓	✓	✓	✓	✓	✓
H2			✓	✓	✓	✓	✓	✓
H3			✓	✓	✓	✓	✓	✓
H4			✓	✓	✓	✓	×	×
H5					✓	✓	✓	✓
H6					✓	✓	✓	✓
H7					✓	✓	✓	✓
H8							✓	✓
H9							✓	✓
H10							✓	✓

Table 4.41 (b) : Summary of hypotheses (long-run share performance of IPOs) based on binary regression model with MIMSI$^{PCA\text{-}LR}$

Binary	Probability occurrence : ln $(\frac{P_i}{1-P_i})$ / P (BHAR) (VW)							
	Model 1 : Behavioural		Model 2 : Behavioural-and-Issue		Model 3 : Behavioural-Issue-and-Firm		Model 4 : (Overall) Behavioural-Issue-Firm-and-Market	
	Logit	Probit	Logit	Probit	Logit	Probit	Logit	Probit
H_1	✓	✓	✓	✓	✓	✓	✓	✓
H2			✓	✓	✓	✓	✓	✓
H3			✓	✓	✓	✓	✓	✓
H4			✓	✓	✓	✓	×	×
H5					✓	✓	✓	✓
H6					✓	✓	✓	✓
H7					✓	✓	✓	✓
H8							✓	✓
H9							✓	✓
H10							✓	✓

Table 4.41 (c) : Summary of hypotheses (long-run share performance of IPOs) based on binary regression model with $MIMSI^{sPCA-LR}$

	Probability occurrence : $\ln(\frac{P_i}{1-P_i})$ / P (BHAR) (VW)							
	Model 1 : Behavioural		Model 2 : Behavioural-and-Issue		Model 3 : Behavioural-Issue-and-Firm		Model 4 : (Overall) Behavioural-Issue-Firm-and-Market	
Binary	Logit	Probit	Logit	Probit	Logit	Probit	Logit	Probit
H_1	✓	✓	✓	✓	✓	✓	✓	✓
H2			✓	✓	✓	✓	✓	✓
H3			✓	✓	✓	✓	✓	✓
H4			✓	✓	✓	✓	✓	✓
H5					✓	✓	✓	✓
H6					✓	✓	✓	✓
H7					×	×	×	×
H8							✓	✓
H9							✓	✓
H10							×	×

Table 4.41 (d) : Summary of hypotheses (long-run share performance of IPOs) based on binary model with $MIMSI^{PLS-LR}$

(Note: Tables summarise hypotheses of long-run share performance of IPOs undertaken by this research. The hypothesis is either accepted or rejected on the basis of regression analysis. Denotes: √~Accepted ; X~Rejected)

4.9 Analysis of price-earnings

This section presents the results of whether PE as a key factor in IPO underpricing at the changes of Malaysia's capital market structure (also referred to as regulatory changes) using 571 IPO firms listed on Bursa Malaysia for the past 21 years from 1 January 2000 to 31 December 2020. Multiple regression analysis is applied. First, this section explains the descriptive statistics of independent variables for PE regression model. Then, it explains the determinants of PE based on OLS regression model. This is followed by quantile regression model as robustness check on PE. Second, it aims to analyse the impact of regulatory changes in Malaysia's capital market structure on IPO share performance, particularly examining how PE and market sentiment shape IPO pricing in the evolving regulatory landscapes. Additionally, ANOVA test is employed to analyse whether there is any significant differences between the means of sub-periods.

4.9.1 Descriptive statistics of the independent variables for price-earnings regression model

Table 4.42 provides the descriptive summary of the dependent and independent variables of fundamental and sentiment factors that influence the PE.

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	PEDF		PDND	GROW	INT	MVL
	(Dependent variable)		*(Independent variables for fundamental factors)*			
Observations (N)	190		188	284	251	252
Mean	2.1733		2.2518	.0030	-.0039	.0014
Median	2.1451		2.3849	.0000	.0021	.0008
Minimum	1.5665		.6754	-.1214	-.5280	.0001
Maximum	3.3057		3.0575	.1560	1.0898	.0131
25th percentile	2.0051		1.9089	-.02504	-.0840	.0004
75th percentile	2.3513		2.6577	.0303	.0747	.0016
Standard deviation	.3359		.5425	.0551	.2235	.0020
Skewness	-.7609		-1.109	-.4098	-.1779	3.8181
	$MIMSI^{PCA}$	$MIMSI^{sPCA}$	$MIMSI^{PLS}$	ΔCCI	ΔBCI	TURN
	(Independent variables for sentiment factors)					
Observations (N)	188	188	188	190	190	248
Mean	-.2364	.2364	.7783	100.2159	94.6346	5.0916
Median	.0089	-.0089	.7502	101.1197	95.6755	5.0080
Minimum	-4.0405	-2.6291	-.0064	94.0646	84.7063	4.3987
Maximum	2.6291	4.0405	1.5532	103.6671	100.5035	6.5438
25th percentile	-1.3971	-1.1434	.6167	99.2415	92.5083	4.8103
75th percentile	1.1434	1.3971	.9627	102.0354	97.1238	5.2672
Standard deviation	1.6736	1.6736	.3379	2.6421	3.2533	.4169
Skewness	-.4867	.4867	.0897	-1.0407	-.9127	1.2741

Table 4.42 : Descriptive summary of sentiment and fundamental factors that influence price-earnings

(Note: Table provides descriptive summary of dependent variable and independent variables in terms of total number of observations 'N', mean value, median value, minimum, maximum and standard deviation)

Table 4.42 provides the overall summary of the fundamental and sentiment factors that influence the PE. Natural logarithm of PE differential (PEDF) is the dependent variable. Whereas, the independent variables are IPO market sentiment (MIMSI), natural logarithm of dividend payout ratio (PDND), industrial production growth rate (GROW), changes in the short-term interest rate (INT), market volatility (MVL), changes in consumer confidence index (ΔCCI), changes in business confidence index (ΔBCI), natural logarithm of the ratio of trading volume to market capitalisation (TURN), and natural logarithm of trailing PE with lagged of 1 month ($(PEDF)_{t-1}$).

In this research, the sentiment factors of PE comprise IPO market sentiment constructed using 3 different methods including PCA, sPCA and PLS methods. The descriptive summary about IPO market sentiment (using PCA method) illustrates that the mean and median $MIMSI^{PCA}$ are -23.64% and 0.89%, respectively. The negative value of $MIMSI^{PCA}$ shows that there is pessimistic perception of investors towards Malaysian IPO market. This implies that in Malaysia the overall IPO market sentiment remains negative (pessimistic), vice versa. The maximum market sentiment over the sample reaches to 262.91%, however, it drops to the lowest level of -404.05%, with a standard deviation of 167.36%. This indicates that in Malaysia there is some variations in terms of market sentiment within IPO market. Similarly, the descriptive summary about IPO market sentiment (using sPCA method) illustrates that the mean and median $MIMSI^{sPCA}$ are 23.64% and -0.89%, respectively. The positive value of $MIMSI^{sPCA}$ shows that there is optimistic perception of investors towards Malaysian IPO market. The maximum and minimum values are 404.05% and -262.91%, respectively with a standard deviation of 167.36%. This indicates that in Malaysia there is some variations in the market sentiment within IPO market. The descriptive summary about IPO market sentiment (using PLS method) illustrates that the mean and median $MIMSI^{PLS}$ are 77.83% and 75.02%, respectively. The positive value of $MIMSI^{PLS}$ shows that there is optimistic perception among investors towards Malaysian IPO market. The maximum and minimum values are 155.32% and -0.64%, respectively with a standard deviation of 33.79%.

The other sentiment factors of PE used in this research are market sentiment proxies including changes in consumer confidence index (ΔCCI), changes in business confidence index (ΔBCI), and natural logarithm of the ratio of trading volume to market capitalisation (TURN). The descriptive summary about changes in consumer sentiment illustrates that the mean and median ΔCCI are 100.21 and 101.11, respectively. The positive value of ΔCCI shows that there is optimistic perception of consumer confidence. This implies that in Malaysia the overall consumer sentiment remains positive (optimistic). The maximum changes in consumer confidence over the sample reaches to 103.66, however, it drops to the lowest level of 94.06, with a standard deviation of 2.64. This indicates that in Malaysia there is some variations in terms of the consumer sentiment. Similarly, the descriptive summary about changes in business confidence illustrates that the mean and median ΔBCI is 94.63 and 95.67, respectively. The positive value of ΔBCI shows that there is positive (optimistic) perception of business confidence. The maximum and minimum values are 100.50 and 84.70, respectively with a standard deviation of 3.25. This indicates that in Malaysia there is some variations in the business confidence. The descriptive summary about the ratio of trading volume to market capitalisation illustrates that the mean and median of TURN are 5.09 and 5.00, respectively. The positive value of TURN shows that the stock is actively being traded relative to its total market capitalisation among investors towards Malaysia stock market, it represents investors are confident with stock market. The maximum and minimum values are 6.54 and 4.39, respectively with a standard deviation of 0.41.

On the hand, the fundamental factors of PE comprise natural logarithm of dividend premium (PDND), growth of industrial production index (GROW), short-term interest rate (INT), and market volatility (MVL). The descriptive summary about dividend premium illustrates that the mean and median of PDND are 2.25 and 2.38, respectively. The maximum and minimum values are 3.05 and 0.67, respectively with a standard deviation of 0.54. Investors often look at the dividend payout ratio to assess how much of a company's profits are being returned to shareholders versus being retained for growth or other purposes. A high dividend payout ratio may indicate that a company is mature and does not require as much reinvestment for growth, while a low dividend payout ratio may suggest that a company is prioritising reinvestment for future expansion. The descriptive summary about growth rate of industrial production (GROW) illustrates that the mean and median of GROW is 0.30% and nil, respectively. The maximum and minimum values are 15.60% and -12.14%, respectively with a standard deviation of 5.51%. A positive growth rate indicates an increase in industrial output compared to the previous period, while a negative growth rate indicates a decrease. This metric is crucial for assessing the health and performance of the industrial sector, which plays a significant role in driving overall economic growth.

The descriptive summary about short-term interest rate (INT) illustrates that the mean and median of INT are -0.39% and 0.21%, respectively. The maximum and minimum values are 108.98% and -52.80%, respectively with a standard deviation of 22.35%. Low interest rates can encourage businesses to expand and consumers can increase purchasing power, thus stimulating economic growth. In contrast, when the central bank raises the short-term interest rate, it becomes more expensive for banks to borrow money from the central bank. As a result, banks may raise the interest rates they charge on loans to consumers and businesses. This increase in borrowing costs can slow down economic activity and inflation by making it more expensive to finance purchases and investments. The descriptive summary of the market volatility (MVL). The data related MVL shows that the mean market volatility in Malaysia is 0.14% and median is 0.08%, respectively. The maximum and minimum value of the market volatility are 0.01% and 1.31%, respectively with the standard deviation of 0.20%. This shows that Malaysia's market volatility remains stable at the time of public offerings from January 2000 to December 2020.

4.9.2 Diagnostic tests for price-earnings regression model

The following subsections explain the results of diagnostic tests used in this research for the PE regression model.

(a) Collinearity

The result of the correlation matrix of all the variables is tabulated in Table 4.43. The independent variables are IPO market sentiment (MIMSI) using PCA, sPCA and PLS methods, natural logarithm of dividend premium (PDND), growth of industrial production index (GROW), short-term interest rate (INT), market volatility (MVL), changes in consumer confidence index (ΔCCI), changes in business confidence index (ΔBCI), natural logarithm of turnover ratio (TURN), and natural logarithm of trailing PE with lagged of 1 month ($(PEDF)t-1$). The result indicates that there is no problem of multicollinearity among variables. The correlation coefficients of all the variables are less than 0.7 which entails that variables are not highly correlated to each other.

There is correlations between $MIMSI^{PCA}$, $MIMSI^{sPCA}$, $MIMSI^{PLS}$ with PDND and ΔBCI of more than 0.70. Nonetheless, in this research there is no cross-sectional analysis model between $MIMSI^{PCA}$, $MIMSI^{sPCA}$, $MIMSI^{PLS}$, PDND and ΔBCI because dividend premium and business confidence index are variables used in computing the MIMSI as stated in Equation 3.1 in Chapter 3.

	$MIMSI^{PCA}$	$MIMSI^{sPCA}$	$MIMSI^{PLS}$	ΔCCI	ΔBCI	TURN	PDND	INT	GROW	MVL
$MIMSI^{PCA}$	1.0000									
$MIMSI^{sPCA}$	-1.0000	1.0000								
$MIMSI^{PLS}$	-0.7559	0.7559	1.0000							
ΔCCI	0.4606	-0.4606	-0.4974	1.0000						
ΔBCI	-0.4795	0.4795	0.7622	0.1594	1.0000					
TURN	0.0156	-0.0156	0.0336	0.2193	0.1991	1.0000				
PDND	0.8340	-0.8340	-0.5456	0.4916	-0.2466	0.0591	1.0000			
INT	-0.0752	0.0752	0.0971	0.0671	0.1556	-0.0550	-0.0588	1.0000		
GROW	-0.0699	0.0699	0.0376	0.0175	0.0780	-0.0264	-0.0925	0.0073	1.0000	
MVL	-0.1680	0.1680	0.1384	-0.1943	0.0443	0.3839	-0.1857	-0.0392	0.0558	1.0000

Table 4.43 : Correlation matrix for price-earnings analysis

(Note: Table presents the correlation matrix for price-earnings analysis. The independent variables are $MIMSI^{PCA}$ is Malaysian IPO market sentiment using principal component analysis method, $MIMSI^{sPCA}$ is Malaysian IPO market sentiment using scaled principal component analysis method, $MIMSI^{PLS}$ is Malaysian IPO market sentiment using partial least squared method, ΔCCI is changes in consumer confidence index, ΔBCI is changes in business confidence index, TURN is natural logarithm of turnover ratio, PDND is natural logarithm of dividend premium, INT is changes in short-term interest rate, GROW is natural logarithm of growth of industrial production index, and MVL is market volatility)

(b) Homoscedasticity test

Table 4.44, Table 4.45 and Table 4.46 represent the results of VIF between $MIMSI^{PCA}$, $MIMSI^{sPCA}$ with PDND; and $MIMSI^{PLS}$ with ΔBCI. The results shows these variables are within the range of 3.48 and 3.51 which is less than 10 suggests low multicollinearity between variables. Besides, this research does not apply PDND and ΔBCI into the regression model when using $MIMSI^{PCA}$, $MIMSI^{sPCA}$, and $MIMSI^{PLS}$ as behavioural factors as explained above.

Independent variables	Dependent variable: PEDF
$MIMSI^{PCA}$	3.48
PDND	3.51
GROW	1.04
INT	1.04
MVL	1.06
(PEDF)t-1	1.10
Mean VIF	1.87
White's test	15.60 (27)
(Chi^2 (df), p-value)	.9601

Table 4.44 : Variance inflation factor (price-earnings) for explanation of high correlation in Table 4.43 for $MIMSI^{PCA}$ and PDND

Independent variables	Dependent variable: PEDF
$MIMSI^{sPCA}$	3.51
PDND	3.48
GROW	1.04
INT	1.04
MVL	1.06
(PEDF)t-1	1.04
Mean VIF	1.87
White's test	15.60 (27)
(Chi^2 (df), p-value)	.9601

Table 4.45 : Variance inflation factor (price-earnings) for explanation of high correlation in Table 4.43 for $MIMSI^{sPCA}$ and PDND

Independent variables	Dependent variable: PEDF
$MIMSI^{PLS}$	2.20
ΔBCI	2.19
GROW	1.05
INT	1.04
MVL	1.05
(PEDF)t-1	1.04
Mean VIF	1.43
White's test (Chi^2 (df), p-value)	21.21 (27) .7761

Table 4.46 : Variance inflation factor (price-earnings) for explanation of high correlation in Table 4.43 for $MIMSI^{PLS}$ and ΔBCI

(Note: VIF values for $MIMSI^{PCA}$, $MIMSI^{sPCA}$, and $MIMSI^{PLS}$ remain below 10 indicating low multicollinearity. PDND and ΔBCI are excluded from regressions when using these sentiment measures)

4.9.3 Ordinary least square regression model to explain fundamental and sentiment factors for price-earnings analysis

In this section, the PE regression model is estimated by using OLS regression model to evaluate the significant determinants of PE regression model. The following subsections explain the determinants of PE based on OLS regression model.

The results in Table 4.47 (Model 1) shows that the influential of dividend premium (PDND) is statistically significant at 5%. This indicates that an increase or decrease in this variable will lead to any changes in PE. This model does not take into account the sentiment factors. The results in Table 4.47 (Model 2) shows that the influential of both fundamental and sentiment factors based on single sentiment proxies including ΔCCI, ΔBCI and TURN on PE are statistically insignificant. This indicates that an increase or decrease in these variables will not lead to any changes in PE.

In contrast, the results in Table 4.47 (Model 3, Model 4 and Model 5) show that fundamental factors are insignificant and sentiment factors based on market aggregate based including $MIMSI^{PCA}$, $MIMSI^{sPCA}$ and $MIMSI^{PLS}$ are statistically significant to the PE at 5%, 5% and 10%, respectively. In general, we find that when market sentiment is high, investors pay a higher price per dollar of earnings. The coefficient for $MIMSI^{PCA}$ is positive and statistically significant, whereas the coefficients for $MIMSI^{sPCA}$ and $MIMSI^{PLS}$ are negative and statistically significant.

Overall, $MIMSI^{PCA}$, $MIMSI^{sPCA}$ and $MIMSI^{PLS}$ outperform all the single-based sentiment proxies, highlighting that the importance of using an index to aggregate information across proxies rather than depending on a single proxy. These findings conclude that market sentiment has significant explanatory power.

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	Dependent variable: PEDF				
	Model 1	Model 2	Model 3	Model 4	Model 5
Independent variables	Fundamental	Fundamental-ΔCCI-ΔBCI-TURN	Fundamental-$MIMSI^{PCA}$	Fundamental-$MIMSI^{sPCA}$	Fundamental-$MIMSI^{PLS}$
PDND	.0978** (2.09)	.0949 (1.51)			
GROW	-.1171 (-.24)	-.2508 (-.48)	-.0957 (-.19)	-.0957 (-.19)	-.1391 (-.27)
INT	.0762 (.75)	.0882 (.83)	.0767 (.71)	.0767 (.71)	.0817 (.78)
MVL	-8.1287 (-1.07)	-.9303 (-.14)	-7.3371 (-1.03)	-7.3371 (-1.03)	-8.5757 (-1.19)
(PEDF)t-1	.2852** (2.47)	.2568** (2.35)	.2823** (2.53)	.2823** (2.53)	.3051** (2.74)
ΔCCI		.0016 (.17)			
ΔBCI		-.0072 (-.62)			
TURN		-.0852 (-1.50)			
$MIMSI^{PCA}$			.0354** (2.39)		
$MIMSI^{sPCA}$				-.0354** (-2.39)	
$MIMSI^{PLS}$					-.1386* (-1.60)

(cont'd)

	Dependent variable: PEDF				
	Model 1	Model 2	Model 3	Model 4	Model 5
Independent variables	Fundamental	Fundamental-ΔCCI-ΔBCI-TURN	Fundamental-$MIMSI^{PCA}$	Fundamental-$MIMSI^{sPCA}$	Fundamental-$MIMSI^{PLS}$
Constant	1.3372***	2.3635**	1.577***	1.577***	1.6274***
	(5.80)	(2.05)	(6.25)	(6.25)	(5.60)
F-statistic	4.28***	4.03***	6.67***	6.67***	5.00***
R-squared	.1556	.1643	.1637	.1637	.1514
Root mean squared error	.3066	.3070	.3046	.3046	.3068
Observation	152	151	153	153	153

Table 4.47 : Sentiment and fundamental factors of the price-earnings

*(Note: Table presents the OLS regression models, where PEDF is natural logarithm of price-earnings differential, PDND is natural logarithm of dividend premium, GROW is growth of industrial production index, INT is changes in short-term interest rate, MVL is market volatility, ΔCCI is changes in consumer confidence index, ΔBCI is changes in business confidence, TURN is natural logarithm of turnover ratio, (PEDF)t-1 is natural logarithm of PEDF with lagged of 1 month, $MIMSI^{PCA}$ is Malaysian IPO market sentiment using principal component analysis method, $MIMSI^{sPCA}$ is Malaysian IPO market sentiment using scaled principal component analysis method, $MIMSI^{PLS}$ is Malaysian IPO market sentiment using partial least squared method, and ε is random error term. Models are estimated using monthly data from January 2000 to December 2020. The above table consist of five models: Model 1 consist of fundamental factors, Model 2 consist of fundamental-ΔCCI-ΔBCI-TURN, Model 3 consists of fundamental-$MIMSI^{PCA}$, Model 4 consists of fundamental-$MIMSI^{sPCA}$, and Model 5 consists of fundamental-$MIMSI^{PLS}$. The significance level of t-statistics as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level)*

Table 4.48 indicates that all the VIF values are less than 10 which suggests low multicollinearity between variables.

	Dependent variable: PEDF				
	Model 1	Model 2	Model 3	Model 4	Model 5
Independent variables	Fundamental	Fundamental-ΔCCI-ΔBCI-TURN	Fundamental-$MIMSI^{PCA}$	Fundamental-$MIMSI^{sPCA}$	Fundamental-$MIMSI^{PLS}$
PDND	1.10	1.50			
GROW	1.04	1.09	1.04	1.04	1.04
INT	1.03	1.05	1.03	1.03	1.03
MVL	1.03	1.35	1.03	1.03	1.03
(PEDF)t-1	1.09	1.15	1.08	1.08	1.04
ΔCCI		1.51			
ΔBCI		1.19			
TURN		1.43			
$MIMSI^{PCA}$			1.10		
$MIMSI^{sPCA}$				1.10	
$MIMSI^{PLS}$					1.04
Mean VIF	1.06	1.29	1.06	1.06	1.04
White's test (Chi^2 (df), p-value)	9.24 (20) 0.9800	39.29 (44) 0.6733	12.37 (20) 0.9027	12.37 (20) 0.9027	19.19 (27) 0.8630

Table 4.48 : Variance inflation factor (price-earnings)

(Note: All VIF values are below 10 indicating low multicollinearity. This confirms that the included variables do not exhibit strong correlations, ensuring model reliability)

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4.9.4 Quantile regression model for price-earnings analysis

Table 4.49 provides the quantile regression models for PE analysis with PEDF as dependent variable.

Dependent variable : PEDF									
Quantiles	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
Model 1 (Fundamental)									
PDND	.1013	.0485	.0716	.09395	.0481	.0374	.0711	.0893	.1154
GROW	.4858	.0675	.0849	-.0793	-.0530	.1035	.0887	-.1176	-.0522
INT	-.0336	-.0778	.0049	-.0133	-.0533	-.0255	-.0071	.0210	.1257
MVL	-4.5154	-5.9893	-10.7246	-5.9670	-9.2316	-12.7867**	-15.6560***	-17.7104**	-26.0424**
(PEDF)t-1	.3767**	.5051***	.4306***	.4422	.4793***	.5005***	.4603***	.4233**	.2093*
Constant	.8855	.8121	.9849***	.9560	1.0245***	1.0591***	1.1218***	1.2154***	1.8071***
Model 2 (Fundamental-ΔCCI-ΔBCI-TURN)									
PDND	.0585	.0316	.0599	.0684*	.0263	.0450	.0553	.0827	.1247
GROW	.1172	.1160	.0672	-.1707	.0144	-.0111	-.2209	-.7669	-.3594
INT	.1250	-.0022	-.0215	-.0718	-.0176	-.0394	-.0265	.0518	.0959
MVL	-2.6779	-4.9863	-2.3448	2.0681	-5.1406	-11.2700	-7.8233	2.8457	-8.9771
(PEDF)t-1	.4356***	.3893***	.3101***	.3026**	.4008***	.4601***	.3884***	.1916***	.2038*
ΔCCI	.0090	.0059	.0003	.0002	.0043	.0034	.0092	.0059	-.0011
ΔBCI	-.0183*	-.0153*	-.0073	-.0117*	-.0127	-.0076	-.0078	-.0253*	-.0217*
TURN	-.0261	-.0284	-.0844	-.1150*	-.0534	-.0977	-.1410**	-.1765**	-.1840***
Constant	1.8481	2.1050	2.3571*	2.9835***	2.2980*	2.0162	1.8413	4.4688***	4.8509***

(cont'd)

Dependent variable : PEDF									
Quantiles	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
Model 3 (Fundamental-MIMSI^{PCA})									
PDND	.1240	.0597	.0647	-.0658	-.0776	-.0580	-.0352	-.0868	-.1561
GROW	.4368	.0751	.1634	-.0744	-.0453	-.0181	.0286	-.4721	1.055
INT	-.1542	-.1052	.0227	-.0370	-.0244	-.0650	-.0554	-.0245	-.0187
MVL	-3.8546	-5.590	-10.9094	-9.6008	-10.6998	-9.2059	-11.7253	-13.8922	-27.117**
(PEDF)t-1	.3697**	-.0057***	.4217***	.5060***	.4494***	.4588***	.4681***	.2019	.1358
MIMSI^{PCA}	-.0080	.5134	.0054	.0383	.0402*	.0393*	.0451*	.0732*	.1007**
Constant	.8512***	.7652**	1.017***	1.2144***	1.4026***	1.3658***	1.3503***	2.1323***	2.5605***
Model 4 (Fundamental-MIMSI^{sPCA})									
PDND	.1240	.0597	.0647	-.0658	-.0776	-.0580*	-.0352	-.0868	-.1561
GROW	.4368	.0751	.1634	-.0744	-.0453	-.0181	.0286	-.4721	1.055
INT	-.1542*	-.1052	.0227	-.0370	-.0244	-.0650	-.0554	-.0245	-.0187
MVL	-3.8546	-5.5907	-10.9094	-9.6008	-10.6998	-9.2059	-11.7253	-13.8922	-27.1172**
(PEDF)t-1	.3697***	.5134***	.4217***	.5060***	.4494***	.4588***	.4681***	.2019*	.1358**
MIMSI^{sPCA}	.0080	.0057	-.0054	-.0383*	-.0402*	-.0393*	-.0451*	-.0732*	-.1007**
Constant	.8512**	.7652**	1.0179***	1.2144***	1.4026***	1.3658***	1.350***	2.1323***	2.5605***
Model 5 (Fundamental-MIMSI^{PLS})									
PDND	.0791	.0120	.0563	.0563	.0051	.0087	.0389	.0411	.0411
GROW	.3122	.0246	-.0216	-.0539	.0843	.0701	.0243	1.0908	1.0908
INT	.0213	.0284	-.0614	-.0088	-.0286	-.0426	-.0339	.0019	.0019
MVL	-5.6702	-3.3821	-6.8855	-10.8187	-9.2271	-12.6536	-15.8698**	-35.7224*	-35.7224**
(PEDF)t-1	.3900***	.3917***	.4003***	.4942***	.4319***	.4923***	.4543***	.1805**	.1805*
MIMSI^{PLS}	-.0870	-.1602	-.1059	-.0705	-.0991	-.0524	-.0990	-.2845**	-.2845**
Constant	.9992***	1.2641***	1.1622***	.9983***	1.3027***	1.1743***	1.2909***	2.2622***	2.2622***

Table 4.49 : Quantile regression models of price-earnings

*(Note: Table presents the quantile regression for price-earnings analysis, where PEDF is natural logarithm of price-earnings differential, PDND is natural logarithm of dividend premium, GROW is growth of industrial production index, INT is changes in the short-term interest rate, MVL is market volatility, ΔCCI is changes in consumer confidence index, ΔBCI is changes in business confidence index, TURN is natural logarithm of turnover ratio, (PEDF)t-1 is natural logarithm of price-earnings differential with lagged of 1 month, $MIMSI^{PCA}$ is Malaysian IPO market sentiment using principal component analysis method, $MIMSI^{sPCA}$ is Malaysian IPO market sentiment using scaled principal component analysis method, $MIMSI^{PLS}$ is Malaysian IPO market sentiment using partial least squared method, and ε is random error term. Models are estimated using monthly data from January 2000 to December 2020. The above table consist of five models: Model 1 consist of fundamental factors, Model 2 consist of fundamental-ΔCCI-ΔBCI-TURN, Model 3 consists of fundamental-$MIMSI^{PCA}$, Model 4 consists of fundamental-$MIMSI^{sPCA}$, and Model 5 consists of fundamental-$MIMSI^{PLS}$. The significance level of t-statistics as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level)*

In Table 4.49 (Model 1) shows that the market volatility (MVL) is statistically significant at 5% level from mid-quantile of 0.6 to upper quantile of 0.9. The other fundamental factors have no significant on price-earnings and do not varies across quantiles in Malaysian IPO market. In Table 4.49 (Model 2) shows that the sentiment factors such as natural logarithm of turnover ratio (TURN) is statistically significant at 5% level at upper quantile of 0.7 and 0.8; and 1% level at upper quantile of 0.9, and significant at 10% at mid-quantile of 0.4. Whereas, the changes in business confidence index (ΔBCI) is statistically significant at 10% to explain PE from lower quantile of 0.1 and 0.2 to upper quantile of 0.8 and 0.9. The effects of TURN and ΔBCI are significant on PE at upper quantiles and varies across quantiles in Malaysian IPO market, we do not find any consistent pattern.

In Table 4.49 (Model 3) shows that the fundamental factor such as market volatility (MVL) is statistically significant at 5% at 0.9 quantile. The sentiment factor refers to IPO market sentiment using PCA method ($MIMSI^{PCA}$) is statistically significant at 10% from mid-quantile of 0.5, it increases to upper quantile of 0.9 with the significance of 5%. In Table 4.49 (Model 4) shows that the fundamental factor such as market volatility (MVL) is statistically significant at 5% at 0.9 quantile. The sentiment factor refers to IPO market sentiment using sPCA method ($MIMSI^{sPCA}$) is statistically significant at 10% from mid-quantile of 0.4 to upper quantile of 0.9, it increases the significance at 5% at 0.9 quantile. In Table 4.49 (Model 5) shows that the fundamental factor such as market volatility (MVL) is statistically significant at 5% at 0.7 and

0.9 quantiles, and 10% at 0.8 quantile. The sentiment factor refers to IPO market sentiment using PLS method ($MIMSI^{PLS}$) is statistically significant at 5% at upper quantile of 0.8 and 0.9.

4.10 Analysis of IPO underpricing during the regulatory changes

The aim of this research is also to understand whether PE influence IPO underpricing during the changes of Malaysia's capital market structure through examining the relationship between these variables and the IPO underpricing phenomenon. To account for the IPO underpricing during the changes, these independent variables were specified following the study done by How et al. (2009) on how regulatory changes affect IPO underpricing in China.

This research apply the regression analysis using market adjusted initial returns (MAIR) as its dependent variable was conducted to examine the key determinants that influence IPO underpricing at different sub-periods. The independent variables are capital raised (CAPR), offer price (PRICE), process time (TIME), oversubscription ratio (OVER), major shareholder ownership (MAJOR), return on equity (ROE), and market volatility (MVL). Additionally, this research has included sentiment factors in examining the influenced the IPO underpricing of Malaysian IPOs from January 2000 to December 2020 by analysing market sentiment from a comparative perspective between single-variable sentiment proxies with the MIMSI the market aggregate based market sentiment.

4.10.1 Descriptive statistics of the dependent and independent variables for IPO underpricing during the regulatory changes

Prior to engaging into the empirical analyses, the background of the main variables collected is examined. This section discusses the descriptive statistics of these variables during the observed period. Table 4.50 summarises the descriptive statistics for the independent variables. The table presents mean, median, 25th percentile, 75th percentile and standard deviation for all variables used in this research by different regulatory periods as shown below.

In this research, we have defined the PE differential (PEDF) to be the difference between the IPO PE ratio on the listing day and the industrial PE ratio. The mean of PE differential (PEDF) is -46.5299 at Pre-Changes, and it maintain -50.5408 at Post-Changes. It shows that the mean of capital raised (CAPR) is RM17.0244 billion at Pre-Changes and increases to RM18.0741 billion at Transitional and further increases to RM18.0951 billion at Post-Changes. The increase in capital raised indicates investors are positive with market outlook with the capital market's structure changes in Malaysia stock market. The mean of offer price (PRICE) is RM1.4940 per share at Pre-Changes and decreases to RM0.9107 per share at Post-Changes. Interestingly, the mean of offer price is RM10.2925 per share at Transitional this could be due to there are issuing firms which issue at high offer price during the Transitional period.

The average processing time between the subscription day and listing day (TIME) is 20.7234 days at Pre-Changes. It took an average of 12.9750 days to process an IPO application at Transitional, and 14.1661 days at Post-Changes. The decline in processing time may indicate that Malaysian IPO market is developing more administrative efficiency. The mean of major shareholder ownership (MAJOR) is consistent throughout the sample period range from 56.5128% at Pre-Changes to 60.0366% at Post-Changes. Besides, it shows that return on equity (ROE) is 13.7930% at Pre-Changes and increases to 20.1392% at Post-Changes. It indicates that higher return on equity can make the IPO more attractive to potential investors as it suggests that the company has a track record of generating healthy profits relative to the amount of equity invested by shareholders. The market volatility (MVL) fluctuates with mean of 0.0021 at Pre-Changes, it increases to 0.0024 at Transitional and decreases to 0.0008 at Post-Changes.

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Independent variables	PEDF	CAPR	PRICE	TIME	OVER	MAJOR	ROE	MVL
Fundamental factors								
From 1 January 2000 to 24 March 2008 (Pre-Changes)								
Observations (N)	91	91	91	91	91	91	91	99
Mean	-46.5299	17.0244	1.4940	20.7234	32.5755	56.5128	13.7930	.0021
Standard Deviation	22.6113	.6321	1.9185	9.1318	36.0273	11.9069	5.7032	.0024
25th percentile	-58.9006	16.6515	.7350	13.6000	7.6290	11.9069	10.5598	.0007
Median	-45.0474	16.9752	1.0250	17.2000	21.8900	57.8650	13.2927	.0012
75th percentile	-31.8081	17.3911	1.6650	26.0000	42.9900	64.3283	15.9078	.0021
From 25 March 2008 to 3 August 2009 (Transitional)								
Observations (N)	10	10	10	10	10	10	10	16
Mean	-45.9583	18.0741	10.2925	12.9750	4.5812	56.5885	17.8260	.0024
Standard Deviation	25.8091	1.4855	6.9372	3.6826	6.4151	21.6581	15.2834	.0017
25th percentile	-57.2181	17.0153	6.0000	12.0000	.0600	51.8000	10.8556	.0015
Median	-41.5789	17.9055	9.0000	13.5000	1.4400	62.1600	13.4533	.0021
75th percentile	-22.7776	18.6354	16.0000	14.5000	9.0850	68.1700	20.2218	.0027
From 4 August 2009 to 31 December 2020 (Post-Changes)								
Observations (N)	88	88	88	88	88	88	88	137
Mean	-50.5408	18.0951	.9107	14.1661	22.7474	60.0366	20.1392	.0008
Standard Deviation	48.8356	1.3850	.7259	4.0762	30.1735	15.7076	28.9622	.0013
25th percentile	-53.5785	17.0514	.3975	12.0000	6.085	55.6450	10.5844	.0003
Median	-36.6265	17.6796	.6608	13.0000	13.2658	65.0000	15.8471	.0005
75th percentile	-20.4677	18.7277	1.2528	16.0000	25.0025	69.6400	21.8634	.0008

Independent variables	PEDF	CAPR	PRICE	TIME	OVER	MAJOR	ROE	MVL
Fundamental factors (cont'd)								
From 1 January 2000 to 31 December 2020 (Full sample)								
Observations (N)	189	189	189	189	189	189	189	252
Mean	-48.3672	17.5985	1.6879	17.2603	26.5183	58.1575	16.9613	.0014
Standard Deviation	37.2083	1.2129	2.9238	7.7150	33.0858	14.4082	20.6046	.0020
25th percentile	-58.1882	16.8023	.5800	12.6666	5.7910	52.7925	10.6224	.0004
Median	-42.0087	17.2299	.8550	14.0000	15.5300	60.9275	13.6255	.0008
75th percentile	-25.0302	18.0141	1.5655	19.8750	34.6125	68.1700	18.4819	.0016

Independent variables	ΔCCI	ΔBCI	TURN	$MIMSI^{PCA}$	$MIMSI^{sPCA}$	$MIMSI^{PLS}$
Sentiment factors						
From 1 January 2000 to 24 March 2008 (Pre-Changes)						
Observations (N)	99	99	95	96	96	96
Mean	99.3367	96.2092	5.2089	-1.5351	1.5351	.9957
Standard Deviation	3.3421	1.6083	.3912	1.4362	1.4362	.2748
25th percentile	95.8489	95.2506	4.9298	-2.5239	.7250	.7842
Median	101.1315	96.2548	5.1762	-1.7319	1.7319	.8806
75th percentile	101.7536	97.2204	5.4273	-.7250	2.5239	1.2673
From 25 March 2008 to 3 August 2009 (Transitional)						
Observations (N)	16	16	16	16	16	16
Mean	99.4814	91.1553	5.9767	.8118	-.8118	.5378
Standard Deviation	2.9808	2.7550	.4442	1.1722	1.1722	.2699
25th percentile	96.2715	88.6266	5.6595	.0589	-1.2768	.4838
Median	100.791	90.0750	5.7509	1.1826	-1.1826	.6226
75th percentile	101.9473	93.5994	6.5072	1.2768	-.0589	.7555

Independent variables	ΔCCI	ΔBCI	TURN	$MIMSI^{PCA}$	$MIMSI^{sPCA}$	$MIMSI^{PLS}$
Sentiment factors (cont'd)						
From 4 August 2009 to 31 December 2020 (Post-Changes)						
Observations (N)	137	137	137	137	137	137
Mean	100.8029	93.0664	4.9067	.9808	-.9808	.5872
Standard Deviation	1.5997	3.5450	.2282	.7168	.7168	.2805
25th percentile	99.8988	90.4226	4.7368	.3994	-1.4859	.3445
Median	100.6737	92.7980	4.8959	1.0726	-1.0726	.6709
75th percentile	102.3641	96.0038	5.0656	1.4859	-.3994	.7100
From 1 January 2000 to 31 December 2020 (Full sample)						
Observations (N)	252	252	248	249	249	249
Mean	100.1548	94.1797	5.0915	-1.3509	2.1009	.7415
Standard Deviation	2.6042	3.3402	.4170	1.625	1.6252	.3425
25th percentile	99.2356	91.3303	4.8103	-1.003	-1.3046	.5218
Median	100.9319	95.2603	5.0080	.3994	-.3994	.7332
75th percentile	102.0178	96.8631	5.2672	1.3046	1.0038	.9079

Table 4.50 : Descriptive statistics of IPO underpricing during the regulatory changes with different sub-periods of independent variables for sentiment and fundamental factors

*(Note: Table provides descriptive statistics of the variables for IPO underpricing during the regulatory changes with different sub-periods. The independent variables are natural logarithm of price-earnings differential (PEDF), natural logarithm of capital raised (CAPR), offer price (PRICE), process time (TIME), oversubscription ratio (OVER); major shareholder ownership (MAJOR), return on equity (ROE); and market volatility (MVL). The significance level of t-statistics as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level. Pre-Changes is from 1 January 2000 to 24 March 2008, Transitional is from 25 March 2008 to 3 August 2009, and Post-Changes is from 4 August 2009 to 31 December 2020. Full sample period is from 1 January 2000 to 31 December 2020)*

4.10.2 Diagnostic tests for IPO underpricing regression model during the regulatory changes

The following subsections explain the results of diagnostic tests used in this research for the regression analysis of IPO underpricing in the context of regulatory changes.

(a) Collinearity

In order to examine the collinearity among variables, this research used correlation matrix and VIF analysis. The result of the correlation matrix of all the variables is tabulated in Table 4.51.

The variables are price-earnings differential (PEDF), capital raised (CAPR), offer price (PRICE), processing time (TIME), oversubscription ratio (OVER), major shareholder ownership (MAJOR), return on equity (ROE), and market volatility (MVL). The result indicates that there is no problem of multicollinearity among variables. The correlation coefficients of all the variables are less than 0.7 which entails that variables are not highly correlated to each other.

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	PEDF	CAPR	PRICE	TIME	OVER	MAJOR	ROE	MVL	ΔCCI	ΔBCI	TURN	$MIMSI^{PCA}$	$MIMSI^{sPCA}$	$MIMSI^{PLS}$
PEDF	1.0000													
CAPR	.1042	1.0000												
PRICE	.0610	.1670	1.0000											
TIME	.1081	-.1496	-.0396	1.0000										
OVER	-.0612	-.3516	-.2085	-.1407	1.0000									
MAJOR	.0369	.0376	-.0059	-.0269	-.0759	1.0000								
ROE	.0030	.2676	.0634	-.0193	-.0728	.1851	1.0000							
MVL	.0108	-.1027	.2424	.2480	.0153	-.1474	-.0503	1.0000						
ΔCCI	-.0805	.0744	-.0676	-.6703	.1774	.0572	-.0197	-.2419	1.0000					
ΔBCI	-.0395	-.1640	-.1423	.0892	.1813	-.0474	.0303	.0586	.1506	1.0000				
TURN	.0521	-.1000	.3897	-.1458	.0917	-.1175	-.0628	.3845	.1401	.1891	1.0000			
$MIMSI^{PCA}$	.0233	.3741	.1584	-.5857	-.1170	.1456	.0713	-.2079	.4435	-.4996	-.0725	1.0000		
$MIMSI^{sPCA}$	-.0233	-.3741	-.1584	.5857	.1170	-.1456	-.0713	.2079	-.4435	.4996	.0725	-1.0000	1.0000	
$MIMSI^{PLS}$	-.0033	-.2052	-.0893	.5177	.0486	-.0781	.0346	.1858	-.4894	.7704	.0880	-.7558	.7558	1.0000

Table 4.51 : Correlation matrix (IPO underpricing during the regulatory changes)

(Note: Table presents the Pearson correlation coefficients among variables with their significance. The variables are natural logarithm of price-earnings differential (PEDF), natural logarithm of capital raised (CAPR), offer price (PRICE), processing time (TIME), oversubscription ratio (OVER), major shareholder ownership (MAJOR), return on equity (ROE), and market volatility (MVL))

(b) Homoscedasticity test

Secondly, this research applied VIF to test the collinearity among variables used to examine the regulatory changes. Table 4.52 provides the summary of VIF test result used in this research to examine the market reactions on IPO underpricing in the context of the changes in Malaysia's capital market structure. The results indicate that all the VIF values are less than 10 and which suggests low multicollinearity between variables.

	Model 1	Model 2	Model 3	Model 4	Model 5
Independent variables	Fundamental	Fundamental-ΔCCI-ΔBCI-TURN	Fundamental-$MIMSI^{PCA}$	Fundamental-$MIMSI^{sPCA}$	Fundamental-$MIMSI^{PLS}$
PEDF	1.03	1.05	1.04	1.04	1.03
CAPR	1.32	1.35	1.43	1.43	1.34
PRICE	1.16	1.40	1.17	1.17	1.16
TIME	1.17	2.14	1.74	1.74	1.54
OVER	1.24	1.27	1.25	1.26	1.25
MAJOR	1.07	1.08	1.09	1.09	1.07
ROE	1.12	1.13	1.12	1.12	1.13
MVL	1.19	1.37	1.19	1.19	1.19
ΔCCI		2.12			
ΔBCI		1.25			
TURN		1.68			
$MIMSI^{PCA}$			1.85		
$MIMSI^{sPCA}$				1.85	
$MIMSI^{PLS}$					1.44
Mean VIF	1.16	1.44	1.32	1.32	1.24
White's test (Chi^2 (df), p-value)	75.48 (44) .0022	102.01 (77) .0298	80.19 (54) .0119	80.19 (54) .0119	93.10 (64) .0008

Table 4.52 : Variance inflation factor for IPO underpricing during the regulatory changes

(Note: Table consist of five models: Model 1 consist of fundamental factors, Model 2 consist of Fundamental-ΔCCI-ΔBCI-TURN, Model 3 consists of Fundamental-$MIMSI^{PCA}$, Model 4 consists of Fundamental-$MIMSI^{sPCA}$, and Model 5 consists of Fundamental-$MIMSI^{PLS}$)

(c) Normality

In order to avoid the problem of non-normality, this research uses the logit and probit regression models that do not require the data normality assumption apart from the OLS regression parameter in analysing the data.

4.10.3 Ordinary least square regression model to explain IPO underpricing towards market adjusted initial returns

In this section, numerous cross-sectional regression models are estimated by using OLS regression model to evaluate the significant determinants of IPO underpricing during the changes of Malaysia's capital market structure. The following subsections explain the determinants of IPO underpricing during such changes based on OLS regression model.

In this research, the OLS regression model is used to investigate the linear relationship between the IPO underpricing and its determinants to explain the regulatory changes. The IPO underpricing is measured by using market adjusted initial returns (MAIR) as dependent variables for IPO share performance. Moreover, the determinants of IPO underpricing (independent variables) are natural logarithm of price-earnings differential (PEDF), natural logarithm of capital raised (CAPR), offer price (PRICE), process time (TIME), oversubscription ratio (OVER), major shareholder ownership (MAJOR), return on equity (ROE), and market volatility (MVL). In this research, the regression results of IPO underpricing based on MAIR are qualitatively identical and quantitatively similar, further empirical studies suggested to use MAIR as dependent variables as it has taken into account the market adjustments.

In line with Hypothesis 3 (b), the results for multivariate regression analysis are measured using the OLS regression model. In order to determine the impacts of changes of Malaysia's capital market structure on IPO underpricing, we identify a group of control variables that have been used in the existing literature as explanatory variables for IPO underpricing. The regression equation is illustrated in Equation 3.32 and 3.33 where, market adjusted initial returns (MAIR) is the market adjusted first-day initial returns of IPO firm. Price-earnings differential (PEDF) represents price-earnings differential is the price-earnings of IPO minus the industrial price-earnings on the listing day. Natural logarithm of capital raised (CAPR) represents capital raised and is the natural logarithm of firm size worth value raised in the IPO. Offer price (PRICE) represents offer price is the price offer at the IPO. Process time (TIME) represents process time is the number of days from the end of offer date to the first listing day. Oversubscription ratio (OVER) represents oversubscription ratio is the shares issued over shares subscribed in the IPO subscription period. Major shareholder ownership (MAJOR) represents major shareholder ownership is the percentage shareholdings owned by major shareholders prior to IPO. Return on equity (ROE) is the return on equity at the fiscal year end before the IPO. Market volatility (MVL) represents market volatility is the standard deviation of the daily FTSE Bursa Malaysia KLCI percentage return for the first one month (30 calendar days) after the IPO. β is the intercept of the equation. ε is the error term of the equation.

The OLS regression results are reported in Table 4.53. The coefficient of each variable is given along with t-ratios in parentheses as computed by robust standard errors. The model fitness is determined from the R-squared and F-statistics. We run the regression model for each of the 2 sub-periods (i.e. Pre-Changes and Post-Changes). The objective is to examine how the regulatory changes affect the underlying factors explaining the IPO underpricing. If the changes of Malaysia's capital market structure has no impacts on IPO underpricing, then the dynamic between the IPO underpricing and dependent variables will not vary substantially in the sub-period analysis. The analysis involves 2 sub-periods are Pre-Changes is from 1 January 2000 to 24 March 2008, and Post-Changes is from 4 August 2009 to 31 December 2020. Full sample period is from 1 January 2000 to 31 December 2020.

Table 4.53, Model 1 provides the estimation of equation by using OLS regression model for full sample. The R-squared is 0.1472, indicates that 14.72% of the total variance in the IPO underpricing is accounted by the independent variables. The F-statistic is 3.45 and result of the F-statistic shows that the overall model is significant at 1% and can be used for further analysis. The result shows that oversubscription ratio (OVER) is the significant factor that influence the IPO share performance during the changes of Malaysia's capital market structure. As such, these variables are statistically significant accepted the hypotheses. The oversubscription rate (OVER) is positively associated with IPO underpricing and statistically significant at 1%. The result shows that natural logarithm of price-earnings differential (PEDF), natural logarithm of capital raised (CAPR), offer price (PRICE), process time (TIME), major shareholder ownership (MAJOR), return on equity (ROE), market volatility (MVL), changes in consumer sentiment index (ΔCCI), changes in business confidence index (ΔBCI) and natural logarithm of turnover ratio (TURN) have no impact on the IPO underpricing and rejected the hypotheses.

Table 4.53, Model 2 provides the estimation of equation by using OLS regression model for Pre-Changes. The R-squared is 0.2441, indicates that 24.41% of the total variance in the IPO underpricing is accounted by the independent variables. The F-statistics is 8.01 and result of the F-statistic shows that the overall model is significant at 1% and can be used for further analysis. The result shows that the natural logarithm of price-earnings differential (PEDF), offer price (PRICE), oversubscription ratio (OVER), and market volatility (MVL) are the significant factors that influence the IPO underpricing during the changes of Malaysia's capital market structure. As such, these variables are statistically significant accepted the hypotheses. The over-subscription ratio (OVER) is positively associated with IPO underpricing and statistically significant at 1%. The offer price (PRICE) is negatively associated with IPO underpricing and statistically significant at 10%. In contrast, the market volatility (MVL) and price-earnings differential (PEDF) are positively associated with IPO underpricing and statistically significant at 5% and 10%, respectively. The result shows that natural logarithm of capital raised (CAPR), process time (TIME), major shareholder ownership (MAJOR), and return on equity (ROE) have no impact on the IPO underpricing and rejected the hypotheses.

Table 4.53, Model 3 provides the estimation of equation by using OLS regression model for Post-Changes. The R-squared is 0.2040, indicates that 20.40% of the total variance in the IPO share performance is accounted by the independent variables. The F-statistics is 2.20 and result of the F-statistics shows that the overall model is significant at 1% and can be used for further analysis. The result shows that oversubscription ratio (OVER) is the significant factor that influence the IPO share performance during the changes of Malaysia's capital market structure. As such, these variables are statistically significant accepted the hypotheses. The oversubscription rate (OVER) is positively, in contrast market volatility (MVL) is negatively associated with IPO underpricing and both statistically significant at 5%. The result shows that natural logarithm of price-earnings differential (PEDF), natural logarithm of capital raised (CAPR), offer price (PRICE), process time (TIME), major shareholder ownership (MAJOR), and return on equity (ROE) have no impact on the IPO underpricing and rejected the hypotheses.

	Dependent variable : MAIR		
	Model 1	Model 2	Model 3
Fundamental	Full sample	Pre-Changes	Post-Changes
PEDF	.0008	.0027**	.0005
	(.94)	(2.25)	(.43)
CAPR	-.0149	-.0351	-.0473
	(-.58)	(-.62)	(-.75)
PRICE	-.0022	-.0331***	-.0220
	(-.10)	(-3.44)	(-.35)
TIME	.0025	.0015	.0161
	(.93)	(.49)	(1.33)
OVER	.0046***	.0032***	.0049**
	(4.21)	(4.03)	(2.16)
MAJOR	.0019	.0013	.0010
	(.84)	(.43)	(.28)
ROE	-.0017	.0012	-.0010
	(-1.46)	(.25)	(-1.04)
MVL	2.4950	34.6143**	-51.1703**
	(.17)	(2.02)	(-2.20)
Constant	.3161	.7722	.7995
	(.73)	(.75)	(.87)
F-statistic	3.45***	8.01***	2.20***
R-squared	.1472	.2441	.2040
Root mean squared error	.4166	.3050	.4623
Observation	189	91	88

Table 4.53 : IPO underpricing during the regulatory changes and control variables (Fundamental) with different sub-periods

*(Note: Table provides the regression results for IPO underpricing during the regulatory changes. The dependent variable is the market adjusted initial returns (MAIR). The independent variables are given as: natural logarithm of price-earnings differential (PEDF), natural logarithm of capital raised (CAPR), offer price (PRICE), process time (TIME), oversubscription ratio (OVER); major shareholder ownership (MAJOR), return on equity (ROE); and market volatility (MVL). The significance level of t-statistics as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level. Pre-Changes is from 1 January 2000 to 24 March 2008, and Post-Changes is from 4 August 2009 to 31 December 2020. Full sample period is from 1 January 2000 to 31 December 2020)*

Table 4.54, Model 1 provides the estimation of equation by using OLS regression model for full sample. The R-squared is 0.1491, indicates that 14.91% of the total variance in the IPO share performance is accounted by the independent variables. The F-statistic is 2.39 and result of the F-statistic shows that the overall model is significant at 1% and can be used for further analysis. The result shows that oversubscription ratio (OVER) is the significant factor that influence the IPO share performance during the changes of Malaysia's capital market structure. As such, these variables are statistically significant accepted the hypotheses. The oversubscription rate (OVER) is positively associated with IPO underpricing and statistically significant at 1%. The result shows that natural logarithm of price-earnings differential (PEDF), natural logarithm of capital raised (CAPR), offer price (PRICE), process time (TIME), major shareholder ownership (MAJOR), return on equity (ROE), market volatility (MVL), changes in consumer sentiment index (ΔCCI), changes in business confidence index (ΔBCI) and natural logarithm of turnover ratio (TURN) have no impact on the IPO underpricing and rejected the hypotheses.

Table 4.54, Model 2 provides the estimation of equation by using OLS regression model for Pre-Changes. The R-squared is 0.3021, indicates that 30.21% of the total variance in the IPO share performance is accounted by the independent variables. The F-statistic is 8.47 and result of the F-statistic shows that the overall model is significant at 1% and can be used for further analysis. The result shows that offer price (PRICE), oversubscription ratio (OVER), changes in business sentiment index (ΔBCI), and natural logarithm of the turnover ratio (TURN) are the significant factor that influence the IPO underpricing during the changes of Malaysia's capital market structure. As such, these variables are statistically significant accepted the hypotheses. The oversubscription rate (OVER) is positively associated with IPO underpricing and statistically significant at 1%. The changes in business sentiment index (ΔBCI), and natural logarithm of the turnover ratio (TURN) are positively associated with IPO underpricing and statistically significant at 5% and 10%, respectively. In contrast, the offer price (PRICE) is negatively associated with IPO underpricing and statistically significant at 1%. The result shows that natural logarithm of price-earnings differential (PEDF), natural logarithm of capital raised (CAPR), process time (TIME), major shareholder ownership (MAJOR), return on equity (ROE), market volatility (MVL), and changes in consumer confidence index (ΔCCI) have no impact on the IPO underpricing and rejected the hypotheses.

Table 4.54, Model 3 provides the estimation of equation by using OLS regression model for Post-Changes. The R-squared is 0.2306, indicates that 23.06% of the total variance in the IPO share performance is accounted by the independent variables. The F-statistics is 2.70 and result of the F-statistics shows that the overall model is significant at 1% and can be used for further analysis. The result shows that oversubscription ratio (OVER) is the significant factor that influence the IPO underpricing during the changes of Malaysia's capital market structure. As such, these variables are statistically significant accepted the hypotheses. The oversubscription ratio (OVER) is positively associated with IPO underpricing and statistically significant at 5%. The result shows that natural logarithm of price-earnings differential (PEDF), natural logarithm of capital raised (CAPR), offer price (PRICE), process time (TIME), major shareholder ownership (MAJOR), return on equity (ROE), market volatility (MVL), changes in consumer sentiment index (ΔCCI), changes in business confidence index (ΔBCI), and natural logarithm of turnover ratio (TURN) have no impact on the IPO underpricing and rejected the hypotheses.

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Fundamental- ΔCCI-ΔBCI-TURN	Dependent variable : MAIR Model 1 Full sample	 Model 2 Pre-Changes	 Model 3 Post-Changes
PEDF	.0006	-.0003	.0007
	(.68)	(-.29)	(.55)
CAPR	-.0094	-.0389	-.0380
	(-.38)	(-.89)	(-.69)
PRICE	.0003	-.0343***	-.0275
	(.01)	(-4.20)	(-.36)
TIME	-.0002	-.0017	.0138
	(-.05)	(-.26)	(1.25)
OVER	.0045***	.0025***	.0051**
	(4.14)	(3.58)	(2.04)
MAJOR	.0024	.0039*	.0009
	(1.08)	(1.74)	(.26)
ROE	-.0019	.0009	-.0018
	(-1.60)	(.22)	(-1.26)
MVL	-6.0794	4.1813	-30.1552
	(-.53)	(.42)	(-1.45)
ΔCCI	-.0079	-.0256	-.0448
	(-.46)	(-1.14)	(-1.09)
ΔBCI	-.0068	.0581**	.0275
	(.64)	(2.44)	(1.02)
TURN	-.0221	.1634*	-.2065
	(-.36)	(1.91)	(-1.10)
Constant	.4932	-3.2200	3.6388
	(.32)	(-.82)	(1.44)
F-statistic	2.39***	8.47***	2.70***
R-squared	.1491	.3021	.2306
Root mean squared error	.4081	.2656	.4634
Observation	186	88	88

Table 4.54 : IPO underpricing during the regulatory changes and control variables (Fundamental-ΔCCI-ΔBCI-TURN) with different sub-periods

*(Note: Table provides the regression results for IPO underpricing during the regulatory changes. The dependent variable is the market adjusted initial returns (MAIR). The independent variables are given as: natural logarithm of price-earnings differential (PEDF), natural logarithm of capital raised (CAPR), offer price (PRICE), process time (TIME), oversubscription ratio (OVER); major shareholder ownership (MAJOR), return on equity (ROE); and market volatility (MVL). The significance level of t-statistics as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level. Pre-Changes is from 1 January 2000 to 24 March 2008, Transitional is from 25 March 2008 to 3 August 2009, and Post-Changes is from 4 August 2009 to 31 December 2020. Full sample period is from 1 January 2000 to 31 December 2020)*

Table 4.55, Model 1 provides the estimation of equation by using OLS regression model for full sample. The R-squared is 0.1490, indicates that 14.90% of the total variance in the IPO underpricing is accounted by the independent variables. The F-statistic is 3.69 and result of the F-statistic shows that the overall model is significant at 1% and can be used for further analysis. The result shows that the oversubscription ratio (OVER) is a significant factor that influence the IPO underpricing during the changes of Malaysia's capital market structure. As such, these variables are statistically significant accepted the hypotheses. The oversubscription rate (OVER) is positively associated with IPO underpricing and statistically significant at 1%. The result shows that natural logarithm of price-earnings differential (PEDF), natural logarithm of capital raised (CAPR), offer price (PRICE), process time (TIME), major shareholder ownership (MAJOR), return on equity (ROE), market volatility (MVL) and Malaysian IPO market sentiment index using PCA method ($MIMSI^{PCA}$) have no impact on the IPO underpricing and rejected the hypotheses.

Table 4.55, Model 2 provides the estimation of equation by using OLS regression model for Pre-Changes. The R-squared is 0.2741, indicates that 27.41% of the total variance in the IPO underpricing is accounted by the independent variables. The F-statistics is 8.18 and result of the F-statistic shows that the overall model is significant at 1% and can be used for further analysis. The result shows that natural logarithm of price-earnings differential (PEDF), offer price (PRICE), oversubscription ratio (OVER), market volatility (MVL), and Malaysian IPO market sentiment index using PCA method ($MIMSI^{PCA}$) are the significant factors that influence the IPO underpricing during the changes of Malaysia's capital market structure. As such, these variables are statistically significant accepted the hypotheses. The oversubscription rate (OVER) is positively associated with IPO underpricing and statistically significant at 1%. The natural logarithm of price-earnings differential (PEDF) and market volatility (MVL) are positively associated with IPO underpricing and statistically significant at 10%. In contrast, offer price (PRICE) and Malaysian IPO market sentiment index using PCA method ($MIMSI^{PCA}$) are negatively associated with IPO underpricing and statistically significant at 5%. The result shows that natural logarithm of capital raised (CAPR), process time (TIME), major shareholder ownership (MAJOR), and return on equity (ROE) have no impact on the IPO underpricing and rejected the hypotheses.

Table 4.55, Model 3 provides the estimation of equation by using OLS regression model for Post-Changes. The R-squared is 0.2059, indicates that 20.59% of the total variance in the IPO underpricing is accounted by the independent variables. The F-statistics is 1.96 and result of the F-statistic shows that the overall model is significant at 1% and can be used for further analysis. The result shows that the oversubscription ratio (OVER) is a significant factor that influence the IPO underpricing during the changes of Malaysia's capital market structure. As such, these variables are statistically significant accepted the hypotheses. The oversubscription rate (OVER) and market volatility (MVL) are positively associated with IPO underpricing and statistically significant at 5%. The result shows that natural logarithm of price-earnings differential (PEDF), natural logarithm of capital raised (CAPR), offer price (PRICE), process time (TIME), major shareholder ownership (MAJOR), return on equity (ROE), and Malaysian IPO market sentiment index using PCA method ($MIMSI^{PCA}$) have no impact on the IPO underpricing and rejected the hypotheses.

	Dependent variable : MAIR		
	Model 1	Model 2	Model 3
Fundamental-$MIMSI^{PCA}$	Full sample	Pre-Changes	Post-Changes
PEDF	.0006	.0020*	.0005
	(.79)	(1.77)	(.46)
CAPR	-.0092	-.0111	-.0406
	(-.31)	(-.23)	(-.65)
PRICE	-.0005	-.0222**	-.0307
	(-.02)	(-2.56)	(-.47)
TIME	.0004	-.0041	.0150
	(.12)	(-1.30)	(1.28)
OVER	.0045***	.0031***	.0050**
	(3.92)	(4.02)	(2.11)
MAJOR	.0021	.0023	.00137
	(1.03)	(.90)	(.39)
ROE	-.0018	-.0005	-.0011
	(-1.58)	(-.11)	(-1.09)
MVL	-4.5718	22.4779*	-47.6212**
	(-.36)	(1.63)	(-2.24)
$MIMSI^{PCA}$	-.0140	-.0596**	-.0325
	(-.56)	(-2.54)	(-.63)
Constant	.2316	.3170	.7120
	(.48)	(.36)	(.78)
F-statistic	3.69***	8.18***	1.96***
R-squared	.1490	.2741	.2059
Root mean squared error	.4112	.2835	.4647
Observation	187	89	88

Table 4.55 : IPO underpricing during the regulatory changes and control variables (Fundamental-$MIMSI^{PCA}$) with different sub-periods

*(Note: Table reports the regression results for IPO underpricing during the regulatory changes. The dependent variable is the market adjusted initial returns (MAIR). The independent variables are given as: natural logarithm of price-earnings differential (PEDF), natural logarithm of capital raised (CAPR), offer price (PRICE), process time (TIME), oversubscription ratio (OVER); major shareholder ownership (MAJOR), return on equity (ROE); and market volatility (MVL). The significance level of t-statistics as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level. Pre-Changes is from 1 January 2000 to 24 March 2008, Transitional is from 25 March 2008 to 3 August 2009, and Post-Changes is from 4 August 2009 to 31 December 2020. Full sample period is from 1 January 2000 to 31 December 2020)*

Table 4.56, Model 1 provides the estimation of equation by using OLS regression model for full sample. The R-squared is 0.1490, indicates that 14.90% of the total variance in the IPO underpricing is accounted by the independent variables. The F-statistic is 3.69 and result of the F-statistic shows that the overall model is significant at 1% and can be used for further analysis. The result shows that the oversubscription ratio (OVER) is a significant factor that influence the IPO underpricing during the changes of Malaysia's capital market structure. As such, this variable is statistically significant accepted the hypotheses. The oversubscription rate (OVER) is positively associated with IPO underpricing and statistically significant at 1%. The result shows that natural logarithm of price-earnings differential (PEDF), natural logarithm of capital raised (CAPR), offer price (PRICE), process time (TIME), major shareholder ownership (MAJOR), return on equity (ROE), market volatility (MVL) and Malaysia IPO market sentiment index using sPCA method ($MIMSI^{sPCA}$) have no impact on the IPO underpricing and rejected the hypotheses.

Table 4.56, Model 2 provides the estimation of equation by using OLS regression model for Pre-Changes. The R-squared is 0.2741, indicates that 27.41% of the total variance in the IPO underpricing is accounted by the independent variables. The F-statistic is 8.18 and result of the F-statistic shows that the overall model is significant at 1% and can be used for further analysis. The result shows that natural logarithm of price-earnings differential (PEDF), offer price (PRICE), oversubscription ratio (OVER), market volatility (MVL), and Malaysian IPO market sentiment index using sPCA method ($MIMSI^{sPCA}$) are the significant factors that influence the IPO underpricing during the changes of Malaysia's capital market structure. As such, these variables are statistically significant accepted the hypotheses. The oversubscription rate (OVER) and Malaysian IPO market sentiment index using PCA method ($MIMSI^{sPCA}$) are positively associated with IPO underpricing and statistically significant at 1% and 5%, respectively. The natural logarithm of price-earnings differential (PEDF) and market volatility (MVL) are positively associated with IPO underpricing and statistically significant at 10%. In contrast, offer price (PRICE) are negatively associated with IPO underpricing and statistically significant at 5%. The result shows that natural logarithm of capital raised (CAPR), process time (TIME), major shareholder ownership (MAJOR), and return on equity (ROE) have no impact on the IPO underpricing and rejected the hypotheses.

Table 4.56, Model 3 provides the estimation of equation by using OLS regression model for Post-Changes. The R-squared is 0.2059, indicates that 20.59% of the total variance in the IPO underpricing is accounted by the independent variables. The F-statistics is 1.96 and result of the F-statistic shows that the overall model is significant at 1% and can be used for further analysis. The result shows that the oversubscription ratio (OVER) is a significant factor that influence the IPO underpricing during the changes of Malaysia's capital market structure. As such, these variables are statistically significant accepted the hypotheses. The oversubscription rate (OVER) is positively, in contrast market volatility (MVL) is negatively associated with IPO underpricing and statistically significant at 5%. The result shows that natural logarithm of price-earnings differential (PEDF), natural logarithm of capital raised (CAPR), offer price (PRICE), process time (TIME), major shareholder ownership (MAJOR), return on equity (ROE), and Malaysia IPO market sentiment index using sPCA method ($MIMSI^{sPCA}$) have no impact on the IPO underpricing and rejected the hypotheses.

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	Dependent variable : MAIR		
	Model 1	Model 2	Model 3
Fundamental-MIMSI^{sPCA}	Full sample	Pre-Changes	Post-Changes
PEDF	.0006	.0020*	.0005
	(.79)	(1.77)	(.46)
CAPR	-.0092	-.0111	-.0406
	(-.31)	(-.23)	(-.65)
PRICE	-.0005	-.0222**	-.0307
	(-.02)	(-2.56)	(-.47)
TIME	.0004	-.0041	.0150
	(.12)	(-1.30)	(1.28)
OVER	.0045***	.0031***	.0050**
	(3.92)	(4.02)	(2.11)
MAJOR	.0021	.0023	.0013
	(1.03)	(.90)	(.39)
ROE	-.0018	-.0005	-.0011
	(-1.58)	(-.11)	(-1.09)
MVL	-4.5718	22.4779*	-47.6212**
	(-.36)	(1.63)	(-2.24)
MIMSI^{sPCA}	.0140	.0596**	.0325
	(.56)	(2.54)	(.63)
Constant	.2316	.3170	.7120
	(.48)	(.36)	(.78)
F-statistic	3.69***	8.18***	1.96***
R-squared	.1490	.2741	.2059
Root mean squared error	.4112	.2835	.4647
Observation	187	89	88

Table 4.56 : IPO underpricing during the regulatory changes and control variables (Fundamental-MIMSI^{sPCA}) with different periods

*(Note: Table provides the regression results for IPO underpricing during the regulatory changes. The dependent variable is the market adjusted initial returns (MAIR). The independent variables are given as: natural logarithm of price-earnings differential (PEDF), natural logarithm of capital raised (CAPR), offer price (PRICE), process time (TIME), oversubscription ratio (OVER); major shareholder ownership (MAJOR), return on equity (ROE); and market volatility (MVL). The significance level of t-statistics as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level. Pre-Changes is from 1 January 2000 to 24 March 2008, Transitional is from 25 March 2008 to 3 August 2009, and Post-Changes is from 4 August 2009 to 31 December 2020. Full sample period is from 1 January 2000 to 31 December 2020)*

Table 4.57, Model 1 provides the estimation of equation by using OLS regression model for full sample. The R-squared is 0.1519, indicates that 15.19% of the total variance in the IPO underpricing is accounted by the independent variables. The F-statistic is 3.03 and result of the F-statistic shows that the overall model is significant at 1% and can be used for further analysis. The result shows that the oversubscription ratio (OVER) is the significant factor that influence the IPO underpricing during the changes of Malaysia's capital market structure. As such, this variable is statistically significant accepted the hypotheses. The oversubscription rate (OVER) is positively associated with IPO underpricing and statistically significant at 1%. The result shows that natural logarithm of price-earnings differential (PEDF), natural logarithm of capital raised (CAPR), offer price (PRICE), process time (TIME), major shareholder ownership (MAJOR), return on equity (ROE), market volatility (MVL) and Malaysian IPO market sentiment index using PLS method ($MIMSI^{PLS}$) have no impact on the IPO share performance and rejected the hypotheses.

Table 4.57, Model 2 provides the estimation of equation by using OLS regression model for Pre-Changes. The R-squared is 0.2761, indicates that 27.61% of the total variance in the IPO share performance is accounted by the independent variables. The F-statistic is 9.92 and result of the F-statistic shows that the overall model is significant at 1% and can be used for further analysis. The result shows that offer price (PRICE), oversubscription ratio (OVER), market volatility (MVL), and Malaysian IPO market sentiment index using PLS method ($MIMSI^{PLS}$) are the significant factors that influence the IPO underpricing during the changes of Malaysia's capital market structure. As such, these variables are statistically significant accepted the hypotheses. The oversubscription rate (OVER), Malaysian IPO market sentiment index using PLS method ($MIMSI^{PLS}$), and market volatility (MVL) are positively associated with IPO underpricing and statistically significant at 1%, 5% and 10%, respectively. In contrast, the offer price (PRICE) is negatively associated with IPO underpricing and statistically significant at 1%. The result shows that natural logarithm of price-earnings differential (PEDF), natural logarithm of capital raised (CAPR), process time (TIME), major shareholder ownership (MAJOR), and return on equity (ROE) have no impact on the IPO underpricing and rejected the hypotheses.

Table 4.57, Model 3 provides the estimation of equation by using OLS regression model for Post-Changes. The R-squared is 0.2175, indicates that 21.75% of the total variance in the IPO share performance is accounted by the independent variables. The F-statistics is 2.54 and result of the F-statistic shows that the overall model is significant at 1% and can be used for further analysis. The result shows that the oversubscription ratio (OVER) is the significant factors that influence the IPO underpricing during the changes of Malaysia's capital market structure. As such, these variables are statistically significant accepted the hypotheses. The oversubscription rate (OVER) is positively, in contrast market volatility (MVL) is negatively associated with IPO share performance and statistically significant at 5%. The result shows that natural logarithm of price-earnings differential (PEDF), natural logarithm of capital raised (CAPR), offer price (PRICE), process time (TIME), major shareholder ownership (MAJOR), return on equity (ROE), and Malaysian IPO market sentiment index using PLS method ($MIMSI^{PLS}$) have no impact on the IPO share performance and rejected the hypotheses.

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	Dependent variable : MAIR		
	Model 1	Model 2	Model 3
Fundamental-MIMSI^{PLS}	Full sample	Pre-Changes	Post-Changes
PEDF	.0007	.0007	.0006
	(.78)	(.63)	(.51)
CAPR	-.0106	-.0431	-.0273
	(-.43)	(-.81)	(-.49)
PRICE	-.0007	-.0293***	-.0626
	(-.03)	(-3.67)	(-.72)
TIME	-.0001	-.0067	.0156
	(-.04)	(-1.58)	(1.35)
OVER	.0045***	.0030***	.0050**
	(4.15)	(3.88)	(2.04)
MAJOR	.0021	.0027	.0013
	(.93)	(.98)	(.36)
ROE	-.0019	-.0009	-.0015
	(-1.62)	(-.21)	(-1.12)
MVL	-4.5740	20.2245*	-41.2286**
	(-.36)	(1.62)	(-2.18)
MIMSI^{PLS}	.1026	.3787**	.2226
	(.89)	(2.25)	(.76)
Constant	.1957	.5774	.3361
	(.48)	(.62)	(.43)
F-statistic	3.03***	9.92***	2.54***
R-squared	.1519	.2761	.2175
Root mean squared error	.4105	.2831	.4613
Observation	187	89	88

Table 4.57 : IPO underpricing during the regulatory changes and control variables (Fundamental-MIMSI^{PLS}) with different periods

*(Note: Table provides the regression results for IPO underpricing during the regulatory changes. The dependent variable is the market adjusted initial returns (MAIR). The independent variables are given as: natural logarithm of price-earnings differential (PEDF), natural logarithm of capital raised (CAPR), offer price (PRICE), process time (TIME), oversubscription ratio (OVER); major shareholder ownership (MAJOR), return on equity (ROE); and market volatility (MVL). The significance level of t-statistics as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level. Pre-Changes is from 1 January 2000 to 24 March 2008, Transitional is from 25 March 2008 to 3 August 2009, and Post-Changes is from 4 August 2009 to 31 December 2020. Full sample period is from 1 January 2000 to 31 December 2020)*

Table 4.58 shows the results of quantile regression on IPO underpricing with different periods. The data is divided into 3 independent groups namely Pre-Changes is from 1 January 2000 to 24 March 2008; Transitional is from 25 March 2008 to 3 August 2009; and Post-Changes is from 4 August 2009 to 31 December 2020. Full sample period is from 1 January 2000 to 31 December 2020. The mean for full sample is 26.71%, for Pre-Changes is 29.74%, for Transitional is 14.54% and for Post-Changes is 23.80%. Here, the ANOVA test is carried out to determine whether there are any statistically significant differences between the means of three or more independent groups. The ANOVA test statistic is 20.7221 with statistically significant at the 1% level. This significance implies that the structural changes in the capital market had a measurable impact on returns, showing that it is important to compare different sub-periods more closely to understand exactly where these differences happen.

For the t-tests, 2 independent t-tests are conducted comparing different pairs of groups, i.e. 'returns of Pre-Changes and Transitional are significantly different from returns of Post-Changes' vs. 'returns of Pre-Changes and Transitional are significantly different from returns of Pre-Changes' to determine if their means are significantly different. The results of the ANOVA test indicates that there is a statistically significant difference in means among the 3 groups (Pre-Changes, Transitional, and Post-Changes). However, the t-value for the comparison of Pre-Changes and Transitional vs. Post-Changes is -0.6874. This suggests that there is no statistically significant difference in means between these 2 groups. This is possibly due to the limited sample size during the Transitional (N=10). The t-value for the comparison of Post-Changes and Transitional vs. Pre-Changes is 1.0713. This indicates that there is no statistically significant difference in means between these 2 groups as well. Overall, the ANOVA test suggests that there are differences among the 3 groups, and the t-tests provide further insights into specific group comparisons.

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4.10.4 ANOVA test

Variable	Observation (N)	Mean	Std. Dev.	25th percentile	Median	75th percentile
Full sample	189	.2617	.4414	.0281	.1462	.3751
Pre-Changes	91	.2974	.3349	.0368	.1962	.5314
Transitional	10	.1454	.7468	-.2617	-.0244	.2683
Post-Changes	88	.2380	.4937	.0302	.1227	.2530
ANOVA test		20.7221***				
Pre-Changes & Transitional	101	.2823	.3914	.0257	.1664	.5132
Transitional & Post-Changes	98	.2286	.5208	.0195	.1167	.2577
$H_0$1: Returns of Pre-Changes and Transitional are significantly different from returns of Post-Changes						
t-value		-.6874				
$H_0$2: Returns of Post-Changes and Transitional are significantly different from returns of Pre-Changes						
t-value		1.0713				

Table 4.58 : Descriptive statistics and ANOVA test by different sub-periods during the regulatory changes

*(Note: Table provides the first day returns of IPOs by 3 periods. Pre-Changes is from 1 January 2000 to 24 March 2008, Transitional is from 25 March 2008 to 3 August 2009, and Post-Changes is from 4 August 2009 to 31 December 2020. Full sample period is from 1 January 2000 to 31 December 2020. The significance level of t-statistics as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level)*

4.11 Summary of hypotheses for price-earnings analysis and IPO underpricing during the regulatory changes

First, it aims to examine on how fundamental and sentiment factors drive variations in PE. Employing OLS and quantile regression models, the findings align with Shiller's (1990) fads theory, highlighting the relationship between PE and market sentiment. This section provides the summary of hypotheses that are developed to examine how fundamental and sentiment factors contribute to variations in PE within the Malaysian IPO market based on regression analysis. The hypothesis is either rejected or accepted on the basis of regression results. Those variables that shows significant relationship based on regression analysis are accepted (✓) the hypothesis. However, those variables that does not show any significance relationship based on regression analysis are rejected (×). Table 4.59 provides the summary of hypotheses of all the OLS regression models that were undertaken to examine the determinants of PE.

Dependent variable : PEDF	Model 1	Model 2	Model 3	Model 4	Model 5
PDND	✓	×			
GROW	×	×	×	×	×
INT	×	×	×	×	×
MVL	×	×	×	×	×
(PEDF)t-1	✓	✓	✓	✓	✓
ΔCCI		×			
ΔBCI		×			
TURN		×			
$MIMSI^{PCA}$			✓		
$MIMSI^{sPCA}$				✓	
$MIMSI^{PLS}$					✓

Table 4.59 : Summary of key determinants based on OLS regression model for price-earnings analysis

(Note: Table consist of five models: Model 1 consist of fundamental factors, Model 2 consist of Fundamental-ΔCCI-ΔBCI-TURN, Model 3 consists of Fundamental-$MIMSI^{PCA}$, Model 4 consists of Fundamental-$MIMSI^{sPCA}$, and Model 5 consists of Fundamental-$MIMSI^{PLS}$)

Second, it also aims to examine the significance of PE as a key factor in IPO underpricing during changes in Malaysia's capital market structure with different sub-periods. It examines how the changes in market structure affect the dynamic between the IPO underpricing and the underlying factors during the different sub-periods as the impacts could be different in each sub-period. Those variables that shows significant relationship based on regression analysis are accepted (✓) the hypothesis. However, those variables that does not show any significance relationship based on regression analysis are rejected (×). Table 4.60 provides the summary of hypotheses of the IPO underpricing during the regulatory changes with different sub-periods.

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Dependent variable :	Full sample					Pre-Changes					Post-Changes				
MAIR	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
PEDF	×	×	×	×	×	✓	×	✓	✓	×	×	×	×	×	×
CAPR	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
PRICE	×	×	×	×	×	✓	✓	✓	✓	✓	×	×	×	×	×
TIME	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
OVER	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MAJOR	×	×	×	×	×	×	✓	×	×	×	×	×	×	×	×
ROE	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
MVL	×	×	×	×	×	✓	×	✓	✓	✓	✓	×	✓	✓	✓
ΔCCI		×					×					×			
ΔBCI		×					✓					×			
TURN		×					✓					×			
$MIMSI^{PCA}$			×					✓					×		
$MIMSI^{sPCA}$				×					✓					×	
$MIMSI^{PLS}$					×					✓					×

Table 4.60 : Summary of key determinants based on OLS regression model for IPO underpricing during the regulatory changes with different sub-periods

(Note: Tables summarise of key determinants based on OLS regression models for IPO underpricing during the regulatory changes with different sub-periods from both fundamental and sentiment perspective. The above table consist of five models: Model 1 consist of fundamental factors, Model 2 consist of fundamental-ΔCCI-ΔBCI-TURN, Model 3 consists of fundamental-$MIMSI^{PCA}$, Model 4 consists of fundamental-$MIMSI^{sPCA}$, and Model 5 consists of fundamental-$MIMSI^{PLS}$)

4.12 Summary of key findings

This research comprehensively examines the market sentiment and Malaysian IPOs. The findings and conclusions are based upon analysis the firms listed on Bursa Malaysia via IPO from January 2000 to December 2020. This section analysed the results of research objectives and key findings of the results are also enlightened accordingly. It summarises the results of findings as explained in Chapter 4. These findings are also discussed in comparison to those of previous studies.

4.12.1 Research Objective 1 : To examine the short-run underpricing and long-run aftermarket share performance of Malaysian IPOs

Short-run share performance of IPOs

In line with the first research objective, this research examines the IPO's short-run share performance in Malaysia from January 2000 to December 2020. The result shows that the IR are 28.52%, whereas, the MAIR are 28.48% as stated in Table 4.10. Given that both the returns are statistically significant at 1% level, it evidenced that in Malaysian IPOs are underpriced in the short-run ranges from 28.48% to 28.52%. This implies that in Malaysia IPO investors could earn between 28.48% to 28.52% if they bought the IPO shares at the offer price and sell it at the market price on the first day of trading. This evidence is consistent with the empirical Malaysian studies. In a study conducted by Yong and Isa (2003) examining the short-run share performance of IPOs (also known as IPO underpricing), it was reported that the average IR from January 1990 to December 1998 was 94.91%. Another notable study by Dawson (1987) aims to measure IPO underpricing performance in Malaysia, focusing on the IR. The data collected from 1978 to 1984 revealed that IPOs in Malaysia experienced significant IPO underpricing, with an offering price compared to the closing price on the first day of trading at 166.70%. In comparison, Hong Kong had an underpricing rate of 13.80%, and Singapore had a rate of 39.40%.

Various research studies have been conducted in Malaysia to investigate the extent of IPO underpricing, among others, the study includes Loughran et al. (1994) document an average IPO underpricing of 80.30% for 132 IPOs listed from 1980 to 1991; and Yong (1991) records an average IPO underpricing of 75.00% for 224 IPOs listed from January 1990 to December

1994. Furthermore, How et al. (2007) demonstrate an average IPO underpricing of 102.00% for 322 companies listed on the Second Board of Bursa Malaysia from 1989 to 2000. In addition, Murugesu and Santhapparaj (2009) observe an average IPO underpricing of 37.00% for IPO firms listed between 1999 and 2004 in Malaysia IPO market. Therefore, based on the literature reviews of IPO underpricing in Malaysia, the majority of empirical evidence supports the existence of IPO underpricing phenomenon.

In order to get in-depth analysis, this research further categorised the IPO's short-run share performance in Malaysia according to industries, year listing and board listing distributions. The industries distribution shows that some of the industries are highly underpriced and some are marginally underpriced, whereas some are overpriced as stated in Table 4.11. For instance, the highest IPO underpricing (MAIR) was reported for energy (58.62%), where investors earned 58.62% returns on the first day of trading, followed by trading & services (36.65%), technology (33.50%), industrial products & services (23.82%), consumer products & services (23.44%), construction (23.10%), plantation (18.16%), and financial services (11.04%). However, the infrastructure industry generated MAIR of -1.59% indicating that on average investors lose out the money by investing in IPO that belongs to the infrastructure industry.

Similarly, the distribution of returns according to year listing show that in the past 20 years Malaysian IPOs are on average underpriced at 28.48% based on MAIR as illustrated in Table 4.12. This indicates that investors on average earned returns by investing in IPOs issued from January 2000 to December 2020. Nevertheless, from 2005 onwards it can be observed from the results that the IPO underpricing shows relatively declining trend such that IPO underpricing (MAIR) in 2005 (16.29%), 2009 (12.55%), 2017 (14.66%), and 2019 (15.90%), except for 2015 (30.51%), 2018 (36.68%), and 2020 (35.37%) record higher IPO underpricing.

Table 4.13 shows that the IPO underpricing with MAIR of 35.18% for ACE Market, and 24.67% for Main Market. In the Malaysian IPO market, companies have the choice to list their firms on either the ACE Market (young and growing company) or the Main Market (established listing company). According to Yong (2015), in general, IPOs listed on the Main Market are subjected to more rigorous listing criteria as compared to those listed on the ACE Market. It is believed that Main Market listed IPOs possess longer trading histories, lower risk profiles, and higher quality in terms of liquidity, profitability, and trading volumes. On the other hand, the ACE Market is designed for smaller IPOs, which may carry a higher level of risk when compared to their counterparts on the Main Market. As a result, IPO investors may perceive ACE Market listings less favourably in comparison to Main Market listed IPOs. Consequently, the risk premium associated with the latter is expected to be lower. Supporting this notion, Uddin and Raj (2001) reports that firms listed in the ACE market in Malaysia tend to exhibit higher IPO underpricing when compared to IPOs listed on the Main Market.

Overall, it is evident that in Malaysian IPOs are significantly underpriced in the short-run, warrants to explore that what are the key determinants that influence IPO's short-run share performance in Malaysia. Similarly, the degree of IPO underpricing in Malaysia varies across different industries indicating that there might be some different industry-specific factors that affect IPO's short-run share performance differently. Likewise, the large variations in the year's performance of IPOs permit that there might be different country-level characteristics that affect IPO share performance each year differently. In this connection, the subsequent section explains the key determinants of IPO's short-run share performance in Malaysia at behavioural, issue, firm, and market characteristics.

Long-run share performance of IPOs

This research examines the IPO's long-run share performance in Malaysia from January 2000 to December 2020. The result shows that 4-year equally-weighted (EW) for CAAR, BHAR, and WR are 188.10%, 21.52%, and 82.15%, respectively. On the other hand, the 4-year value-weighted (VW) for CAAR, BHAR, and WR are 5.75%, 1.25% and 0.18%, respectively. As such, the degree of underperformance based on VW scheme are less than the EW scheme, indicates that in Malaysia larger firms perform well than smaller firm in the long-run. Given that all the returns based on both EW and VW schemes are statistically significant at 1% level, the results has confirmed that in Malaysian IPOs are on average underperformed in the long-run. The results strongly validates the divergence of opinion hypothesis of IPO's aftermarket underperformance in Malaysia.

The findings of this research contrast with those of Ahmad-Zaluki et al. (2007), who observe overperformance in their study on Malaysian IPOs issued between 1990 and 2000. Ahmad-Zaluki et al. (2007) report significant overperformance using CAAR (EW) and BHAR (EW) measures adjusted against market benchmarks. However, the significance diminished when CAAR (VW) and BHAR (VW) measures and matched firm benchmarks were employed.

Ahmad-Zaluki et al. (2007) further test performance using the calendar-time methodology (Fama-French 3-factor model) and did not find any significant abnormal performance. This finding suggests that event-time studies may be associated with relatively more positive abnormal returns compared to calendar-time studies.

With respect to Table 4.25, Table 4.27 and Table 4.29, it is clear that long-run IPO studies are subject to methodological issues. For instance, in other studies conducted by Kooli and Suret (2004), significant underperformance was identified for Canadian IPOs when using a CAAR (VW) measure. However, the significance diminished when employing a BHAR (VW) measure. Further, when applying the calendar-time methodology, they found significant underperformance based on EW scheme.

Based on the above examples, it appears that there is no consistent pattern that explains the differences in conclusions depending on the applied methodology. However, most researchers concur that the choice of methodology, performance measures, and benchmarks can significantly impact the conclusions drawn. Therefore, it is crucial for the outlined methodology to provide detailed explanations for selecting a particular approach over others. The methodology should encompass both theoretical and practical justifications for the adopted performance measures, weighting schemes, and benchmarks.

4.12.2 Research Objective 2 : To identify the key fundamental and sentiment factors that contribute to the short-run and long-run share performance of Malaysian IPOs

<u>Short-run share performance of IPOs</u>

This research examines the key determinants of Malaysian IPO’s short-run share performance at behavioural, issue, firm, and market characteristics. Table 4.61 highlights the summary of key determinants for IPO’s short-run share performance in Malaysia based on OLS regression model. These variables are Malaysia IPO market sentiment (MIMSI), IPO period (IPOP), offer price (PRICE), offer size (OSIZE), issue cost ratio (ICOR), underwriter reputation (UREP), book value per share (BOOK), firm age (FAGE), market volatility (MVL), oversubscription ratio (OVER), hot issue market (HOT), and board listing (BLIST).

Independent variables	Expected sign	OLS regression model		
		PCA	sPCA	PLS
Behavioural Characteristics				
MIMSI	(+)	(+)	(-)	(-)
Issue Characteristics				
IPOP	(-)	(-)	(-)	(-)
PRICE	(-)	(-)***	(-)***	(-)***
OSIZE	(-)	(+)	(+)	(+)
ICOR	(+)	(-)	(-)	(-)
UREP	(+)	(-)	(-)	(-)
Firm Characteristics				
BOOK	(+)	(-)	(-)	(-)
FAGE	(-)	(+)	(+)	(+)
Market Characteristics				
MVL	(+)	(+)	(+)	(+)
OVER	(+)	(+)*	(+)*	(+)**
HOT	(+)	(+)***	(+)***	(+)***
BLIST	(-)	(-)*	(-)*	(-)*

Table 4.61 : Summary of key determinants based on OLS regression model for short-run share performance of IPOs with $MIMSI^{PCA\text{-}SR}$, $MIMSI^{sPCA\text{-}SR}$, and $MIMSI^{PLS\text{-}SR}$

*(Note: Table presents the result for IPO's short-run share performance of OLS regression model for model consist of behavioural-issue-firm-and-market characteristics (overall). t-statistic is given with significance level as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level)*

Table 4.61 summarises the key determinants based on OLS regression model for the short-run share performance of IPOs. The results show that Malaysian IPO market sentiment (MIMSI) is insignificantly related to IPO underpricing in all models. This indicates that sentiment-driven investor behaviour does not have a significant impact on the short-run performance of IPOs in the Malaysian market. This finding is consistent with empirical studies that suggest sentiment effects are more pronounced in markets with high retail investor participation and speculative trading, while they have limited impact on IPO underpricing in markets where institutional investors play a dominant role and regulatory oversight is more stringent (Pastor and Veronesi, 2005). Similarly, Chi and Padgett (2005) find that in certain emerging markets, fundamental valuation factors tend to take precedence over sentiment-driven prices, resulting in a negligible impact of investor sentiment on IPO underpricing.

Derrien and Kecskés (2007) further argue that rational institutional investors act as a stabilising force by correcting price inefficiencies arising from sentiment-driven retail demand, thereby reducing the long-run impact of market sentiment on IPO pricing. The insignificant relationship observed in this study suggests that the Malaysian IPO market is relatively less susceptible to short-term sentiment fluctuations and IPO prices are primarily influenced by firm and market characteristics. This finding supports the study by Ritter and Welch (2002), who claim that while sentiment can influence demand for IPOs in certain contexts, its explanatory power is often overshadowed by fundamental factors related to the firm and market conditions.

Furthermore, the results show that issue characteristics, namely the offer price (PRICE), plays an important role in all models which is consistent with the findings by Albada et al. (2025). The results also show that there is a negative relationship between the offer price (PRICE) and the extent of IPO underpricing. This is consistent with the finding of Benveniste and Busaba (1997) that the offer price plays an important role in influencing investor demand during the pre-IPO period under the fixed price mechanism. The level of the offer price can lead to (positive or negative) demand cascades, as the offer price is set without obtaining investor information. Furthermore, Ljungqvist et al. (2006) state that it seems plausible that the presence of sentiment investors could lead to higher offer prices and lower IPO underpricing as rational issuers take advantage of them.

The oversubscription ratio (OVER) is significantly positively related to IPO underpricing in all models. This result is consistent with previous research (Ljungqvist and Wilhelm, 2003; Yong, 2011), which suggest that higher oversubscription signals robust investor demand leading to larger initial price increases. Higher oversubscription reflects stronger investor interest and perceived growth prospects, leading to more aggressive bidding and higher first-day returns. In addition, the winner's curse hypothesis (Rock, 1986) suggests that informed investors primarily drive oversubscribed IPOs and drive up prices due to the limited availability of shares, as these investors are willing to pay a premium to secure allocations. Albada et al. (2025) provide evidence that investor demand, as measured by the oversubscription ratio, is a key determinant of IPO underpricing in Malaysia. Under the fixed-price regime, the lack of pre-market information on investor demand creates uncertainty in market demand.

Hot issue market (HOT) shows a significant positive effect on IPO underpricing. This supports the "windows of opportunity" hypothesis (Ritter, 1991), which states that firms strategically plan their issues in time of increased investor optimism, which leads to greater IPO underpricing. Helwege and Liang (2004) also argue that IPOs conducted during hot markets are often characterised by increased speculative trading and momentum-driven demand, both of which contribute to higher initial returns. In addition, Purnanandam and Swaminathan (2004) find that firms that go public during bull markets are often overvalued, leading to initial price increases triggered by investor enthusiasm.

In contrast, board listing (BLIST) is significantly negatively associated with IPO underpricing. This result is consistent with Chahine and Filatotchev (2008), who find that firms listed on more stringent regulatory boards exhibit less information asymmetry, reducing the need for excessive IPO underpricing. Goergen et. al., (2007) also suggest that firms that choose to list on a premium market are subject to stricter disclosure requirements and higher corporate governance standards, which increases investor confidence and leads to lower IPO discounts. These findings suggest that IPOs listed on more prestigious boards are perceived as less risky, which contributes to more efficient pricing and reduced IPO underpricing.

The binary regression models have an advantage of being more realistic than OLS regression model because of its dichotomous in nature. Moreover, binary regression models do not assume the data normality assumption of regressions. Based on binary regression model, the results of logit regression model is similar or close to the results of probit regression model. In the event of IPO underpricing, these are the key determinants that IPO investors would take into account when making investment decisions as shown in Table 4.62. Hot issue market (HOT) is too significant thus has been omitted to avoid biasness based on binary regression model.

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Independent variables	Expected sign	Logit regression model			Probit regression model		
		PCA	sPCA	PLS	PCA	sPCA	PLS
Behavioural Characteristics							
MIMSI	(+)	(-)	(+)	(-)	(-)	(+)	(-)
Issue Characteristics							
IPOP	(-)	(+)	(+)	(+)	(+)	(+)	(+)
PRICE	(-)	(-)**	(-)**	(-)**	(-)***	(-)**	(-)**
OSIZE	(-)	(+)*	(+)*	(+)*	(+)**	(+)*	(+)*
ICOR	(+)	(-)*	(-)*	(-)*	(-)*	(-)*	(-)*
UREP	(+)	(+)**	(+)**	(+)**	(+)**	(+)**	(+)**
Firm Characteristics							
BOOK	(+)	(+)**	(+)**	(+)**	(+)**	(+)**	(+)**
FAGE	(-)	(+)	(+)	(+)	(+)	(+)	(+)
Market Characteristics							
MVL	(+)	(+)*	(+)*	(+)	(+)*	(+)*	(+)
OVER	(+)	(+)***	(+)***	(+)***	(+)***	(+)***	(+)***
HOT	(+)	-	-	-	-	-	-
BLIST	(-)	(+)	(+)	(+)	(+)	(+)	(+)

Table 4.62 : Summary of key determinants based on binary regression model for short-run share performance of IPOs with $MIMSI^{PCA\text{-}SR}$, $MIMSI^{sPCA\text{-}SR}$, and $MIMSI^{PLS\text{-}SR}$

*(Note: Table presents the result for IPO's short-run share performance of binary regression model for model consist of behavioural-issue-firm-and-market characteristics (overall). t-statistic is given with significance level as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level)*

Table 4.63 summarised the marginal probability analysis for the short-run share performance of IPOs in the Malaysian market. Several key variables have emerged as significant determinants of IPO underpricing, including offer price (PRICE), offer size (OSIZE), issue cost ratio (ICOR), underwriter reputation (UREP), book value per share (BOOK), market volatility (MVL), and oversubscription ratio (OVER). These variables consistently show strong correlations with IPO underpricing, with the majority showing a positive relationship, suggesting that an increase in these factors correlates with higher initial returns. In particular, higher offer prices and larger offer sizes are associated with more efficient IPO pricing, leading to lower IPO underpricing, while higher market volatility and oversubscription ratio tend to increase IPO underpricing due to increased investor demand and speculative behaviour.

The effect of market sentiment (MIMSI) is found to be insignificant in all models, indicating that sentiment-driven investor behaviour does not significantly affect the undervaluation of IPOs in the Malaysian IPO market. In contrast, offer price (PRICE), offer size (OSIZE), issue cost ratio (ICOR), underwriter reputation (UREP), book value per share (BOOK), market volatility (MVL) and oversubscription ratio (OVER) all have a notable impact on IPO underpricing. Reputable underwriters attract greater investor interest, while higher issue costs reduce IPO underpricing by boosting investor confidence. Firms with higher book values and those operating in volatile market conditions experience higher IPO underpricing, while greater demand for IPO shares, reflected in oversubscription, leads to higher initial returns. Overall, the results underline the crucial role of firm and market characteristics in determining IPO pricing dynamics.

Independent variables	PCA	sPCA	PLS
Behavioural Characteristics			
MIMSI	Δ (-)	Δ (+)	Δ (-)
Issue Characteristics			
IPOP	Δ (+)	Δ (+)	Δ (+)
PRICE	Δ (-)***	Δ (-)***	Δ (-)***
OSIZE	Δ (+)**	Δ (+)**	Δ (+)**
ICOR	Δ (-)*	Δ (-)*	Δ (-)*
UREP	Δ (+)**	Δ (+)**	Δ (+)**
Firm Characteristics			
BOOK	Δ (+)**	Δ (+)**	Δ (+)*
FAGE	Δ (+)	Δ (+)	Δ (+)
Market Characteristics			
MVL	Δ (+)*	Δ (+)*	Δ (+)
OVER	Δ (+)***	Δ (+)***	Δ (+)***
HOT	-	-	-
BLIST	Δ (+)	Δ (+)	Δ (+)

Table 4.63 : Summary of marginal probability based on logit regression model for short-run share performance of IPOs

*(Note: Table presents the result for IPO's short-run share performance of marginal probability for model consist of behavioural-issue-firm-and-market characteristics (overall). t-statistic is given with significance level as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level)*

Conclusions

The results of this study indicate that in the influence of market sentiment in the Malaysian IPO market is insignificant. Rather, the offer price, oversubscription ratio, hot issue market and board listing play a more significant role in determining IPO underpricing. In light of these findings, policymakers should focus on creating an environment that promotes transparency, efficient information dissemination and fair valuation practises in the IPO market. This approach will help reduce information asymmetry and improve market efficiency, ultimately leading to more accurate IPO pricing and minimising the extent of IPO underpricing. As the study found significant relationships between the key factors of offer price, oversubscription ratio, hot issue market, and board listing, policy makers should monitor their impact on IPO pricing outcomes. Aligning policy with these specific factors can contribute to more informed investment decisions and better IPO pricing.

Long-run share performance of IPOs

This research examines the key determinants of Malaysian IPO's long-run share performance at behavioural, issue, firm, and market characteristics. Table 4.64 highlights the summary of key determinants for long-run IPO share performance in Malaysia based on OLS regression model. These variables are Malaysian IPO market sentiment (MIMSI), initial return (IR), offer size (OSIZE), underwriter reputation (UREP), firm age (FAGE), board size (BSIZE), major shareholder ownership (MAJOR), market volatility (MVL), oversubscription ratio (OVER), and board listing (BLIST). Hot issue market (HOT) is excluded from the result analysis because it has high correlation with initial return (IR) as shown in Table 4.32.

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Independent variables	Expected sign	OLS regression model		
		PCA	sPCA	PLS
Behavioural Characteristics				
MIMSI	(+)	(+)***	(-)***	(-)***
Issue Characteristics				
IR	(-)	(-)***	(-)***	(-)***
OSIZE	(-)	(-)***	(-)***	(-)***
UREP	(+)	(+)***	(+)***	(+)***
Firm Characteristics				
FAGE	(+)	(+)***	(+)***	(+)***
BSIZE	(+)	(-)*	(-)*	(-)**
MAJOR	(+)	(-)	(-)	(+)
Market Characteristics				
MVL	(-)	(-)***	(-)***	(-)***
OVER	(-)	(-)***	(-)***	(-)***
BLIST	(+)	(+)***	(+)***	(+)***

Table 4.64 : Summary of key determinants based on OLS regression model for long-run share performance of IPOs with $MIMSI^{PCA-LR}$, $MIMSI^{sPCA-LR}$, and $MIMSI^{PLS-LR}$

*(Note: Table presents the result for IPO's long-run share performance of OLS regression model for model consist of behavioural-issue-firm-and-market characteristics (overall). t-statistic is given with significance level as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level)*

Table 4.64 shows the summary of key determinants based on OLS regression model for long-run share performance of IPOs. The result concludes that the behavioural characteristics plays a significant role in all models, it shows that $MIMSI^{PCA-LR}$, $MIMSI^{sPCA-LR}$ and $MIMSI^{PLS-LR}$ are significantly relates to IPO's long-run share performance in Malaysian IPO. This is consistent with the studies by Bayley et al. (2006) and Chong et al. (2011) evidence that the behavioural tendency of trade in IPO market has proven to be significant in the long-run in the Malaysian IPO market. Followed by issue characteristics namely, initial return (IR), offer size (OSIZE), and underwriter reputation (UREP); firm characteristics namely, firm age (FAGE), and board size (BSIZE); market characteristics namely, market volatility (MVL), oversubscription ratio (OVER), and board listing (BLIST). Major shareholder ownership (MAJOR) has no significance on aftermarket underperformance. However, there is no consistent results to determine the key determinants that influence aftermarket share performance in Malaysia IPOs empirically.

Both $MIMSI^{sPCA\text{-}LR}$ and $MIMSI^{PLS\text{-}LR}$ have negative coefficients represents the negative relationship between market sentiment with long-run abnormal returns. This is consistent with findings by Lowry (2003) but inconsistent with the market sentiment hypothesis. $MIMSI^{sPCA\text{-}LR}$ and $MIMSI^{PLS\text{-}LR}$ have adjusted for target variable, therefore the effects of $MIMSI^{sPCA\text{-}LR}$ and $MIMSI^{PLS\text{-}LR}$ towards abnormal returns are consistent as compared to $MIMSI^{PCA\text{-}LR}$. In case of IPO market sentiment using PCA method ($MIMSI^{PCA\text{-}LR}$), the findings revealed a positive relationship between market sentiment and IPO's long-run share performance in Malaysia. This signifies that in Malaysia, IPOs issued at the time high market sentiment generates positive long-run returns. As such, the market sentiment in Malaysia is widely influenced by market factors. Thus, the positive relationship between market sentiment and IPO's long-run performance in Malaysia is the outcome of considerable economic stability and its optimistic impact on the investor's perception, vice versa. This is consistent with study done by Dimovski and Brooks (2004) and consistent with the market sentiment hypothesis.

Overall, the findings shows that IPO market sentiment (MIMSI) in all models has significantly relates to aftermarket share performance of IPOs. The results support Miller and Reilly (1987), who suggest that one plausible explanation for the aftermarket share underperformance of IPOs is the divergence of opinion hypothesis. This hypothesis posits that investors often exhibit excessive optimism regarding the future cash flows and growth potential of IPO. Such optimism leads investors to overvalue IPO shares relative to their intrinsic worth. As more information becomes available over time, these optimistic investors revise their valuations downward, aligning more closely with the intrinsic values of the shares. This process reduces the disparity between optimistic and pessimistic investors' valuations.

Based on binary regression model, the results of logit regression model is similar or close to the results of probit regression model. In the event of aftermarket underperformance, these are the key determinants that IPO investors would take into account when making investment decisions as shown in Table 4.65.

Independent variables	Expected sign	Logit regression model			Probit regression model		
		PCA	sPCA	PLS	PCA	sPCA	PLS
Behavioural Characteristics							
MIMSI	(+)	(+)***	(-)***	(-)***	(+)***	(-)***	(-)***
Issue Characteristics							
IR	(+)	(+)***	(+)***	(+)***	(+)***	(+)***	(+)***
OSIZE	(+)	(+)***	(+)***	(+)***	(+)***	(+)***	(+)***
UREP	(-)	(-)	(-)	(-)**	(-)	(-)	(-)*
Firm Characteristics							
FAGE	(+)	(+)***	(+)***	(+)***	(+)***	(+)***	(+)***
BSIZE	(-)	(-)*	(-)*	(-)*	(-)*	(-)*	(-)*
MAJOR	(-)	(-)***	(-)***	(-)	(-)***	(-)***	(-)
Market Characteristics							
MVL	(-)	(-)***	(-)***	(-)***	(-)***	(-)***	(-)***
OVER	(-)	(-)***	(-)***	(-)***	(-)***	(-)***	(-)***
BLIST	(+)	(-)*	(-)*	(-)	(-)*	(-)*	(-)

Table 4.65 : Summary of key determinants based on binary regression model for long-run share performance of IPOs with $MIMSI^{PCA\text{-}LR}$, $MIMSI^{sPCA\text{-}LR}$, and $MIMSI^{PLS\text{-}LR}$

*(Note: Table presents the result for IPO's long-run share performance of binary regression model for model consist of behavioural-issue-firm-and-market characteristics (overall). t-statistic is given with significance level as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level)*

Table 4.66 presents the results of the marginal probability analysis, which provides several important insights into the factors that influence the long-run share performance of IPOs. Market sentiment (MIMSI), together with initial returns (IR), offer size (OSIZE), firm age (FAGE), and board size (BSIZE) consistently show a significant impact on IPO's long-run share performance in Malaysia. In particular, higher initial returns and larger offer sizes are associated with stronger post-IPO share performance, while older firms perform better in the long run, likely due to their stability and established market presence.

In contrast, market volatility (MVL) shows a consistently negative and highly significant relationship with IPO's long-run share performance, highlighting its adverse impact. Newly listed firms, which are more susceptible to external factors due to their lack of a proven public market track record, are particularly vulnerable to heightened volatility. Increased market uncertainty undermines investor confidence, leading to weaker performance outcomes over time. These findings highlights the crucial role of stable market conditions in fostering investor trust and supporting long term value creation for newly listed firms.

The oversubscription ratio (OVER) also shows a negative and statistically significant relationship with IPO's long-run share performance. While oversubscription ratio is generally seen as a positive short term signal, its negative effect in the long term suggests that excessive investor demand may indicate overvaluation, leading to price corrections or unsustainable growth post-IPO. This highlights the importance of maintaining a balanced demand-supply equilibrium in IPO offerings to ensure sustained long term performance.

Other variables, such as underwriter reputation (UREP), major shareholder ownership (MAJOR), and board listing (BLIST), show inconsistent effects on the long-run share performance of IPOs. Although these variables exhibit marginally negative associations, their overall influence remains limited. In conclusion, the findings highlight the dominant role of market sentiment (MIMSI), initial returns, offer size, and firm age, while also highlighting the significant adverse effects of market volatility and oversubscription on long-run IPO outcomes.

Independent variables	PCA	sPCA	PLS
Behavioural Characteristics			
MIMSI	Δ (+)***	Δ (-)***	Δ (-)***
Issue Characteristics			
IR	Δ (+)***	Δ (+)***	Δ (+)***
OSIZE	Δ (+)***	Δ (+)***	Δ (+)***
UREP	Δ (-)	Δ (-)	Δ (-)*
Firm Characteristics			
FAGE	Δ (+)***	Δ (+)***	Δ (+)**
BSIZE	Δ (-)*	Δ (-)*	Δ (-)*
MAJOR	Δ (-)***	Δ (-)***	Δ (-)
Market Characteristics			
MVL	Δ (-)***	Δ (-)***	Δ (-)***
OVER	Δ (-)***	Δ (-)***	Δ (-)***
BLIST	Δ (-)*	Δ (-)*	Δ (-)

Table 4.66 : Summary of marginal probability based on logit regression model for long-run share performance of IPOs

*(Note: Table presents the result for IPO's long-run share performance of marginal probability for model consist of behavioural-issue-firm-and-market characteristics (overall). t-statistic is given with significance level as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level)*

Conclusions

This research examines the influence of market sentiment on Malaysian IPO aftermarket share performance from January 2000 to December 2020. It can be concluded that Malaysian IPO provides evidence of underperformance aftermarket share performance over 48 months after listing. Further, the results based on OLS regression model show that the IPO's aftermarket share performance is significantly to sentiment factor, thus, it supports the divergence of opinion / overreaction hypothesis, and impresarios / fad hypothesis. Besides, the results also significant to factors based on issue-related, firm-related and market-related characteristics. It shows that initial return, offer size, underwriter reputation, firm age, board size, market volatility, oversubscription ratio, and board listing are significantly affecting the share price performance 4 years after listing. In contrast, major shareholder ownership is found to be insignificant to aftermarket share performance. This is primarily because issuing firms must comply with the minimum public shareholding requirement of 25%, with the remaining shares typically held by the issuing firms' founders and their family members in Malaysian IPOs. Finally, the interaction between market sentiment and key determinants including initial returns (IR), offer size (OSIZE), underwriter reputation (UREP), firm age (FAGE), board size (BSIZE), market volatility (MVL), oversubscription ratio (OVER), and board listings (BLIST) significantly influences the long-run share performance of IPOs, highlighting the critical role of market sentiment in shaping BHAR. These findings emphasize the need for both regulators and investors to consider sentiment-driven factors when assessing IPO performance and making strategic decisions.

4.12.3 Research Objective 3 : To analyse the impact of regulatory changes in Malaysia's capital market structure on IPO share performance, particularly examining how price-earnings and market sentiment shape IPO pricing in the evolving regulatory landscapes

This section is divided into 2 parts in order to address this research objective: (i) to examine how fundamental and sentiment factors contribute to variations in PE within Malaysian IPO market; and (ii) to examine the key determinants in IPO underpricing during changes of Malaysia's capital market structure, specifically, examining the extent to which PE and market sentiment influence IPO outcomes.

Price-earnings and its determinants

OLS estimates the 'mean effect' of the independent variables on the dependent variable (i.e. PE). It assumes that the relationship between the dependent and independent variables is the same across the entire distribution of the dependent variable. In other words, it provides a single estimate for each coefficient, reflecting the average effect of the independent variables on the dependent variable (i.e. PE).

The results in Table 4.67 (Model 1) show that dividend premium (PDND), represents fundamental factor, plays a significant role in influencing PE without the interference of behavioural factors. On the other hand, the results in Table 4.67 (Model 2) show that the influential of both fundamental and sentiment factors based on single sentiment proxies such as changes in consumer confidence index (ΔCCI), changes in business confidence index (ΔBCI), and turnover ratio (TURN) on PE are insignificant. This indicates that fluctuations in these variables do not lead to any changes in PE. Lutfur and Shamsuddin (2019) similarly utilised single sentiment proxies such as ΔCCI, ΔBCI, and TURN as indicators of market sentiment. However, relying on single variable proxies may be insufficient to comprehensively capture market sentiment, because multiple factors contribute to variations in these single variable proxies.

In contrast, the recent empirical studies evidence that researchers have constructed the sentiment index by using aggregate market-based indicators that directly reflect the investors' behaviour. Following Baker and Wurgler (2006 and 2007) and Baker et al. (2012), this research employed market-based indicators for constructing MIMSI from 1 January 2000 to 31 December 2020 using PCA, sPCA and PLS methods as shown in Table 4.67 (Model 3, Model 4 and Model 5). In this research, the results from OLS regression model show that fundamental factors are insignificant and behavioural factors ($MIMSI^{PCA}$, $MIMSI^{sPCA}$ and $MIMSI^{PLS}$) based on aggregate market-based are significant to PE. The aggregate sentiment index evidence that there is significant influence between market sentiment and PE in Malaysian IPO market which means the IPO valuation (i.e. PE) is influenced by market conditions and market sentiment.

Dependent variable : PEDF	Model 1	Model 2	Model 3	Model 4	Model 5
PDND	(+)**	(+)			
GROW	(-)	(-)	(-)	(-)	(-)
INT	(+)	(+)	(+)	(+)	(+)
MVL	(-)	(-)	(-)	(-)	(-)
(PEDF)t-1	(+)***	(+)***	(+)***	(+)***	(+)***
ΔCCI		(+)			
ΔBCI		(-)			
TURN		(-)			
$MIMSI^{PCA}$			(+)**		
$MIMSI^{sPCA}$				(-)**	
$MIMSI^{PLS}$					(-)*

Table 4.67 : Summary of key determinants based on OLS regression model for the results on sentiment and fundamental factors of price-earnings

*(Note: Table consist of five models: Model 1 consist of fundamental factors, Model 2 consist of Fundamental-ΔCCI-ΔBCI-TURN, Model 3 consists of Fundamental-$MIMSI^{PCA}$, Model 4 consists of Fundamental-$MIMSI^{sPCA}$, and Model 5 consists of Fundamental-$MIMSI^{PLS}$. t-statistic is given with significance level as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level)*

Additionally, the quantile regression is employed to acts as the robustness check on PE regression model whether the existence of 'fads' phenomenon in valuing IPO. The fads theory, associated with Shiller (1990b), suggests that stock markets are influenced by waves of optimism and pessimism due to investor psychology and market fads. Further, quantile regression model estimates the 'effect of the independent variables at different points of the distribution' of the dependent variable (i.e., PE differential (PEDF)). This is able to show how the effect of each variable changes at different quantiles (i.e., high PEDF). Quantile regression model is less sensitive to outliers than OLS regression model because it provides a more complete view of the relationship by focusing on different parts of the distribution. Table 4.68 shows the summary of key determinants based on quantile regression model of PE analysis.

Dependent variable : PEDF									
Quantiles	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
Model 1 (Fundamental)									
PDND	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
GROW	(+)	(+)	(+)	(-)	(-)	(+)	(+)	(+)	(+)
INT	(-)	(-)	(+)	(-)	(-)	(-)	(-)	(-)	(-)
MVL	(-)	(-)	(-)	(-)	(-)	(-)**	(-)***	(-)**	(-)**
Model 2 (Fundamental-ΔCCI-ΔBCI-TURN)									
PDND	(+)	(+)	(+)	(+)*	(+)	(+)	(+)	(+)	(+)
GROW	(+)	(+)	(+)	(-)	(+)	(-)	(-)	(-)	(-)
INT	(+)	(-)	(-)	(-)	(-)	(-)	(-)	(+)	(+)
MVL	(-)	(-)	(-)	(+)	(+)	(-)	(-)	(+)	(-)
(PEDF)t-1	(+)***	(+)***	(+)***	(+)**	(+)***	(+)***	(+)***	(+)***	(+)*
ΔCCI	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(-)
ΔBCI	(-)*	(-)*	(-)	(-)*	(-)	(-)	(-)	(-)*	(-)*
TURN	(-)	(-)	(-)	(-)*	(-)	(-)	(-)**	(-)**	(-)***
Model 3 (Fundamental-MIMSI^{PCA})									
PDND	(+)	(+)	(+)	(-)	(-)	(-)	(-)	(-)	(-)
GROW	(+)	(+)	(+)	(-)	(-)	(-)	(+)	(-)	(-)
INT	(-)	(-)	(+)	(-)	(-)	(-)	(-)	(-)	(-)
MVL	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)**
(PEDF)t-1	(+)**	(-)***	(+)***	(+)***	(+)***	(+)***	(+)***	(+)	(+)
MIMSI^{PCA}	(-)	(+)	(+)	(+)	(+)*	(+)*	(+)*	(+)*	(+)**
Model 4 (Fundamental-MIMSI^{sPCA})									
PDND	(+)	(+)	(+)	(-)	(-)	(-)*	(-)	(-)	(-)
GROW	(+)	(+)	(+)	(-)	(-)	(-)	(+)	(-)	(+)
INT	(-)*	(-)	(+)	(-)	(-)	(-)	(-)	(-)	(-)
MVL	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)**
(PEDF)t-1	(+)***	(+)***	(+)***	(+)***	(+)***	(+)***	(+)***	(+)*	(+)**
MIMSI^{sPCA}	(+)	(+)	(-)	(-)*	(-)*	(-)*	(-)*	(-)*	(-)**
Model 5 (Fundamental-MIMSI^{PLS})									
PDND	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
GROW	(+)	(+)	(-)	(-)	(+)	(+)	(+)	(+)	(+)
INT	(+)	(+)	(-)	(-)	(-)	(-)	(-)	(+)	(+)
MVL	(-)	(-)	(-)	(-)	(-)	(-)	(-)**	(-)*	(-)**
(PEDF)t-1	(+)***	(+)***	(+)***	(+)***	(+)***	(+)***	(+)***	(+)**	(-)*
MIMSI^{PLS}	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)**	(-)**

Table 4.68 : Summary of key determinants based on quantile regression model of price-earnings

*(Note: Table presents the key determinants of PEDF across quantiles using different model specifications. Significant coefficients are marked with *, **, and *** at different confidence levels highlighting variations in the effects of fundamental and sentiment factors across the distribution of PEDF)*

In the explanatory and analysing the results of quantile regression model, the results will discuss the impact of independent variables at 0.8 and 0.9 of upper quantiles. This is because it provides consistent results at upper quantiles of 0.8 and 0.9 in which the results show that behavioural factors are significant in all models at upper quantiles.

Table 4.68 (Model 1) shows that at the upper quantiles (0.8 and 0.9), as market volatility (MVL) increases the PE differential (PEDF) decreases, this shows that increased market uncertainty has a negative effect on PE analysis. The findings show that market volatility (MVL) has a stronger impact when the PE differential (PEDF) is larger. This means that when market volatility goes up, firms with inflated PE ratios (overvalued firms - usually are technology-based firms) tend to see higher decreases in IPO valuation. High market volatility usually means uncertainty in the market, which makes investors reconsider and lower the value of these overvalued firms. It highlights how important market volatility in influencing IPO valuation, and it suggests that market volatility should be taken into consideration to predict IPO pricing, especially during unstable market periods. Based on the findings, regulators should consider implementing policies that account for the heightened impact of market volatility on overvalued firms to enhance IPO pricing frameworks. Investors should pay attention to market volatility, as it disproportionately affects firms with inflated PE, leading to significant valuation adjustments.

Table 4.68 (Model 2) shows that at the upper quantiles (0.8 and 0.9), the negative coefficient for changes in the business confidence index (ΔBCI) indicates that a drop in business confidence is linked to a reduction in PEDF for firms with large PE deviations from their industry. This suggests that falling business confidence leads investors to lower the IPO valuation of these firms, reducing the PE deviations. Firms with high PE are more sensitive to changes in market sentiment and may react more sharply. Additionally, the negative coefficient for turnover ratio (TURN) at upper quantiles shows that higher trading volume to market capitalisation are associated with a decrease in PEDF. Increased liquidity improves information efficiency, when shares are traded actively, new information is more quickly incorporated into share prices, causing prices to adjust faster, reducing overvaluation. Another possible reason is 'speculative trading', where investors buy and sell shares based on short-term price changes in stock market rather than the firm's real value. When shares are traded substantially, this speculative activity can fade, leading to price adjustments. This is important for firms with high PE because they are more likely to be overvalued due to speculation. The findings suggest that regulators should stabilise business confidence and reducing speculative trading to keep IPO valuations fair, particularly for firms with high PE. Investors and firms should pay attention to changes in business confidence and trading activity, as these can strongly affect IPO prices and how quickly overvalued shares adjust.

Table 4.68 (Model 3, Model 4 and Model 5) show that the significant impact at the upper quantiles (0.8 and 0.9) suggests that firms with higher PE are more sensitive to market sentiment. Model 3 shows that a positive coefficient for sentiment ($MIMSI^{PCA}$) has a strong positive impact on firms with higher PEDF. However, Model 4 and Model 5 show that when market sentiment (measured by $MIMSI^{sPCA}$ and $MIMSI^{PLS}$) declines, these firms encounter larger price adjustments, reducing the gap between firms' and industries' PE. Notably, the negative impact of $MIMSI^{PLS}$ is stronger compared to $MIMSI^{sPCA}$ at upper quantiles. This means that when market sentiment (as measured by PLS method) declines, the reduction in PEDF is more substantial. This indicates that firms planning IPOs should be cautious during periods of declining sentiment, as their valuations may face stronger downward adjustments. For investors, these findings emphasize the importance of sentiment analysis, especially when dealing with firms that have large PE deviations, to better predict price movements in varying sentiment environments.

Additionally, in Table 4.68 (Model 3, Model 4 and Model 5) show that market volatility (MVL) has large negative effects, especially in Model 5 at 0.8 and 0.9 quantiles. This means that when market volatility goes up, firms with inflated PE ratios (overvalued firms) tend to see higher decreases in IPO valuation. High market volatility usually means uncertainty in the market, which makes investors reconsider and lower the value of these overvalued firms. This impact is particularly strong at 0.9 quantile, where the firms are the most overvalued. Based on the findings, regulators should explore strategies to reduce the impact of market volatility, such as promoting market stability and ensuring greater transparency, to safeguard valuations and maintain investor confidence. For investors, the findings underscore the importance of monitoring market volatility, as it can result in significant valuation corrections for overvalued firms. Firms planning IPOs should strategically avoid high-volatility periods to minimise the risk of steep declines in valuation.

Overall, this research concludes that the role of sentiment factors is paramount in IPO valuation. Additionally, market sentiment exhibits incremental explanatory power, underscoring its significance. Sentiment factors are particularly useful in explaining deviations of PE from its fundamental value, suggesting that sentiment factors can provide a more complete picture of IPO valuation.

<u>IPO underpricing and price-earnings during the regulatory changes</u>

Table 4.69 shows the summary of key determinants based on OLS regression model for IPO underpricing during the regulatory changes with different sub-periods using OLS regression model. The results are divided into 3 independent groups namely, full sample is from 1 January 2000 to 31 December 2020; Pre-Changes is from 1 January 2000 to 24 March 2008; and Post-Changes is from 4 August 2009 to 31 December 2020.

The findings reveal that PE remains a significant factor in determining IPO underpricing during the Pre-Changes period (Models 1, 3, and 4). However, in the Post-Changes period, PE becomes insignificant in influencing IPO underpricing. This suggests that, the changes in Malaysia's capital market structure have not placed adequate emphasis on PE, this could be due to the fact that revision of regulations in relation to PE was taken place since January 1996.

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Dependent variable : MAIR	Full sample					Pre-Changes					Post-Changes				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
PEDF	(+)	(+)	(+)	(+)	(+)	(+)**	(-)	(+)*	(+)*	(+)	(+)	(+)	(+)	(+)	(+)
CAPR	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)
PRICE	(-)	(+)	(-)	(-)	(-)	(-)***	(-)***	(-)**	(-)**	(-)***	(-)	(-)	(-)	(-)	(-)
TIME	(+)	(-)	(+)	(+)	(-)	(+)	(-)	(-)	(-)	(-)	(+)	(+)	(+)	(+)	(+)
OVER	(+)***	(+)***	(+)***	(+)***	(+)***	(+)***	(+)***	(+)***	(+)***	(+)***	(+)***	(+)**	(+)**	(+)**	(+)**
MAJOR	(+)	(+)	(+)	(+)	(+)	(+)	(+)*	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)
ROE	(-)	(-)	(-)	(-)	(-)	(+)	(+)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)
MVL	(+)	(-)	(-)	(-)	(-)	(+)**	(+)	(+)*	(+)*	(+)*	(-)**	(-)	(-)**	(-)**	(-)**
ΔCCI		(-)					(-)					(-)			
ΔBCI		(-)					(+)**					(+)			
TURN		(-)					(+)*					(-)			
$MIMSI^{PCA}$			(-)					(-)**					(-)		
$MIMSI^{sPCA}$				(+)					(+)**					(+)	
$MIMSI^{PLS}$					(+)					(+)**					(+)

Table 4.69 : Summary of key determinants based on OLS regression model for IPO underpricing during the regulatory changes with different sub-periods

*(Note: Table summarises the results of IPO underpricing during the regulatory changes with different sub-periods from both fundamental and sentiment perspectives based on OLS regression model. The above table consist of five models: Model 1 consist of fundamental factors, Model 2 consist of fundamental-ΔCCI-ΔBCI-TURN, Model 3 consists of fundamental-$MIMSI^{PCA}$, Model 4 consists of fundamental-$MIMSI^{sPCA}$, and Model 5 consists of fundamental-$MIMSI^{PLS}$. t-statistic is given with significance level as follows: *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level)*

In contrast, oversubscription ratio (OVER) emerges as a consistent key determinant which is positively and significantly correlates with MAIR at both Pre-Changes and Post-Changes periods, suggesting that demand of investors significantly influence IPO share performance across market conditions. This positive relationship indicates that higher levels of oversubscription lead to greater initial returns, as IPOs that attract excess demand often experience price increases upon listing. The oversubscription ratio (OVER) acts as a proxy for investor enthusiasm, where high demand suggests strong market confidence or speculative interest in the issuance of new shares through IPOs. This effect aligns with the IPO underpricing phenomenon frequently observed in IPO markets, where issuers and underwriters set the offer price lower to ensure a successful subscription, subsequently leading to high initial returns as prices adjust upward in the secondary market (after listing). Despite evolving market conditions, the oversubscription ratio (OVER) continues to be a key driver of IPO performance, underscoring the strong influence of investor demand on initial returns. Investors consistently prioritise high-demand IPOs, anticipating short-term gains regardless of the level of market transparency.

Besides, Market volatility (MVL) significantly influences IPO underpricing, with its effects varying between the Pre-Changes and Post-Changes periods. In the Pre-Changes period, market volatility is positively related to IPO underpricing. Higher volatility increases uncertainty, leading issuers to set lower offer prices to attract investors, resulting in higher IPO underpricing. Further, speculative behaviour is more prominent in less transparent markets, further encourages initial returns. In contrast, in the Post-Changes period, market volatility is negatively associated with IPO underpricing. Regulatory reforms, including enhanced IPO disclosures and increased transparency, could have reduced information asymmetry, enabling investors to make informed decisions. In this more transparent environment, high volatility deters risk-averse investors, lowering demand for IPOs and reducing IPO underpricing. This shift reflects a transition toward a more efficient and rational market structure.

At Pre-Changes period: Investor optimism, as captured by the aggregate market-based sentiment ($MIMSI^{PCA}$, $MIMSI^{sPCA}$, $MIMSI^{PLS}$) in the Pre-Changes period, where it positively influences MAIR, while this impact becomes less pronounced in the Post-Changes period. During the Pre-Changes period, IPO market sentiment ($MIMSI^{PCA}$, $MIMSI^{sPCA}$, $MIMSI^{PLS}$) are statistically significant at 5% level, indicate that market sentiment plays a substantial role in driving up MAIR. On the other hand, based on the single proxies of market sentiment only

2 sentiment proxies: changes in business confidence index (ΔBCI), and turnover ratio (TURN) are statistically significant at 5% and 10% level. Such phenomenon promoting positive market sentiment and access to underpriced IPO shares. However, it also introduces risks of overvaluation due to irrational exuberance.

At Post-Changes period: Market sentiment remains positive but statistically insignificant, indicating a diminished influence of market sentiment on MAIR after regulatory changes in the Malaysia IPO market. This shift may attributed to the reduction in information asymmetry over time. Specifically, regulatory enhancements, such as improved disclosure requirements, stricter listing requirements, and increased transparency in the IPO process, have contributed to narrowing the gap between what issuers and investors know. As a result, investors have greater access to accurate and timely information, reducing reliance on speculative behaviour and market sentiment as key drivers of IPO performance. These changes likely curtailed speculative activities, aligning IPO underpricing more closely with fundamental factors and attracting informed investors who base decisions on intrinsic value rather than market speculation. Consequently, the diminished impact of market sentiment in the Post-Changes period underscores a transition toward a more rational and efficient market environment. IPO underpricing is increasingly influenced by fundamental factors such as the oversubscription ratio (OVER) reflecting investor enthusiasm for IPOs with high demand, and market volatility (MVL) negatively influenced with IPO underpricing could reduce information asymmetry. This trend suggests that even in a more transparent market, investor optimism can drive short-term gains, highlighting the continued importance of demand dynamics in IPO performance with better market efficiency.

In conclusion**,** the findings highlight the significant role of market sentiment in shaping MAIR, particularly within the context of changes in Malaysia's capital market. During the Pre-Changes period, sentiment-driven investors played a pivotal role in mitigating the winner's curse by enhancing the demand for IPO shares, thereby allowing rational investors to benefit from IPO underpricing. However, the Post-Changes period reflects a transition toward a market where the influence of market sentiment diminishes, resulting in a more fundamentally driven pricing mechanism. This suggests that more information available in the market before any investment decision leading to reduction in information asymmetry over time. As a result, the market has evolved toward a more efficient structure where IPO pricing is less influenced by speculative sentiment and more aligned with fundamental valuation metrics.

4.13 Summary

This research constructs and employs a composite market sentiment index, and a full range of issue, firm, and market characteristics variables to study IPO market in Malaysia. This research evidence that overall the Malaysian IPOs underpriced by -28.48% based on MAIR. Besides, this research finds that generally Malaysian IPO is underperformed by -1.67% based on BHAR (VW) after listing from ‘month 1 to 48’. The findings evidence that sentiment factor plays a significant role in both short-run and long-run IPO share performance. This research acknowledges the limitations of neoclassical finance theories in explaining the behaviour of investors in Malaysian IPO markets. By incorporating behavioural finance theories, this research recognises that fundamental factors might not be the sole driver of investor decisions. This shift in focus towards market sentiment and psychology adds a fresh perspective to understanding IPO market in Malaysia stock market.

Additionally, sentiment factors are particularly valuable in accounting for discrepancies between the PE and its fundamental value. This suggests that these factors can effectively enhance the fundamental model of IPO valuation. The results suggest that the aggregate market-based sentiment indices constructed using PCA, sPCA and PLS methods provide consistent evidence of a relationship between market sentiment and PE in the Malaysian IPO market across all models in this research as opposed to single-variable sentiment proxies evidence inconclusive results.

While market sentiment does not significantly influence short-run IPO performance, its effects are more pronounced in the long-run IPO performance and also for high-PE IPOs during volatile periods. This contrast highlights the conditional and time-varying role of market sentiment in emerging markets. Understanding when market sentiment matters provides important behavioural insights and supports more targeted policy responses.

CHAPTER 5 : CONCLUSION AND FUTURE STUDY

5.1 Introduction

This chapter highlights the implications of this study for investors, financial analysts, and policymakers. It addresses the limitations encountered, suggests avenues for future research, and provides practical recommendations to improve IPO pricing and valuation, transparency, and market efficiency. By bridging these critical gaps, this chapter establishes a framework for enhancing both academic understanding and practical insights into the Malaysian IPO market.

5.2 Synthesis of key insights

This study sets out to examine how market sentiment influences IPO performance in Malaysia through 3 interrelated research objectives. In measuring IPO performance, the study applied both short-run and long-run return measures commonly used in IPO performance research. For the short-run, MAIR was adopted to isolate IPO-specific price reactions by adjusting market movements on the listing day. For the long-run, the study employed a triangulated approach involving CAAR, BHAR, and WR. Among these, BHAR was prioritised due to its suitability in IPO event studies and alignment with investor holding behaviour over time.

This study contributes to the behavioural finance literature by offering empirical evidence on the extent and variability of investor sentiment effects in the Malaysian IPO market. Using a novel multi-dimensional MIMSI constructed using PCA, sPCA, and PLS methods, the study identifies key sentiment factors that significantly influence IPO outcomes, particularly from the short-run, long-run and regulatory changes perspectives. The results demonstrate that market sentiment plays a more persistent and pronounced role over longer holding periods, aligning with theories of sentiment-driven mispricing and delayed correction.

Moreover, this study moves beyond broad claims of sentiment impact by highlighting the conditions under which market sentiment matters most. Sentiment effects are particularly salient in IPOs with high initial valuations (i.e., high PE), in periods of elevated market volatility, and during bullish sentiment cycles - consistent with behavioural bias amplification in uncertain environments. Conversely, the study finds limited role of market sentiment influence on IPO's short-run share performance, suggesting that Malaysian IPO pricing at issuance is less prone to speculative deviations. This nuanced finding challenges the assumption of uniformly strong market sentiment effects and underscores the importance of market setting and temporal horizon in behavioural finance research.

The comparison of pre- and post-2009 periods reveals a clear shift in IPO pricing behaviour. Before 2009, IPO underpricing was significantly driven by both sentiment and fundamental factors indicating sentiment-driven pricing in a less transparent environment. After 2009, under the disclosure-based regime, market sentiment influence disappears, and only oversubscription ratio and market volatility remain significant. This suggests that IPO pricing became more anchored in investor demand and market liquidity, with less reliance on issue's characteristic factors and market sentiment, reflecting improved transparency and reduced information asymmetry.

In summary, this study fulfils its research objectives by integrating a multi-dimensional market sentiment approach, behavioural finance perspectives, and regulatory changes to provide a comprehensive explanation of IPO outcomes in Malaysia. It demonstrates that market sentiment is not uniformly influential, but varies across short-run and long-run phases as well as different regulatory regimes offering nuanced contributions to both academic theory and practical policy discourse.

Importantly, this study reveals that while market sentiment plays a limited role in the short-run, it has a more pronounced and lasting impact in the long-run particularly under conditions of market volatility and high-valuation IPOs. This nuanced finding highlights that investor psychology may take time to manifest in pricing distortions. Equally, the diminishing influence of market sentiment in the post-regulatory reform era suggests a structural shift in Malaysia's IPO market toward fundamental-based valuation. This evolution not only aligns Malaysia with developed markets but also contributes novel empirical evidence from an emerging economy, enhancing the understanding of how institutional reforms can temper behavioural biases in capital markets.

5.3 Policy implications and recommendations

The outcomes of this study have several implications to key stakeholders such as investors, financial analysts, and policymakers.

Short-run and long-run share performance of IPOs

In case of investors, this research reveals that IPO investors can earn on average positive returns in the short-run, if the IPO shares are bought at the IPO offer price and sell it on the first-trading day. Likewise, investors should also need to be more careful by holding the shares for a longer time. For example, based on equally-weighted portfolio of buy-and-hold abnormal returns, the negative returns with decreasing trend has improved with lower negative returns in the 2nd month after the first day of listing. After the 2nd month of listing, the IPO's aftermarket share performance improved. Investors will loss-out the money by selling the shares too early after listing. Most importantly, the results reveals that besides the issue, firm and market characteristics, this research also examines the significant level of behavioural characteristics for investors while formulating their short-run and long-run investment strategies. Here, investors should monitor market sentiment indicators such as MIMSI which play significant role in the Malaysian IPO market.

For financial analysts, the findings on IPO underpricing in the short-run and underperformance in the long-run provide valuable inputs for refining valuation models and improving forecasting accuracy. By understanding how returns change over time and identifying the key determinants that affect IPO pricing, financial analysts can build better valuation models to estimate IPO valuation. The results also show how market sentiment and other factors influence IPO performance, helping financial analysts predict how shares will perform after listing and give more reliable advice to potential investors.

Furthermore, the findings of this research have significant implications for policymakers. The results indicate that IPOs in Malaysia experience notable IPO underpricing and aftermarket underperformance, mainly driven by information disparities between informed and uninformed investors. In light of these insights, policymakers should focus on fostering an environment that emphasizes transparency, facilitates efficient information dissemination, and ensures fair valuation practices within the IPO market. Key initiatives include the development of reliable, real-time sentiment indicators specifically tailored to the Malaysian IPO market for better insights into investor behaviour; promoting investor education critical in helping retail investors better understand the risks associated with speculative investing to reduce cognitive biases like overconfidence and herd behaviour; and enhancing IPO disclosure standards to increase market confidence in IPO valuations, this includes detailed explanations of how the IPO offer price is derived along with the underlying assumptions. Additionally, implementing subscription limits can curb speculative bidding and minimising the risks associated with IPOs driven by oversubscription ratio. These efforts will foster a more informed, rational investment environment, improve aftermarket share performance, and enhance market liquidity.

IPO underpricing and price-earnings during the regulatory changes

For investors' perspective, the findings of this study suggest that investors should focus more on fundamental factors such as the oversubscription ratio and market volatility, when assessing IPO investments, particularly in the Post-Changes period. In this period, market sentiment's influence on IPO performance is statistically insignificant, making sentiment-based decisions less reliable. In contrast, during the Pre-Changes period, market sentiment had a stronger impact on IPO performance, therefore investors should be cautious of the risks caused by overly optimistic expectations, which can result in IPO shares being overpriced. Investors seeking short-term gains should recognise that, following regulatory changes, market sentiment plays a lesser role, and IPO pricing is more closely aligned with fundamental factors.

This study offers valuable insights for financial analysts seeking to refine their forecasting models. Financial analysts should prioritise fundamental factors such as oversubscription ratio, when predicting IPO underpricing and aftermarket performance, particularly in the Post-Changes period where the influence of market sentiment has diminished. In the Pre-Changes period, sentiment proxies such as business confidence index and turnover ratio were significant and remain useful for short-term market predictions. By accounting for the reduced role of market sentiment in the Post-Changes period, financial analysts can provide more accurate recommendations, advising clients on IPO investments based on stable and fundamental factors.

From a policymaking perspective, the findings highlight that, while regulatory changes have led to a reduced impact of market sentiment, there is still room for improvement. Policymakers should consider further strengthening regulations that encourage the integration of fundamental factors, such as price-earnings ratios into IPO pricing models, as these factors remain underemphasized since January 1996 after the revision of regulations in relation to PE was taken place. Moreover, continuing efforts to stabilise the market by reducing speculative behaviours and promoting informed investment decisions could enhance the overall market efficiency and fairness of the IPO market. Policymakers should monitor market sentiment such as the business confidence index and turnover ratios to mitigate risks of irrational exuberance and promote a balanced, sustainable market. In addition to the key initiatives outlined above, policymakers can implement periodic market assessments. These evaluations would help policymakers regularly study market trends, ensuring that rules stay effective in reducing irrational behaviour and adjusting to evolving market conditions.

Further, the findings show that the shift from a positive relationship (Pre-Changes) to a negative one (Post-Changes) between market volatility and IPO underpricing. While it initially acted as a catalyst for higher IPO underpricing in less transparent markets (Pre-Changes), the post-reform environment has transformed its role, making market volatility a factor that tempers IPO demand and reduces IPO underpricing. It underscores the success of regulatory reforms in enhancing market efficiency. By reducing information asymmetry and increasing investor confidence, these reforms have minimised speculative sentiment's influence, aligning IPO pricing with fundamental factors. Regulators can use these insights to further strengthen market stability and transparency, ensuring market volatility does not disproportionately impact investor confidence or IPO performance. Issuers may need to consider the impact of volatility on investor sentiment when pricing IPOs. In highly volatile markets, issuers could face reduced demand, leading to challenges in achieving successful subscriptions.

5.4 Limitations of the study

Despite the substantial contributions of this research, various limitations to the extent need to be acknowledged that may corroborate the prospects for forthcoming research. The foremost limitation of this research is data limitation. First, this research excludes the firms from Real Estates Investment Trusts (REITs) sector, and firms listed on the Leading Entrepreneur Accelerator Platform (LEAP) market of Bursa Malaysia for analysis because of their distinctive and non-comparable nature as compared to the entire sample firms in this research. Second, this research has excluded firms for which has incomplete data. Also, firms which are delisted by Bursa Malaysia are excluded from the analysis. The foremost limitation of this research is data limitation. This research considered all the firms listed on Bursa Malaysia from January 2000 to December 2020 and also which are in operation during the entire period of research. However, this research excluded the firms for which complete data is unavailable. The firms which are in process of merger and acquisitions and those delisted by Bursa Malaysia are also excluded from the analysis. Likewise, due to the limited number of firms in each industry, it was impossible to conduct the across sectors / industries analysis. Therefore, this research mainly focused on the analysis based on the overall sample. Lastly, in this research the long-run share performance of IPO firms were assessed using a single market benchmark, namely FTSE Bursa Malaysia Emas Index. However, it is worth noting that certain previous studies evaluate IPO's long-run share performance have employed multiple benchmarks instead of relying on a single market benchmark. Due to the unavailability of data for Main Board, Second Board and MESDAQ at Pre-Changes period; Main Market and ACE Market indices at Post-Changes period, this research has adopted single market benchmark, namely FTSE Bursa Malaysia Emas Index. FTSE Bursa Malaysia Emas Index comprises of (i) FTSE Bursa Malaysia Top 100 Index, and (ii) FTSE Bursa Malaysia Small Cap Index. Nevertheless, Ahmad-Zaluki (2007) evidence that the IPO's long-run share performance does not significantly differ across industrial sectors, and there is also no significant difference between the performance of IPOs listed on the Main Board and the Second Board of Bursa Malaysia.

Further, the PE ratio offers several advantages, including its simplicity of calculation, reliance on actual data, and applicability to all profit-making companies. However, despite these benefits, valuations based on the PE ratio are subject to a probability of error. Taking net profits as one of the basic indicators in calculating PE ratio may lead to several problems. When the net profits do not reflect the actual profits as a result of the effects of different accounting practices and inflation, the derived value can be misleading are among the disadvantages of the PE ratio. In this study, the PE differential is computed using the simple PE ratio of each IPO firms on the listing day and compared it against the PE ratio of the respective industry sector that IPO firm operates. One of the limitation is that the composition of the IPO sample and the industry sector may not perfectly match, leading to biases in the comparison.

Besides, another limitation is that the results for Transitional period is unable to generate due to the lack of total number of observations. Therefore, the different sub-periods are divided into Pre-Changes period and Post-Changes period, therefore there is no results cover the Transitional period.

Additionally, Kim and Ritter (1999) argue that PE ratios based on forecasted earnings provide more accurate valuations than those using trailing earnings, which reflect past results. However, forward PE ratios rely on estimates and are prone to forecasting errors. Before February 2008, Malaysian IPOs had to disclose forecasted earnings, but the requirement became voluntary due to uncertainties in assumptions (Securities Commission, 2020). Since then, few firms disclose forecasts, often viewed as inaccurate, leading to IPO undervaluation. This study excludes forward PE analysis due to limited data availability.

Due to distinctive nature of Malaysia, the results of this research may not be generalised to other countries, in particular to developing and developed markets. This research is conducted to examine the IPO market share performance in Malaysia, a developing market. Malaysia is classified as a developing market because of low gross domestic products, low IPO activities, the stock market infrastructure is still immature, and a high number of delisted firms. Whether this prediction of IPO investor sentiment can be applied to developed markets, other emerging markets and developing markets remain an unanswered question.

5.5 Future study

This research involves the examinations of IPO share performance which includes the determinants of IPO underpricing and aftermarket share performance from a combination of fundamental and sentiment factors in the context of the changes in regulatory resultant from changes in Malaysia's capital market structure, are fruitful areas in this research.

Nonetheless, the study presents some limitations. The analysis primarily focused on examining the relationship between IPO underpricing and a composite measure of Malaysian IPO market sentiment using various proxies. In the future study, it would be interesting to explore the impact of retail investors' sentiment and institutional investors' sentiment separately on IPO underpricing. This would help determine if the previously observed significant relationship between Malaysian IPO market sentiment and IPO underpricing holds true for specific investor groups.

Besides, it suggests for future study a further extension of the long-run share performance of IPOs might be to consider a longer period after going public (i.e. beyond 4 years' periods in Malaysia). The research finds that the IPO's aftermarket performance is sensitive to the applied methodology specifically the long-run returns measurement. Therefore, the future researchers may assess the IPO's long-run share performance based on event study approach along with calendar time approach with different benchmarks (i.e. Bursa Malaysia Top 10 gainers and losers) to examine the fundamental and sentiment patterns and trends. Furthermore, future research should consider analysing each particular firm that produces large abnormal returns in the sample period because such firms may affect the portfolio returns regardless of their market capitalisation.

Future research on IPO valuation (i.e. PE) could analyse smaller groups (sub-samples) of firms based on their unique characteristics. For example, researchers could look at firms grouped by industry sector (i.e. technology, healthcare) or size (i.e. small-cap or large-cap) or growth stage (i.e. young phase, growth phase or well-established). By doing so, the analysis could reveal differences (heterogeneity) in how various factors influence deviations in PE for firms with distinct traits. It suggests that the relationship between variables and PE differential may not be uniform across all firms but could vary depending on their specific characteristics. The above future research and recommendations will provide a new and wide range of information that might be helpful for investors, financial analysts, policy makers, as well as academic researchers.

5.6 Summary

This chapter summarises the findings, focusing on how fundamental and sentiment factors influence IPO underpricing, aftermarket performance, and IPO valuation, urging stakeholders to implement well-informed strategies. The study also highlights the important role of market sentiment in shaping investor behaviour. Furthermore, the study acknowledges several limitations that hinder the generalisability of the findings. Future research is needed to deepen the understanding of IPO outcomes by addressing these limitations. To enhance market efficiency, the research recommends improving transparency, developing real-time sentiment indicators, and promoting investor education to reduce speculative behaviour and better align

IPO valuations with market fundamentals. These measures are essential for data-driven decision-making, fostering a balanced IPO market, and benefiting investors, analysts, and policymakers. Additionally, policymakers are encouraged to focus on information dissemination to minimise IPO underpricing and improve market dynamics. Effective information dissemination helps to reduce information asymmetry, ensuring that all parties involved in IPOs have access to the same data, which in turn leads to more informed decision-making and market efficiency. This reduces the likelihood of speculative behaviour or mispricing of IPO shares.

REFERENCES

Abdi, H., & Williams, L. J., (2010). Principal component analysis. Wiley Interdisciplinary Reviews: Computational Statistics, 2, 433-459.

Abdul-Rahim, R., & Yong, O., (2008). Initial returns of Shariah-compliant IPOs in Malaysia. Capital Market Review, 16(2), 270-279.

Abdul-Rahim, R., & Yong, O., (2010). Initial returns of Malaysian IPOs and Shariah-compliant status. Journal of Islamic Accounting and Business Research, 1(1), 60-74.

Abdullah, N. H., & Mohd Taufil, K., N., (2004). Factors influencing the underpricing of initial public offerings in an emerging market: Malaysian evidence. Journal of Economics and Management, 12(2), 2-21.

Abdollah, A., Hawati, J., Ruzita, A. R., & Tamat, S., (2021). Herding behaviour and stock market conditions. PSU Research Review, Emerald Publishing Limited, 1399-1747.

Abukari, K., & Vijay, J., (2011). Long-term performance and predictability of initial public offerings (IPOs), FMA Annual Meeting Program, Ottawa, viewed 20 August 2012.

Agathee, U. S., Brooks, C., & Sannassee, R. V., (2012). Hot and cold IPO markets: The case of the Stock Exchange of Mauritius. Journal of Multinational Financial Management, 22, 168-192.

Agathee, U. S., Sannassee, R. V., & Brooks, C., (2014). The long-run performance of IPOs: The case of the Stock Exchange of Mauritius. Applied Financial Economics, 24(17), 1123-1145.

Agarwal, S., Liu, C., & Rhee, S. G., (2008). Investor demand for IPOs and aftermarket performance: Evidence from the Hong Kong stock market. Journal of International Financial Markets, Institutions and Money, 18(2), 176-190.

Aggarwal, R., & Conroy, P., (2000). Price discovery in initial public offerings and the role of the lead underwriter. Journal of Finance, 55, 2903-2922.

Aggarwal, R., Leal, R., & Hernandez, L., (1993). The aftermarket performance of initial public offerings in Latin America. Financial Management, 22(1), 42-53.

Aggarwal, R., Prabhala, N. R., & Puri, M., (2002). Institutional allocations in initial public offerings: Empirical evidence. Journal of Finance, 57, 1421-1442.

Aggarwal, R. & Rivoli, P., (1990). Fads in the initial public offerings market? Financial Management, 19(4), 45-57.

Ahmad-Zaluki, N. A., Campbell, K., & Goodacre, (2007). The long-run share price performance of Malaysian initial public offerings. Journal of Business Finance and Accounting, 34(2), 78-110.

Ahmad-Zaluki, N. A., & Lim B. K., (2012). The investment performance of MESDAQ Market initial public offerings. Asian Academy of Management Journal of Accounting and Finance, 8(1), 1-23.

Akerlof, G. A., (1970). The market for "Lemons": Quality uncertainty and the market mechanism. The Quarterly Journal of Economics, 84(3), 488-500.

Akyol, A. C., Cooper T., Meoli M., & Vismara, S., (2014). Do regulatory changes affect the underpricing of European IPOs? Journal of Banking & Finance, 45, 43-58.

Alanazi, A. S., & Al-Zoubi, H. A., (2015). Extreme IPO underpricing and the legal environment in wealthy emerging economies. Journal of Multinational Financial Management, 31, 83-103.

Albada, A., & Yong, O., (2017). IPO research in Malaysia: A review of underpricing phenomenon. The International Journal of Banking and Finance, 13(1), 95-118.

Albada, A., Yong, O., & Low, S. W., (2019). Relationship between prestige signals and over-subscription ratio. International Journal of Managerial Finance. Emerald Group Publishing Limited, 15(4), 564-579.

Albada, A., Abusham, E. E., Ong, C. Z., Qatiti, K. A., (2025). Machine learning insights: probing the variable importance of ex-ante information. Managerial Finance, 51(1), 12-31.

Ali, N., Nassir, A. M., Hassan, T., & Abidin, S. Z., (2010). Short-run stock overreaction: Evidence from Bursa Malaysia. International Journal of Economics and Management, 4(2), 319-333.

Al-Hassan, A., Delgado, F., & Omran, M., (2010). The underpricing of IPOs in the Gulf cooperation council countries. Research in International Business and Finance, 24(3), 344-360.

Al-Masawa, A. M., Mohd-Rashid, R., & Al-Jaidi, H. A., (2020). A descriptive analysis of IPOs post-listing liquidity in Malaysia. International Journal of Financial Research, 11(1), 171-180.

Alli, K. L., Subrahmanyam, V., & Gleason, K. C., (2010). Short-and long-run performance of initial public offerings in post-apartheid South Africa. Journal of African Business, 11(1), 1-25.

Allen, F., & Faulhaber, G. R., (1989). Signaling by underpricing in the IPO market. Journal of Financial Economics, 23, 303-323.

Allen, J. P., & Land, D., (1999). Attachment in adolescence. In J. Cassidy and P. R. Shaver (Eds.), Handbook of attachment: Theory, research, and clinical applications (223-319). New York: Guilford Press.

Al-Tamimia, H. A. H., Alwana, A. A., & Rahmana, A. A. A., (2011). Factors affecting stock prices in the UAE financial markets. Journal of Transnational Management, 16, 3-19.

Alvarez L., & Gonzalez I., (2005). Organisational learning and market orientation: Interface and effects on performance. Industrial Marketing Management, 34, 187-202.

Amemiya, T., (1981). Qualitative response models: A Survey. Journal of Economic Literature, American Economic Association, 19(4), 1483-1536.

Amihud, Y., Hauser, S., & Kirsh, A., (2003). Allocations, adverse selection, and cascades in IPOs: Evidence from the Tel Aviv stock exchange. Journal of Financial Economics, 68(1), 137–158.

Ammer, M. A., & Ahmad-Zaluki, N. A., (2016). The effect of underwriter's market share, spread and management earnings forecasts bias and accuracy on underpricing of Malaysian IPOs. International Journal of Managerial Finance, 12(3), 351-371.

Ammer, M. A., & Ahmad-Zaluki, N. A., (2017). The effect of disclosure regulation on the bias and accuracy of management earnings forecasts in Malaysian IPO prospectuses. Journal of Financial Reporting and Accounting, 15(1), 59-77.

Anderson, K., & Brooks, C., (2006). Decomposing the price-earnings ratio. Journal of Asset Management, 6, 456-469.

Angela-Maria, F., Maria, P. A., & Miruna, P. M., (2015). An empirical investigation of herding behaviour in CEE stock markets under the global financial crisis. Procedia Economics and Finance, 25, 354-361.

Ang, J. S., & Zhang, S., (2004). An evaluation of testing procedures for long horizon event studies. Review of Quantitative Finance and Accounting, 23, 251-274.

Ariff, M., & Shamsher, M., (1999). Regulatory effect as an explanation for the excessive underpricing in an emerging market. Paper presented at the Graduate School, Universiti Utara Malaysia.

Atiq, M., Rafiq, M., & Roohullah, M., (2010). Factors affecting stock prices: A case study of Karachi stock exchange. Business & Economic Review, 2, 7-12.

Badru, B. O., & Ahmad-Zaluki, N. A., (2018). Explaining IPO initial returns in Malaysia: Ex-ante uncertainty versus signalling. Asian Review of Accounting, 26(1), 84-106.

Bai, J., & Ng, S., (2008). Forecasting economic time series using targeted predictors. Journal of Econometrics, 146(2), 304-317.

Bakar, N, A., & Uzaki, K., (2013). An empirical study of initial public offerings underpricing for Shariah-compliant companies: The case of Malaysian market. International Journal of Economics, Business and Finance, 1(9), 262-274.

Bakar, S., & Yi, A. N. C., (2016). The impact of psychological factors on investors' decision making in Malaysian stock market: a case of Klang Valley and Pahang. Procedia Economics Finance, 35, 319-328.

Baker, H. K., Hargrove, M. B., & Haslem, J. A., (1977). An empirical analysis of the risk return preferences of individual investor. Journal of Financial and Quantitative Analysis, 12, 377-389.

Baker, M., & Stein, J., (2004). Market liquidity as a sentiment indicator. Journal of Financial Markets, 7, 271-299.

Baker, M., & Wurgler, J., (2000). The equity share in new issues and aggregate stock returns. Journal of Finance, 55, 2219-2257.

Baker, M., & Wurgler, J., (2006). Investor sentiment and the cross-section of stock returns. Journal of Finance, 65(4), 1645-1680.

Baker, M., & Wurgler, J., (2007). Investor sentiment in the stock market. Journal of Economic Perspectives, 21(2), 129-152.

Baker, M., Wurgler, J., & Yuan, Y., (2012a). Global, local, and contagious investor sentiment. Journal of Financial Economics, 104, 272-287.

Baker, M., & Wurgler, J., (2012b). Behavioural corporate finance: An updated survey. In Handbook of the Economics of Finance. Elsevier, 2, 357-424..

Balvers, R. J., Bill M., & Robert E. M., (1988). Underpricing of new issues and the choice of auditors as a signal of investment banker reputation, The Accounting Review, 63, 605-622.

Bancel, F., & Mittoo, U. R., (2009). Why do European firms go public? European Financial Management, 15(4), 844-884.

Barber, B. M., & Lyon, J. D., (1997). Detecting long-run abnormal stock returns: The empirical power and specification of test statistics. Journal of Financial Economics, 43, 341-372.

Barberis, N., Shleifer, A., & Vishny, R., (1998). A model of investor sentiment. Journal of Financial Economics, 49, 307-345.

Baron, D. P., (1982). A model of the demand for investment banking advising and distribution services for new issues. Journal of Finance, 37(4), 955-976.

Barry, B. C., & Jennings, H. R., (1993). The opening price performance of initial public offerings of common stock. Financial Management, Spring, 54-63.

Bashar, Y. A., (2015). The impact of market sentiment index on stock returns: An empirical investigation on Kuala Lumpur Stock Exchange. Journal of Arts, Science & Commerce, 3, 1-28.

Bathia, D., & Bredin, D., (2013). An examination of investor sentiment effect on G7 stock market returns. Europe Journal of Finance, 19(9), 909-937.

Bayley, L., Lee, P. J., & Walter, T. S., (2006). IPO flipping in Australia: Cross-sectional explanations. Pacific-Basin Finance Journal, 14, 327-348.

Bazeet, O. B., & Ahmad-Zaluki, N. A., (2018). Explaining IPO initial returns in Malaysia: Ex-ante uncertainty vs signalling. Asian Review of Accounting, 26(1), 84-106.

Beatty, R. P., & Ritter, J. R., (1986). Investment banking, reputation and the underpricing of initial public offerings. Journal of Financial Economics, 15, 213-232.

Beatty, B. R., (2000). The emotions of educational leadership: breaking the silence. International Journal of Leadership in Education, 3(4), 331-357.

Beaver, W., & Morse, D., (1978). What determines price-earnings ratios? Finance Analysts Journal, 34(4), 65-76.

Belghitar, Y., & Dixon, R., (2012). Do venture capitalists reduce underpricing and underperformance of IPOs? Applied Financial Economics, 22(1), 3-44.

Benveniste, L. M., & Busaba, W. Y., (1997). Bookbuilding vs. fixed price: an analysis of competing strategies for marketing IPOs. Journal of Financial and Quantitative Analysis, 32, 383-403.

Benveniste, L. M., & Spindt, P. A., (1989). How investment bankers determine the offer price and allocation of new issues. Journal of Financial Economics, 24(2), 343-361.

Berk, J., & Demarzo, P., (2013). Corporate Finance, Third Edition. Pearson Education.

Bessler, W., & Thies, S., (2007). The long-run performance of initial public offerings in Germany. Managerial Finance, 33(6), 420-441.

Bird, R., & Yeung, D., (2010). Institutional ownership and IPO performance: Australian evidence. Working paper series 6, Paul Woolley Centre for Capital Market Dysfunctionality, University of Technology Sydney, New South Wales, viewed 4 December 2012.

Bikhchandani, S., Hirshleifer, D., & Welch, I., (1992). A theory of fads, fashion, custom and cultural change as informational cascades. Journal of Political Economy, 100(50), 992-1026.

Blasco, N., Corredor, P., & Ferreruela, S., (2012). Does herding affect volatility? Implications for the Spanish stock market. Quantitative Finance, 12, 311-327.

Bodie, Z., Kane, A., Marcus, A. J., & Mohanty, P., (2005). Investments. 6th Edition, Tata McGraw-Hill Publishing Company, New Delhi.

Boonchuaymetta, E., & Chuanrommanee, W., (2013). Management of the IPO performance in Thailand. Journal of Multinational Financial Management, 23(4), 272-284.

Boonlert, J., (2017). Does investor sentiment affect price-earnings ratios? Studies in Economics and Finance, 34(2), 183-193.

Booth, J. R., & Richard, L., (1986). Capital raising, underwriting and the certification hypothesis. Journal of Financial Economics, 15, 261-281.

Booth, J. R., & Chua, L., (1986). Ownership dispersion, costly information and IPO underpricing. Journal of Financial Economics, 41, 291-310.

Boreiko, D., & Lombardo, S., (2011). Italian IPOs: Allocations and claw back clauses. Journal of International Financial Markets, Institutions and Money, 21(1), 127-143.

Boudriga, A., & Slama, B. S., & Boulila, N., (2009). What determines IPO underpricing? Evidence from a frontier market. MPRA Paper 18069, University Library of Munich, Germany.

Boulton, T. J., Smart, S. B., & Zutter, C. J., (2010). IPO underpricing and international corporate governance. Journal of International Business Studies, 41(2), 206-222.

Boulton, T. J., Smart, S. B., & Zutter, C. J., (2011). Earnings quality and international IPO underpricing. The Accounting Review, 86(2), 483-505.

Boulton, T. J., Smart, S. B., & Zutter, C. J., (2017). Conservatism and international IPO underpricing. Journal of International Business Studies, 48, 763-785.

Bradley, D. J., Jordan, B. D., Yi, H. C., & Roten, I. C., (2001). Venture capital and IPO lockup expiration: An empirical analysis, Journal of Financial Research, 24, 465-492.

Brav, A., Geczy, C., & Gompers, P. A., (2000). Is the abnormal return following equity issuances anomalous? Journal of Financial Economics, 56, 209-249.

Brav, A., & Gompers, P. A., (1997). Myth or reality? The long-run underperformance of initial public offerings: Evidence from venture and non-venture capital-backed companies. Journal of Finance, 52, 1791-1821.

Brown, K. C., Harlow, W. V., & Tinic, S. M., (1988). Risk aversion, uncertain information, and market efficiency. Journal of Financial Economics, 22(2), 355-385.

Brown, G. W., & Cliff, M. T., (2004). Investor sentiment and the near-term stock market. Journal of Empirical Finance, 11(1), 1-27.

Butler, A. W., Keefe, M. O., & Kieschnick, R., (2014). Robust determinants of IPO underpricing and their implications for IPO research, Journal of Corporate Finance, 27, 367-383.

Cai, X. J., Tian, S., Yuan, N., & Hamori, S., (2008). Interdependence between oil and East Asian stock markets: Evidence from wavelet coherence analysis. Journal of International Finance. Market Institution Money, 48, 206-223.

Cattaneo, M., Meoli, M., & Vismara, S., (2015). Financial regulation and IPOs: Evidence from the history of the Italian stock market. Journal of Corporate Finance, 31, 116-131.

Carter, R. B., Frederick, H. D., & Singh, A. K., (1998). Underwriter reputation, initial returns, and the long-run performance of IPO stocks. Journal of Finance, 53, 285-311.

Carter, R. B., & Manaster, S., (1990). Initial public offerings and underwriter reputation, Journal of Finance, 45, 1045-1067.

Cassia, L., Guidici, G., Paleari, S., & Redondi, R., (2004). IPO underpricing in Italy. Applied Financial Economics, 14(3), 179-194.

Certo, T., Daily, C. M., & Dalton, D., (2001). Signalling firm value through board structure: An investigation of initial public offerings. Entrepreneurship: Theory and practice, 26(2), 33-50.

Certo, T., (2003). Influencing initial public offering investors with prestige: Signalling with board structures. Academy of Management Review, 28(3), 112-134.

Chahine, S. & Filatotchev, I., (2008). The effects of information disclosure and board independence on IPO Discount. Journal of Small Business Management, 46(2), 219-241.

Chalk, A., & Peavy, I., (1987). Initial public offerings: daily returns, offering types and the price effect. Finance Analysis Journal, 43(5), 65-69.

Chalk, A., & Peavy, I., (1990). Understanding the pricing of initial public offerings, Research in Finance (JAI Press, Greenwich).

Chan, K., Wang, J., & Wei, K. C. J., (2004). Underpricing and long-term performance of IPOs in China. Journal of Corporate Finance, 10, 409-430.

Chang, E., Chen, C., Chi, J., & Young, M., (2008). IPO underpricing in China: New evidence from the primary and secondary markets. Emerging Markets Review, 9, 1-16.

Chang, E. C., Cheng, J. W., & Khorana, A., (2000). An examination of herd behaviour in equity markets: An international perspective. Journal of Banking and Finance, 24, 1651-1679.

Che-Yahya, N., Mohd Rashid, A. H., Rahman, A. I., & Mohd Rashid, S. N., (2017). The moderating effect of information asymmetry on the signalling role of institutional investors in the Malaysian IPOs. Asian Journal of Business and Accounting, 10(1), 127-165.

Chemmanur, T., & Fulghieri, P., (1994). Investment bank reputation, information production, and financial intermediation. Journal of Finance, 49(1), 57-79.

Chen, G., Firth, M., & Kim, J. B., (2000). The post-issue market performance of initial public offerings in China's new stock markets. Review of Quantitative Finance and Accounting, 14, 319-339.

Chen, A., Hung, C. C., & Wu, C. S., (2002). The underpricing and excess returns of initial public offerings in Taiwan based on noisy trading: A stochastic frontier model. Review of Qualitative Finance and Accounting, 18(2), 139-158.

Chen, C. H., & Shih H. T., (2004). Initial public offering and corporate governance in China's transitional economy, NBER Chapters, in: Governance, Regulation, and Privatization in the Asia-Pacific Region, National Bureau of Economic Research, Inc.

Chen, J., Hong, H., & Stein, J. C., (2002). Breadth of ownership and stock return. Journal of Financial Economics, 49, 307-343.

Chen, M. P., Chen, P. F., & Lee, C. C., (2013). Asymmetric effects of investor sentiment on industry stock returns: panel data evidence. Emerging Market Review, 14, 35-54.

Chen Y., Goyal A., Veeraraghavan M., & Zolotoy, L., (2020). Terrorist attacks, investor sentiment, and the pricing of initial public offerings. Journal of Corporate Finance, 65, 1-26.

Chernozhukov, V., Hansen, C., & Liao, Y., (2017). A lava attack on the recovery of sums of dense and sparse signals. Annals of Statistics 45, 39-76.

Cheung, Y.L., Jing, L.H., Lu, T. & Rau, P.R., (2009). Tunnelling and propping up: An analysis of related party transactions by Chinese listed companies. Pacific-Basin Finance Journal, 17, 372-93.

Chi, J., & Padgett, C., (2005). The performance and long-run characteristics of the Chinese IPO markets. Pacific Economic Review, 10(4), 451-469.

Chi, K. T., Liu, J., & Lau F. C. M., (2010). A network perspective of the stock market. Journal of Empirical Finance, 17(4), 659-667.

Chuang, W. J., Ouyang, L. Y., & Lo, W. C., (2010). The impact of investor sentiment on excess returns a Taiwan stock market case. International Journal of Information and Management Sciences, 21, 13-28.

Clarkson, P. M., & Merkley, J., (1994). Ex-ante uncertainty and the underpricing of initial public offerings: Further Canadian evidence, Canadian Journal of Administrative Sciences, 11, 54-67.

Cho, J., (1994). Determinants of earnings-price ratios: A re-examination. Review of Financial Economics, 3(2), 105-120.

Cho, J., & Lee, J., (2013). The venture capital certification role in R&D: Evidence from IPO underpricing in Korea. Pacific-Basin Finance Journal, 23, 83-108.

Chong, F. N., (2009). Disposition effect and flippers in Bursa Malaysia. Journal of Behavioural Finance, 10, 152-157.

Chong, F. N., Ali, R., & Ahmad, Z., (2011). Representative heuristics and the aftermarket dynamics of the new listings in Malaysia, Labuan Bull. International Business Finance, 9, 1-11.

Chong, B. S., & Ho, K. W., (2007). Lockup and voluntary earnings forecast disclosure in IPO. Financial Management, 36(3), 63-80.

Chong, F., & Puah, C. H., (2009). The time series behaviour of volume, initial return and economic condition of the Malaysian IPO market. International Review of Business Research Papers, 5(4), 409-417.

Chorruk, J., & Worthington, A. C., (2010). New evidence on the pricing and performance of initial public offerings in Thailand, 1997-2008. Emerging Markets Review, 11(3), 285-299.

Chowdhry, B., & Sherman, A., (1996). International differences in oversubscription and underpricing IPOs. Journal of Corporate Finance, 2, 359-381.

Chua, A., DeLisle, R. J., Feng, S. S., & Lee, B. S., (2015). Price-to-earnings ratios and option prices. Journal of Future Markets, 35(8), 738-752.

Clarke J., Khurshed, A., Pande, A., & Ajai S. K., (2016). Sentiment traders and IPO initial returns: The Indian evidence. Journal of Corporate Finance, 37, 24-37.

Clarkson, P, M., & Simunic, D. A., (1994). The association between audit quality, retained ownership, and firm-specific risk in U.S. vs Canadian IPO markets. Journal of Accounting and Economics, 17(1-2), 207-228.

Colaco, H. M. J., Cesari, A. D., & Hegde, S. P., (2017). Retail investor attention and IPO valuation, 23(4), 691-727.

Copeland, T. E., & Weston, J. F. A., (2005). Financial Theory and Corporate Policy (4th edition). Boston, Mass: Pearson Addison-Wesley, Cop.

Corhay, A., Teo, S., & Tourani-Rad, A., (2002). The long-run performance of Malaysian initial public offerings: Value and growth effects. Managerial Finance, 28(2), 52-65.

Cornelli, F., & Goldreich, D., (2003). Bookbuilding: How informative is the order book? Journal of Finance, 58(4), 1415-1443.

Cornelli, F., Goldreich, D., & Ljungqvist, A., (2006). Investor sentiment and pre-IPO markets. Journal of Finance, 61(3), 1187-1216.

Daily, C., Certo, S., Dalton, D., & Roengpitya, R., (2003). IPO underpricing: A meta-analysis and research synthesis. Entrepreneurship: Theory and Practice, 27, 271-295.

Da, Z., Engelberg, J., & Gao, P., (2011). In search of attention. Journal of Finance, 66(5), 1461-1499.

Dash, S. R., & Mahakud, J., (2013). Investor sentiment and stock return: Do industries matter? Journal of Applied Economic Research, 7(3), 315-349.

Dawson, M. S., (1987). Secondary stock market performance of initial public offers, Hong Kong, Singapore and Malaysia: 1978-1984. Journal of Business Finance and Accounting, 14(1), 65-76.

DeAngelo, H., & DeAngelo, L., (1990). Dividend policy and financial distress: An empirical investigation of troubled NYSE firms. Journal of Finance, 45(5), 1415-1431.

De Bondt, W., & Thaler, R., (1985). Does the stock market overreact? Journal of Finance, 40(3), 793-805.

Dehghani, P., & Sapian, R. Z. Z., (2014). Sectoral herding behaviour in the aftermarket of Malaysian IPOs. Journal of Entrepreneurial Finance, 16(3), 227-246.

De Long, J. B., Shleifer, A., Summers, L. H., & Waldmann, R. J., (1990). Noise trader risk in financial markets. Journal of Political Economy, 98(4), 703-738.

Deloof, M., Maeseneire, W. D., & Inghelbrecht, K., (2009). How do investment bank value initial public offerings? Journal of Business Finance & Accounting, 36(1-2), 130-160.

Dergiades, T., (2012). Do investors' sentiment dynamics affect stock returns? Evidence from the US economy. Economics Letters, 116(3), 404-407.

Derrien, F., (2005). IPO pricing in "Hot" market conditions: Who leaves money on the table? Journal of Finance, 60, 487-520.

Derrien, F., (2013). Initial public offerings: The role of investor sentiment. European Financial Management, 19(3), 502-516.

Derrien, F., & Kecskes, A., (2007). The initial public offerings of listed firms. Journal of Finance, LXII(1), 447-479.

Dimovski, W., Philavanh, S., & Brooks, R., (2011). Underwriter reputation and underpricing: Evidence from the Australian IPO market. Review of Quantitative Finance and Accounting, 37(4), 409-426.

Dimovski, W., & Brooks, R., (2004). Do you really want to ask an underwriter how much money you should leave on the table? Journal of International Financial Markets, Institutions and Money, 14(3), 267-280.

Ding, W., Mazouz, K., & Wang, Q., (2019). Investor sentiment and the cross-section of stock returns: New theory and evidence. Review of Quantitative Finance and Accounting, 53, 493-525.

Divanbeigi, R., & Ramalho, R., (2015). Business regulations and growth. Policy Research Working Paper Series 7299, The World Bank.

Doidge, C. G., Andrew, K. G., & Rene, S. M., (2010). Why do foreign firms leave United States equity markets? Journal of Finance, 65(4), 1507-1553,

Dong, M., Michel, J. S., & Pandes, J. A., (2011). Underwriter quality and long-run IPO performance. Financial Management, 40(1), 219-251.

Dorn, D., (2009). Does sentiment drive the retail demand for IPOs? Journal of Financial and Quantitative Analysis, 44(1), 85-108.

Drobetz, W., Momtaz, P. P., & Schillhofer, A., (2018). Investor sentiment and IPO pricing during different market states. Review of Managerial Science, 12(3), 669-704.

Durukan, B. M., (2002). The relationship between IPO returns and factors influencing IPO performance: Case of Istanbul stock exchange, 28(2), 18-38.

Dwaikat, N., Queiri, A., & Qubbaj, I. S., (2020). Board governance on dividend initiation by initial public offerings: Evidence from the Malaysian stock market. Cogent Economics & Finance, 48(2), 239-310.

Eichengreen, B., & Moody, A., (1998). What explains changing spreads on emerging market debt: Fundamentals or market sentiment? NBER Working Paper 6408. National Bureau of Economic Research, Cambridge, Mass.

Ekkayokkaya, M., & Pengniti, T., (2012). Governance reform and IPO underpricing. Journal of Corporate Finance, 18, 238-253.

Elan, L. S., (2010). Behavioural patterns and pitfalls of U. S. investors. Federal Research Division, Library of Congress.

Eldomiaty, T. I., (2008). Determinants of corporate capital structure: evidence from an emerging economy. International Journal of Commerce and Management, 17(1-2), 25-43.

Engelen, P. J., & Van Essen, M., (2010). Underpricing of IPOs: Firm-, issue- and country-specific characteristics. Journal of Banking & Finance, 34, 1958-1969.

Esfahanipour, A., Goodarzi, M., & Jahanbin, R., (2015). Analysis and forecasting of IPO underpricing. Neural Computing and Applications, 27(3), 651-658.

Fahmi, I., (2011). Accountancy Analysis Report. Bandung: ALFABETA.

Falconieri, S., Filatotchev, I. & Tastan, M., (2019). Size and diversity in VC syndicates and their impact on IPO performance. European Journal of Finance. 25(11), 1032-1053.

Fama, E. F., & Eugene, F., (1998). Market efficiency, long-term returns, and behavioural finance. Journal of Financial Economics, 49, 283-306.

Fernando, S. C., Krishnamurthy, S., & Spindt, P. A., (1999). Offer price, target ownership structure and IPO performance. The Wharton Financial Institutions Centre.

Field, L. C., & Hanka, G., (2001). The expiration of IPO share lockups. Journal of Finance, 56(2), 471-500.

Firth, M., (1998). IPO profit forecasts and their role in signaling firm value and explaining post-listing returns. Applied Financial Economics, 8(1), 29-39.

Fisher, K. L., & Statman, M., (2000). Investor sentiment and stock returns. Financial Analysts Journal, 56, 16-23.

Gajewski J. F., & Gresse C., (2005). A survey of the European IPO market, Research report, European Capital Markets Institute.

Gao, S., Meng, Q., & Chan, K. C., (2016). IPO pricing: Do institutional and retail investor sentiments differ? Economics Letters, 148, 115-117.

Gao, S., Meng, Q., Chan, J. Y., & Chan, K. C., (2018). Cognitive reference points, institutional investors' bid prices, and IPO pricing: Evidence from IPO auctions in China. Journal of Financial Markets, 38, 124-140.

Giannone, D., Lenza, M., & Primiceri, G. E., (2018). Economic predictions with big data: The illusion of sparsity. Working Paper.

Gitman, L. J., (2009). Principles of Managerial Finance (12th ed.). United States: Pearson Education Inc.

Graham, B., & Dodd, D. L., (1934). Security analysis. New York: McGraw-Hill Book Company.

Goergen, M., Khurshed, A., & Mudambi, R., (2007). The long-run performance of U.K. IPOs: Can it be predicted? Managerial Finance, 33(6), 401-419.

Goergen, M., & Renneboog, L., (2007). Shareholder wealth effects of European domestic and cross-border takeover bids. European Financial Management, 28, 1-5.

Gompers, P. A., & Lerner, J., (2003). The really long-run performance of initial public offerings: The pre-Nasdaq evidence. Journal of Finance, 58(4), 1355-1392.

Gong, X., Zhang, W., Wang, J., & Wang, C., (2022). Investor sentiment and stock volatility: New evidence. International Review of Finance Analysis, 73, 101612.

Gong, N., & Shekhar, C., (2001). Underpricing of privatised IPOs: the Australian experience, Australian Journal of Management, 26(2), 91-106.

Gordon, M. J., (1959). Dividends, earnings and stock prices. Review of Economics and Statistics. 41(2), 99-105.

Gounopoulos, D., Nounis, C. P., & Stylianides, P., (2007). The short- and long-term performance of initial public offerings in the Cyprus Stock Exchange. Journal of Financial Decision Making, 4(1), 1-28.

Gujarati, D., Porter, D., & Gunasekar, S., (2012). Basic Econometrics. New Delhi: McGraw Hill.

Guo, H., & Brooks, R., (2008). Underpricing of Chinese A-share IPOs and short-run underperformance under the approval system from 2001 to 2005. International Review of Financial Analysis, 17(5), 984-997.

Guo, H., Brooks, R., & Shami, R., (2010). Detecting hot and cold cycles using a Markov regime switching model – Evidence from the Chinese A-share IPO market. International Review of Economics and Finance, 19, 196-210.

Habib, M. A., & Ljungqvist, A., (2001). Underpricing and entrepreneurial wealth losses in IPOs: Theory and evidence. Review of Financial Studies, 14, 433-458.

Habib, M. A., & Ljungqvist, A., (1998). Underpricing a IPO proceeds: A note, 14(2), 433-458.

Hansen, R. S., & Crutchley, C., (1990). Corporate earnings and financings: An empirical analysis. Journal of Business, 63(3), 347-371.

Haritha, P., & Uchil, R., (2016). Conceptual framework on market factors affecting investor's sentiments and the effect of behavioural pitfalls on investment decision making. Journal of Economics and Finance, 29-34.

He, G., (2018). The impact of impeding credit rating changes on management earnings forecasts. Global Journal of Management and Business Research, 18(4), 1-18.

Helwege, J., & Liang, N., (2004). IPOs in hot and cold markets. Journal of Financial and Quantitative Analysis, 39, 541-569.

Hensler, J., Hubona, G., & Ray, P. A., (1997). Using PLS path modelling win new technology research: Updated guidelines. Industrial Management & Data Systems, 116(1), 2-20.

Hill, R. C., Griffiths, W. E., & Lim, G. C., (2008). Principles of Econometrics, Hoboken, Wiley.

Hirshliefer, D., (2001). Investor psychology and asset pricing. Journal of Finance, 56, 1533-1598.

Ho, B., Taher, M., Lee, R., & Fargher, N. L., (2001). Market sentiment, media hype and the underpricing of initial public offerings: The case of Australian technology IPOs, Working Paper, School of Accounting, University of New South Wales.

Ho, C., & Hung, C., (2009). Investor sentiment as conditioning information in asset pricing. Journal of Banking & Finance, 33(5), 892-903.

Hoberg, G., (2007). The underwriter persistence phenomenon. Journal of Finance, 62(3), 1169-1206.

Hoechle, D., Karthaus, L., & Schmid, M., (2009). The long-term performance of IPO's, Revisited, Working Papers on Finance 1706, University of St. Gallen, School of Finance.

Holderness, C. G., (2003). A survey of blockholders and corporate control. Economic Policy Review, 9, 51-64.

How, J., (2000), Initial and long-run performance of mining IPOs in Australia. Australian Journal of Management, 25(1), 95-118.

How, J., Jelic, R., Saadouni, B., & Verhoeven, P., (2007). Share allocations and performance of KLSE Second Board IPOs. Pacific-Basin Finance Journal, 15, 292-314.

Huang, D., Jiang, F., Tu, J., & Zhou, G., (2015). Investor sentiment aligned: A powerful predictor of stock returns. Review of Financial Studies, 28(3), 791-837.

Huang, A. G., & Wirjanto, T. S., (2012). Is China's price-earnings ratio too low? Examining the role of earnings volatility. Pacific-Basin Finance Journal, 20, 41-61.

Huang, D., Jiang, F., Li, K., Tong, G., & Zhou, G., (2022). Scaled PCA: A new approach to dimension reduction. Management Science, 68(3), 1678-1695.

Ibbotson, R. G., & Jaffe, J. F., (1975). Hot issue markets. Journal of Finance, 30(4), 1027-1042.

Ibbotson, R. G., (1975). Price performance of common stock new issues. Journal of Finance Economics, 2, 235-272.

Ibbotson, R. G., Sindelar, J., & Ritter, J., (1994). The market's problems with the pricing of initial public offerings. Journal of Applied Corporate Finance, 7, 66-74.

Ibbotson, R., Sindelar, J., & Ritter, J., (1988). Initial public offerings. Journal of Applied Corporate Finance, 1, 37-45.

Ismail, K. N. I. K., Abidin, F. Z., & Zainuddin, N., (1993). Performance of new stock issues on the KLSE. Capital Market Review, 1(1), 81-95.

Jain, B. A., & Kini, O., (1994). The post-issue operating performance of IPO firms. Journal of Finance, 49(5), 1699-1726.

Jain, B. A., & Kini, O., (1999). The life cycle of initial public offering firms. Journal of Business Finance and Accounting, 26, 1281-1307.

Jakobsen, J., & Sorensen, O., (2001). Decomposing and testing long-term returns: An application on Danish IPOs. European Financial Management, 7(3), 393-417.

Jaskiewicz P. G., Víctor M. M., & Schiereck, D., (2005). Long-run IPO performance analysis of German and Spanish family-owned businesses. Family Business Review, 18(3), 179-2002.

Jelic, R., Saadouni, B., & Briston, R., (2001). Performance of Malaysian IPOs: Underwriters reputation and management earnings forecasts. Pacific-Basin Finance Journal, 9, 457-486.

Jenkinson, T., & Ljungqvist, A., (2001). Going public the theory and evidence on how companies raise equity finance. The Review of Financial Studies, 14(2), 433-458.

Jewartowski, T., & Lizinska, J., (2012). Short-term and long-term performance of polish IPOs. Emerging Markets Finance and Trade, 48(2), 59-75.

Jiang, L., & Li, G., (2013). Investor sentiment and IPO pricing during pre-market and aftermarket periods: Evidence from Hong Kong. Pacific-Basin Finance Journal, 23, 65-82.

Jiang, Y., Huang, J., & Xu, F., (2022). Preference for visual intensity in sentimental purchases. Psychol Mark, 40, 1361-1371.

Johnson, R. A., & Wichern, (2007). Applied Multivariate Statistical Analysis (6th Edition). Pearson Prentice Hall.

Johnston, J., & Madura, J., (2002). The performance of internet firms following their initial public offering. Financial Review, 37, 525-550.

Jog, V., & Wang, L., (2002). Aftermarket volatility and underpricing of Canadian initial public offerings.

Kafayat, A., & Farooqi, A. R., (2014). The Factors Affecting the Money Left on the Table by Pakistani IPO Issuers. Acta Universitatis Danubius. Economica, Danubius University of Galati, 10(4), 51-60.

Kahneman, D., & Tversky A., (1979). The framing of decisions and the psychology of choice. Science, New Series, 211(44), 453-458.

Kandel, S., Sarig, O., & Wohl, A., (1999). The demand for stocks: An analysis of IPO auctions. Review of Financial Studies, Society for Financial Studies, 12(2), 227-247.

Kane, A., Marcus, A., & Noh, J., (1996). The price-earnings multiple and market volatility. Finance Analysts Journal, 52(4), 16-24.

Kang, J. K., & Shivdasani, A., (1999). Alternative mechanisms for corporate governance in Japan: An analysis of independent and bank-affiliated firms. Pacific-Basin Finance Journal, 7(1), 1-22.

Kelly, B., & Pruitt, S., (2013). Market expectations in the cross-section of present values. Journal of Finance, 68(5), 1721-1756.

Kelly, B., & Pruitt, S., (2014). The three-pass regression filter: A new approach to forecasting using many predictors. Journal of Econometrics, 186(2), 294-316.

Keloharju, M., (1993). The winner's curse, legal liability, and the long-run price performance of initial public offerings in Finland. Journal of Financial Economics, 34, 251-277.

Kenney, M., Patton, D., & Ritter, J. R., (2012). Post-IPO employment and revenue growth for United States IPOs, June 1996-2010, Kauffman Foundation Report.

Kim, M., & Ritter J. R., (1999). Valuing IPOs. Journal of Financial Economics, 53, 409-437.

Kirkulak, B., & Davis, C., (2005). Underwriter reputation and underpricing: Evidence from the Japanese IPO market. Pacific-Basin Finance Journal, 13, 451-470.

Kiymaz, H., (2000). The initial and aftermarket performance of IPOs in an emerging market. Journal of Multinational Financial Management, 10(2), 213-227.

Khan, S. H., (2009). Determinants of share price movements in Bangladesh: Dividends and retained earnings. Karlskrona: Blekinge Institute of Technology.

Khurshed, A., Paleari, S., & Vismara, Silvio., (2005). The operating and share price performance of initial public offerings: The United Kingdom experience. Paper for the 16th Australasian Banking and Finance Conference in Sydney, 17-19 December 2003.

Klein, A., (1996). Can investors use the prospectus to price initial public offerings? Journal of Financial Statement Analysis, 2, 23-39.

Kulendran, N., & Wong, K. K. F., (2011). Determinants versus composite leading indicators in predicting turning points in growth cycle. Journal of Travel Research, 50, 417-430.

Kumar, A., & Lee, C. M. C., (2006). Retail investor sentiment and return co-movements. Journal of Finance, 61, 2451-2486.

Kutsuna, K., Dimovski, W., & Brooks, R. D., (2008). The pricing and underwriting cost of Japanese REIT IPOs. Journal of Property Research, 25(3), 22-239.

Koenker, R., & Gilbert, B., (1978). Regression quantiles. Econometrica, 46(1), 33-50.

Koh, F., & Walter, T., (1989). A direct test of Rock's model of the pricing of unseasoned issues. Journal of Financial Economics, 23, 251-272.

Komenkul, K., & Siriwattanakul, D., (2016). Journal of Financial Regulation and Compliance, 24(3), 317-342.

Kooli, M., & Suret, J. M., (2004). The aftermarket performance of initial public offerings in Canada. Journal of Multinational Financial Management, 14(1), 47-66.

Kothari, S. P., & Warner, J. B., (1997). Measuring long-horizon security price performance. Journal of Financial Economics, 43, 301-340.

Krishnamurti, C., & Kumar, P., (2002). The initial listing performance of Indian IPOs. Managerial Finance, 28(2), 39-51.

Lai, M., & Lau, S., (2004). Herd behaviour and market stress: The case of Malaysia. Academy of Accounting and Financial Studies Journal, 8(3), 85-101.

Lee, P. J., Taylor, S. L., & Walter, T. S., (1996), Australian IPO pricing in the short-run and long-run. Journal of Banking & Finance, 20(7), 1189-1210.

Leland, H. E., & Pyle, D. H., (1977). Informational asymmetries, financial structure, and financial intermediation. Journal of Finance, 32, 371-387.

Lerner, J., (1994). Venture capitalists and the decision to go public. Journal of Financial Economics, 35(3), 293-316.

Leuz, C., & Wysocki, P. D., (2008). Economic consequences of financial reporting and disclosure regulation: A review and suggestions for future research, March, 1-90.

Levis, M., (1990). The winner's curse problem, interest costs and the underpricing of initial public offerings. Economic Journal, 100, 76-89.

Levis, M., (1993). The long-run performance of initial public offerings: The United Kingdom experience 1980-1988. Financial Management, 22, 28-41.

Li, X., Xie, H., Chen, L., Wang, J., & Deng, X., (2014). News impact on stock price return via sentiment analysis. Knowledge-Based Systems, 69, 14-23.

Li, C. C., Xu, H. C., & Zhou, W. X., (2020). News coverage and portfolio returns: Evidence from China. Pacific-Basin Finance Journal, 60, 101293.

Li, Y., & Ran, J., (2020). Investor sentiment and stock price premium validation with Siamese twins from China. Journal of Multinational Financial Management, 57-58, 100655.

Liu, Q., Tang, J., & Tian G., (2013). Does political capital create value in the IPO market? Evidence from China. Journal of Corporate Finance, 23, 395-413.

Liu, X., (2014). Venture capitalists and portfolio companies' real activities manipulation. Review of Quantitative Finance & Accounting, 43, 173-210.

Loughran, T., (1994). NYSE vs NASDAQ returns: Market microstructure or the poor performance of initial public offerings? Journal of Financial Economics, 33(2), 241-260.

Loughran, T., & Ritter, J. R., (1995). The new issues puzzle. Journal of Finance, 50, 23-51.

Loughran, T., Ritter, J. R., & Rydqvist, K., (1994). Initial public offerings: International insights. Pacific Basin Finance Journal, 2(2), 165-199.

Loughran, T., & Ritter, J. R., (2004). Why has IPO underpricing changed over time? Financial Management, 5-37.

Low, S. W., & Yong, O., (2011). Explaining over-subscription in fixed-price IPOs: Evidence from the Malaysian stock market. Emerging Markets Review, 12, 205-216.

Low, S. W., & Yong, O., (2013). Initial public offerings and investor heterogeneity: Evidence from Malaysia. American Journal of Finance and Accounting, 3(1), 41-56.

Lowry, M., (2003). Why does IPO volume fluctuate so much? Journal of Financial Economics, 67(1), 3-40.

Lowry, M., & Schwert, G. W., (2002). IPO market cycles: Bubbles or sequential learning? Journal of Finance, 57(3), 1171-1200.

Lowry, M., Officer, M., & Schwert, G. W., (2010). The variability of IPO initial returns. Journal of Finance, 65(2), 425-465.

Ljungqvist, A., (1997). Pricing initial public offerings: Further evidence from Germany. European Economic Review, 41(7), 1309-1320.

Ljungqvist, A., (2004). IPO underpricing: empirical corporate finance. Nan Yang University Press, New York.

Ljungqvist, A., & Wilhelm, W., (2003). IPO pricing in the Dot-com bubble, Journal of Finance, 58(2), 723-752.

Ljungqvist, A., & Wilhelm, W., (2005). Does prospect theory explain IPO market behaviour? Journal of Finance, 60(4), 1750-1790.

Ljungqvist, A., Nanda, V., & Singh, R., (2006). Hot markets, investor sentiment, and IPO pricing. Journal of Business, 79(4), 1667-1702.

Lutfur, M. R., & Shamsuddin, A., (2019). Investor sentiment and the price-earnings ratio in the G7 stock markets. Pacific-Basin Finance Journal 55, 46-62.

Maddala, G. S., (2001). Introduction to Econometrics. 3rd Edition, Wiley, New York.

Maio, P. F., & Santa-Clara, P., (2017). Short-term interest rates and stock market anomalies. Journal of Financial and Quantitative Analysis, 53(3), 1-58.

Malhotra, M. S., & Nair, M., (2015). Initial public offerings' underpricing: A study on the short-run price performance of book-built IPOs in India. Paripex-Indian Journal of Research, 4(2), 197-204.

Mayur, M., & Mittal, S., (2014). Relationship between underpricing and post-IPO performance: Evidence from Indian IPOS. Asia-Pacific Journal of Management Research and Innovation, 10(2), 129-136.

McGuinness, P. B., (2009). An examination of the underpricing of initial public offerings in Hong Kong: 1980-1990. Journal of Business Finance & Accounting, 19(2), 165-186.

Menyah, K., Paudyal, K., & Inyangete, C., (1995). Subscriber return, underpricing, and long-term performance of United Kingdom privatisation initial public offers. Journal of Economics and Business, 47(5), 473-495.

Merikas, A., Merikas, A., Vozikis, G. S., & Prasad, D., (2011). Economic factors and individual investor behaviour: The case of the Greek stock exchange. Journal of Applied Business Research, 20, 93-98.

Mohd Azwan. S., (2019). Norlid Investor sentiment and stock returns: Evidence in Malaysia. Malaysian Journal of Business and Economic, 2 (December), 69-79.

Michaely, R., & Shaw, W. H., (1994). The pricing of initial public offerings: Tests of adverse-selection and signaling theories. Review of Financial Studies, 7, 279-319.

Miller, E. M., (1977). Risk, uncertainty, and divergence of opinion. Journal of Finance, 32, 1151-1168.

Miller, R. E., & Reilly, F. K., (1987). An examination of mispricing, returns, and uncertainty for initial public offerings. Financial Management, 16(2), 33-38.

Minardi, A. M., Ferrari, G. L. & Araujo T. P. C., (2013). Performances of Brazilian IPOs backed by private equity. Journal of Business Research, 66, 448-455.

Mohamed, S., Nasir, A., & Arif, M., (1994). Analysis of underpricing in the Malaysian new issues market during 1975-1990: Are new issues excessively underpriced?. Capital Markets Review, 2, 17-27.

Mohammed, A. A., & Nurwati, A. A., (2016). The effect of underwriter's market share, spread and management earnings forecasts bias and accuracy on underpricing of Malaysia IPOs. International Journal of Managerial Finance, 12(2), 351-371.

Mok, M. K., & Hui, Y. V., (1998). Underpricing and aftermarket performance of IPOs in Shanghai, China. Pacific-Basin Finance Journal, 6, 453-474.

Mohd-Rashid, R., Masih, M., Abdul-Rahim, R. & Che-Yahya, N., (2018). Does prospectus information matter in IPO pricing? Journal of Islamic Accounting and Business Research, 9(4), 514-530.

Mohd-Rashid, R., Abdul-Rahim, R., & Yong, O., (2019). The influence of lock-up provisions on IPO initial returns: Evidence from an emerging market. Economic Systems, 38(4), 487-501.

Mudambi, R., Mudambi, S. M., Khurshed, A., and Goergen, M., (2012). Multi-nationality and the performance of IPOs. Applied Financial Economics, 22(10), 763-776.

Mumtaz, M. Z., Smith, Z. A., & Masqood, A., (2016). An examination of short-run performance of IPOs using Extreme Bounds Experience. The Latin American Business Review, 8(4), 97-114.

Murugesu, J., & Santhapparaj, S., (2009). Impact of risk disclosure in the prospectus on valuation and initial returns of initial public offerings in Malaysia. Journal of Applied Finance, 16, 2-18.

Naik, P. K., & Padhi, P., (2016). Investor sentiment, stock market returns and volatility: Evidence from National stock exchange of India. International Journal of Management Practice, July, 213-237.

Narayanasamy, C., Rashid, M., & Ibrahim, I., (2017). Divergence of opinion and moderating effect of investors' attentions in IPO market: Malaysian evidence. Review of Behavioural Finance, 10(1), 105-126.

Nawadali, D., Axel, P., & Francois, D., (2019). Are IPOs underpriced or overpriced? Evidence from an emerging market. Research in International Business and Finance.

Neal, R., & Simon M. W., (1998). Do measures of investor sentiment predict returns?, Journal of Financial and Quantitative Analysis, 33, 523-547.

Nikbakht, E., & Polat, C., (1998). A global perspective of price-earnings ratio determinants: The case of ADRs. Global Finance Journal, Elsevier, 9(2), 253-267.

Norliza, C., Siti, S. S., & Nura, L. M., (2023). Pre-market individual investors' sentiment and IPO initial performance of the emerging market. Corporate Governance and Organizational Behaviour Review, 7(1), 8-17.

Norliza, C., & Yoshiyuki, M., (2021). Journal of Asian Finance, Economics and Business, 8(4), 1079-1090.

Nurwati, A. A., & Lim, B. K., (2012). The investment performance of MESDAQ market initial public offerings. Asian Academy of Management Journal of Accounting and Finance, 8(1), 1-23.

Omran, M., (2005), Underpricing and long-run performance of share issue privatisations in the Egyptian stock market. Journal of Financial Research, 28(2), 215-234.

Ong, C. Z., Ngui, Y. Y., & Teh, B. H., (2010). Can high price earnings ratio act as an indicator of the coming bear market in the Malaysia? International Journal of Business and Social Science, 1(1), 195-213.

Ong, T. S., Teh, B. H., & Ang, Y. W., (2014). The impact of environmental improvements on the financial performance of leading companies listed in Bursa Malaysia. International Journal of Trade, Economics and Finance, 5(5), 386.

Ong, C. Z., Rashid, M. R., & Taufil-Mohd, K. N., (2020). Growth opportunity and IPO value: An empirical study of Malaysian IPOs. Jurnal Pengurusan, 58(2).

Ong, C. Z., Mohd-Rashid, R., & Taufil-Mohd, K. N., (2021a). IPO valuation using the price-multiple methods: Evidence from Malaysia. Journal of Financial Reporting and Accounting. Emerald Publishing Limited.

Ong, C. Z., Mohd-Rashid, R., Mehmood, W., & Tajuddin, A. H., (2021b). Does disclosure of earnings forecasts regulation affect the valuation of IPOs? Evidence from an emerging country. Asian Review of Accounting, 29(4), 558-578.

Ong, C. Z., Mohd-Rashid, R., Anwar, A., & Mehmood, W., (2023). Earnings forecast disclosures and oversubscription rates of fixed-price initial public offerings: The case of Malaysia. Journal of Asian Business and Economic Studies, 30(4), 270-282.

Park, S., (2000). What does the price-earnings ratio mean? Journal of Investing, 9(3), 27-34.

Pastor, L., & Veronesi, P., (2005). Rational IPO waves. Journal of Finance, American Finance Association, 60(4), 1713-1757.

Paudyal, K., Saadouni, B., & Briston, R. J., (1998). Privatisation initial public offerings in Malaysia: Initial premium and long-term performance. Pacific-Basin Finance Journal, 6, 427-451.

Peng, M. W., & Luo, Y. D., (2000). Managerial ties and firm performance in a transition economy: The nature of a micro-macro link. Academy of Management Journal, 43(3), 486-501.

Perera, W., & Kulendran, N., (2014). Evaluation of short-run market performance and its determinants using binary models: Evidence from Australian IPOs.

Poonam, M., Rajan, P., & Byomakesh, D., (2023). Investor attention and IPO returns: evidence from Indian markets. Journal of economic and administrative sciences, 39(1), 1026-4116.

Purnanandam, A., & Swaminathan, B., (2004). Are IPOs really underpriced? Review of Financial Studies, 17(3), 811-848.

Pukthuanthong-Le, K., & Varaiya, N., (2007). IPO pricing, block sales, and long-term performance. The Financial Review, 42, 319-348.

Pradhan, R. S., & Shrestha, A. K., (2016). The Impact of Capital Adequacy and Bank Operating Efficiency on Financial Performance of Nepalese Commercial Banks. Nepalese Journal of Management, 3(3), 1-11.

Prasad, D., Vozikis, G. S., & Ariff, M., (2006). Government public policy, regulatory intervention, and their impact on IPO underpricing: The case of Malaysian IPOs. Journal of Small Business Management, 44, 81–98.

Price, R., Roman, F., Rountree, B., (2011). The impact of governance reform on performance and transparency. Journal of Financial Economics, 99, 76-96.

Qian, X., (2014). Small investor sentiment, differences of opinion and stock overvaluation. Journal of Financial Markets, 19, 219-246.

Rad, S. S. E., & Embong, Z., (2014). IFRS adoption and information quality: Evidence from emerging market. Asian Journal of Accounting and Governance, 5(1), 37-45.

Rajan, R., & Servaes, H., (1997). Analyst following of initial public offerings. Journal of Finance, 52, 507-529.

Ramcharran, H., (2002). An empirical analysis of the determinants of the price-earnings ratio in emerging markets. Emerging Markets Review, 3(2), 165-178.

Ramlee, R., & Ali, R., (2012). Liquidity, initial public offering long-term return and government ownership: Evidence from Bursa Malaysia IPO stocks. Asian Academy of Management Journal of Accounting and Finance, 8(1), 39-66.

Rangan, S., (1998). Earnings management and the performance of seasoned equity offerings. Journal of Financial Economics, 50(1), 101-122.

Rasidah, M., Abdul-Rahim, R., & Yong, O., (2014). The influence of lock-up provisions on IPO initial returns: Evidence from an emerging market. Economic Systems, 38, 487-501.

Rasidah, M., Ruzita, A., Norliza, C., & Ahmad, H. T., (2017). Voluntary lock-up provisions and performance of IPOs: Effects of information asymmetry. Journal of Economic Cooperation and Development, 38(4), 1-24.

Rasidah, M., Ahmad H. T., Khaw, K. L., & Ong, C. Z., (2022). The impact of changes in regulations on Malaysian IPOs. Accounting Research Journal, 35(3), 317-335.

Rehman, M. U., (2013). Investor's sentiments and stock market volatility: An empirical evidence from emerging stock market. Pakistan Journal of Commerce and Social Sciences, 7(1), 80-90.

Reilly, F. K., & Brown, K. C., (1997). Investment analysis and portfolio management (5th edition). New York: Dryden Press.

Reilly, F.K., Griggs, F.T. & Wong, W., (1983). Determinants of the aggregate stock market earning multiple. Journal of Portfolio Management, 10(1), 36-45.

Ritter, J. R., (1984). The "Hot issue" market of 1980. Journal of Business, 57, 215-240.

Ritter, J. R., (1991). The long-run performance of initial public offerings. Journal of Finance, 46, 3-27.

Ritter, J. R., (1998). Initial public offerings. Contemporary Finance Digest, 2, 5-30.

Ritter, J. R., (2003), Differences between European and American IPO market. European Journal of Management, 9, 421-434.

Ritter, J. R., & Welch, I., (2002). A review of IPO activity, pricing, and allocations. Journal of Finance, 57, 1795-1828.

Rock, K., (1986). Why new issues are underpriced? Journal of Financial Economics, 15, 187-212.

Roosenboom, P., (2007). How do underwriters value initial public offerings? An empirical analysis of the French IPO market. Contemporary Accounting Research, 24(4), 1217-1243.

Ruzita, A. R., Azhan, T. A., & Shifa, M. N., (2016). Technical analysis and its implications for the efficiency of the stock market in Malaysia. Journal of Management, 48, 3-20.

Saadouni, B., Jelic, R., & Briston, R., (2007). Performance of Malaysian IPOs: Underwriters reputation and management earnings forecasts. Pacific-Basin Finance Journal, 9(5), 457-486.

Sahudin, Z, Pardi, F, Aziz, A., (2011). The theory of capital structure in Malaysia, VDM Verlag, 1-64.

Samarakoon, L. P., (2010). The short-run underpricing of initial public offerings in the Sri Lankan stock market. Journal of Multinational Financial Management, 20, 197-213.

Sapian, R. Z. Z., Rahim, R. A., & Yong, O., (2013). IPO underpricing and aftermarket liquidity: Evidence from Malaysia. International Journal of Business and Society, 14(2), 299-318.

Schultz, P., (2003). Pseudo market timing and the long-run underperformance of IPOs. Journal of Finance, LVIII(2), 483-517.

Schmeling, M., (2009). Investor Sentiment and Stock Returns: Some International Evidence. Journal of Empirical Finance, 16, 394-408.

Shrestha, P. K., & Biggyan, R. S., (2014). Determinants of stock market performance in Nepal (No. NRB-WP-24).

Shah, A., & Khan, S., (2007). Determinants of capital structure: Evidence from Pakistani panel data. International Review of Business Research Papers, 3, 265-282.

Shamsuddin, A., Hillier, J., (2004). Fundamental determinants of the Australian price–earnings multiple. Pacific-Basin Finance Journal, 12(5), 565-576.

Shari, W., & Hassan, M. H. A., (2024). Determinants of the long-term performance of Malaysian initial public offerings. International Journal of Banking and Finance, 19(2), 211-240.

Shaw, D. C., (1971). The performance of primary common stock offerings: A Canadian comparison. Journal of Finance, 26, 1101-1113.

Shefrin, H., (2000). Beyond greed and fear, Harvard University Press, Boston.

Shi, C., Pukthuanthong, K., & Walker, T., (2013). Does disclosure regulation work? Evidence from international IPO markets. Contemporary Accounting Research, 30, 356-387.

Shiller, R. J., (1984). Stock prices and social dynamics. Brookings Papers on Economic Activity, 457-498.

Shiller, R. J., (1990a). Speculative prices and popular models. Journal of Economic Perspectives, 4, 55-65.

Shiller, R. J., (1990b). Market volatility and investor behaviour. American Economic Review, 80(2), 58-62.

Shivakumar, L., (2000). Do firms mislead investors by overstating earnings before seasoned equity offerings? Journal of Accounting and Economics, 29(3), 339-371.

Siti, S. S., & Norliza, C., (2021). Initial and long-term performance of IPOs. Does growth opportunity of issuing firm matter? Business and Economic Horizons, 15(2), 276-291.

Sohail, M., & Nasir, M., (2007). Performance of initial public offerings in Pakistan. International Review of Business Research Paper, 3(2), 420-441.

Song, S., Tan, J., & Yang, Y., (2014). IPO initial returns in China: Underpricing or overvaluation? China Journal of Accounting Research, 7(1) 31-49.

Song, Z., Gong, X., Zhang, C., & Yu, C., (2023). Investor sentiment based on scaled PCA method: A powerful predictor of realised volatility in the Chinese stock market. International Review of Economics and Finance, 83, 528-545.

Statman, M., (2014). Behavioural finance: Finance with normal people. Borsa Istanbul Review, 14, 65-73.

Studenmund, A., (2001). Using econometrics - A practical guide. Addison Wesley Longman, London.

Strong, N., & Xu, X., (2003). Understanding the equity home bias: Evidence from survey data. Review of Economics and Statistics, 85, 307-312.

Su, D., & Fleisher, B. M., (2015). An empirical investigation of underpricing in Chinese IPOs. Pacific-Basin Finance Journal, 7(2), 173-202.

Su, D., & Fleisher, B. M., (1999). An empirical investigation of underpricing in Chinese IPOs. Pacific-Basin Finance Journal, 7, 173-202.

Suchard, J., & Singh, M., (2007). Determinants of the pricing of privatisation IPOS in the United Kingdom and Australia. International Journal of Business, 12(3), 33-45.

Sulaiman, M. A., Salisi, M. S., & Bujang, I., (2020). Investor sentiment and stock returns: Evidence in Malaysia. Malaysian Journal of Business and Economics, 2.

Sum, V., (2014). Effects of business and consumer confidence on stock market returns: Cross-sectional evidence. Economic Management Financial Markets, 9(1), 21-25.

Sun, X. Q., Cheng, X. Q., & Shen, H. W., (2016). Trading network predicts stock price, Scientific Reports, 4, 3711.

Tajuddin, A. H., Mohd-Rashid, R., Abdullah, N. A. H., & Abdul-Rahim, R., (2015). An empirical examination of over-subscription in the Malaysian IPO market. International Journal of Economics and Management, 9(2), 81-102.

Takahashi, H., & Yamada, K., (2015). IPOs, growth, and the impact of relaxing listing requirements. Journal of Banking & Finance, 59, 505-519.

Taufil Mohd, K. N., (2007). Regulations and underpricing of IPOs. Capital Market Review, 15(1), 1-27.

Teoh, S. H., Welch, I., & Wong, T. J., (1998). Earnings management and the long-run market performance of initial public offerings. Journal of Finance, 53(6), 1935-1974.

Tian, L., (2011). Regulatory underpricing: Determinants of Chinese extreme IPO returns. Journal of Empirical Finance, 18(1), 78-90.

Tinic, S. M., (1988). Anatomy of initial public offerings of common stock. Journal of Finance, 43(4), 789-822.

Titman, S., & Trueman, B., (1986). Information Quality and the Valuation of New Issues. Journal of Accounting and Economics, 8(2), 159-171.

Tong, L. Y., & Ahmad, R., (2015). The signalling power of the investment banks' reputation on the performance of IPOs on Bursa Malaysia. Journal of Management, 45, 27-37.

Thaler, K. R., (1988). Anomalies: The winner's curse, Journal of Economic Perspectives, 2(1), 191-202.

Thomadakis, S., Nounis, C., & Gounopoulos, D., (2012). Long-term performance of Greek IPOs. European Financial Management, 18(1), 117-141.

Thorp, W. A., (2004). Investor Sentiment as a Contrarian Indicator.

Thorsell, A., & Isaksson, A., (2012). Director experience and the performance of IPOs: Evidence from Sweden. Australasian Accounting, Business and Finance Journal, 8(1), 3-24.

Trautmann, S. T., Vieider, F. M., & Wakker, P. P., (2008). Causes of Ambiguity Aversion: Known versus Unknown Preferences. Journal of Risk and Uncertainty, 36, 225-243.

Uddin, H., & Raj, M., (2001). Aftermarket risk and underpricing of initial public offers in the Arabian Gulf Countries: An empirical analysis. The International Journal of Business and Finance Research, 6 (3), 123-138.

Uygur, U. & Tas, O., (2012). Modelling the effects of investor sentiment and conditional volatility in international stock markets. Journal of Applied Finance and Banking, 2(5), 239.

Van Heerden G., & Alagidede, P., (2012). Short-run underpricing of initial public offerings in the Johannesburg stock exchange. Review of Development Finance, 2(3-4), 130-138.

Vega, C., (2006). Stock price reaction to public and private information. Journal of Financial Economics, 82, 103-133.

Verma, R., & Soydemir, G., (2009). The impact of individual and institutional investor sentiment on the market price of risk. Quarterly Review of Economics and Finance, 49(3), 1129-1145.

Vincent, O., & Bamiro, K., (2013). Fluctuations in stock market prices: What went wrong, its implications to Nigerian economy? International Journal of Computer Applications, 63, 13-20.

Wadhwa, K., Reddy, V. N., Goyal, A., & Mohamed, A., (2014). Initial public offerings and secondary equity offerings, real investments, and market timing: Emerging market evidence. Journal of International Financial Markets, Institutions and Money, 45, 21-41.

Wan-Hussin, W. N., (2005). The effects of owners' participation and lockup on IPO underpricing in Malaysia. Asian Academy of Management Journal, January, 19-36.

Wang, J., Liu, S., & Wu, C., (2003). Does underwriter reputation affect the performance of IPO issues? Journal of Entrepreneurial Finance and Business Ventures, 8(3), 17-41.

Wang, H., Keswani, A., & Taylor, S. J., (2006). The relationships between sentiment, returns and volatility. International Journal of Forecasting, 22(1), 109-123.

Weigand, R. A., & Irons, R., (2007). The market price-earnings ratio, earnings trends, and stock return forecasts. Journal of Portfolio Management Summer, 33(4), 87-101.

Welch, I., (1989). Seasoned offerings, imitation costs, and the underpricing of initial public offerings. Journal of Finance, 44(2), 421-449.

Welch, I., (1992), Sequential sales, learning, and cascades. Journal of Finance, 44(2), 695-732.

Wen, Y. F., & Cao, M. H., (2013). Short-run and the long-run performance of IPOs: Evidence from Taiwan stock market. Journal of Finance and Accounting, 1, 32-40.

White, H., (1980). A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. Econometrica, 48, 817-838.

White, B., (2000). What price-earnings will the US stock market support? Finance Analysts Journal, 56(6), 30-38.

Wong, S. K., Wong, W. B., & Lee, S. T., (2017). Initial public offerings underpricing in Malaysian settings. Journal of Economic & Financial Studies, 5(3), 14-25.

Wu, C., (2014). Underpricing of homecoming A-share IPOs by Chinese firms already listed abroad, Review of Quantitative Finance and Accounting, 43, 627-649.

Xia. Y., & Xu, X., (2013). Internal corporate governance and the use of IPO over-financing: Evidence from China. China Journal of Accounting Research, 5(3), 231-249.

Xie, C., & Wang, Y., (2017). Does online investor sentiment affect the asset price movement? Evidence from the Chinese stock market. Nonlinear Problems: Mathematical Modelling, Analysing, and Computing for Finance 2016.

Yatim, P., (2011). Underpricing and board structures: An investigation of Malaysian initial public offerings (IPOs). Asian Academy of Management Journal of Accounting and Finance, 7(1), 73-93.

Yong, O., (1991). Performance of IPOs of securities in Malaysia, Malaysian Accountant, 3-6.

Yong, O., (1996). Size of the firm, over-subscription ratio and performance of IPOs, Malaysian Management Review, 31(2), 28-39.

Yong, O., Yatim, P., & Sapian, R. Z. Z., (2002). Size of offer, over subscription ratio and performance of Malaysian IPOs. Malaysian Management Journal, 6(1-2), 35-51.

Yong, O., (2007a). A review of IPO research in Asia: What's next? Pacific-Basin Finance Journal, 15, 253-275.

Yong, O., (2007b). Investor demand, size effect and performance of Malaysian initial public offerings: Evidence from post-1997 financial crisis. Journal of Management, 26, 25-47.

Yong, O., & Ibrahim, I., (1999). Is there day-of-the-week effect in the Malaysian Stock Market? Journal of Management, 18, 25-38.

Yong, O., & Isa, Z., (2003). Initial performance of new issues of shares in Malaysia. Applied Economics, 35, 919-930.

Yong, O., (2011). Winner's curse and bandwagon effect in Malaysian IPOs: Evidence from 2001-2009. Journal of Management, 32, 21-26.

Yong, O., (2013). Winner's curse, size effect and bandwagon effect in explaining the underpricing phenomenon of Malaysian IPOs. Current Research in Malaysia, 2(1), 101-120.

Yong, O., (2015). What is the "true" value of an initial public offering? Journal of Scientific Research and Development, 2(10), 78-85.

Yu, T., & Tse, Y. K., (2005). An empirical examination of IPO underpricing in the Chinese A-share market. China Economic Review, 17, 363-382.

Yung, C., & Zender, J. F., (2010). Moral hazard, asymmetric information and IPO lockups, Journal of Corporate Finance, Elsevier, 16(3), 320-332.

Zainudin, Z., & Mohd Zaki, Z., & Abdul Hadi, A. R., & Hussain, H. I., & Kantakji, M. H., (2019). Investor sentiment and firm financial performance of Malaysian IPO firms: Pre and post financial crisis. International Journal of Financial Research, International Journal of Financial Research, Sciedu Press, 11(5), 450-458.

Zaharyeva, I., (2009). Herding toward the market: Evidence from the stock market of Ukraine. Kyiv School of Economics.

Zarafat, H., & Vejzagic, M., (2014). The long-term performance of initial public offerings: Evidence from Bursa Malaysia. Journal of Applied Economics and Business Research, 4(1), 42-51.

Zhang, C., (2008). Defining, modelling, and measuring investor sentiment. University of California, Berkeley, Department of Economics.

Zhang, Y., He, M., Wang, Y., & Liang, C., (2022). Global economic policy uncertainty aligned: An informative predictor for crude oil market volatility. International Journal of Forecasting.

Zhang, Q., & Yang, S., (2009). Noise trading, investor sentiment volatility, and stock returns. Systems Engineering – Theory & Practice, 29(3), 40-47.

Zhou, J., & Lao, L. J., (2012). Analysis of influencing factors of IPO underpricing in ChiNext. Physics Procedia, 33, 846-851.

Zhu, B., & Niu, F., (2016). Investor sentiment, accounting information and stock price: Evidence from China. Pacific-Basin Finance Journal, 38, 125-134.

Zingales, L., (1995). Insider ownership and the decision to go public. Review of Economic Studies, 62(3), 425-448.

APPENDIX I

Descriptive analysis for dependent variable and independent variables and results of OLS regression models to explain long-run share performance of IPOs with window periods T+1 month, T+3 month, T+6 month, T+9 month, T+12 month, T+24 month, T+36 month and T+48 month

(i) Descriptive analysis for dependent variable and independent variables with window periods T+1 month, T+3 month, T+6 month, T+9 month, T+12 month, T+24 month, T+36 month and T+48 month

Dependent variables	N	Mean	Median	Maximum	Minimum	Standard deviation
BHAR (VW_1)	262	-.0175	-.0011	.0278	-.1411	.1919
Independent variables	N	Mean	Median	Maximum	Minimum	Standard deviation
Panel A : Behavioural Characteristics						
IPO market sentiment ($MIMSI^{PCA-LR}$)	249	-.4734	-.0634	1.5659	-2.8719	1.4187
IPO market sentiment ($MIMSI^{sPCA-LR}$)	249	.4734	.0634	2.8719	-1.5659	1.4187
IPO market sentiment ($MIMSI^{PLS-LR}$)	249	.7839	.8061	1.3269	.2597	.2390
Panel B : Issue Characteristics						
Initial return (IR)	262	.2569	.1324	2.6200	-.4285	.5232
Offer size (OSIZE)	261	17.3746	17.1179	21.6726	15.3683	1.2694
Panel C : Firm Characteristics						
Firm age (FAGE)	262	19.5610	18.0000	52.0000	1.0000	10.8540
Board size (BSIZE)	262	7.1679	7.0000	13.0000	4.0000	1.7925
Major shareholder ownership (MAJOR)	262	62.6817	64.6650	80.5600	31.6900	10.7529
Panel D : Market Characteristics						
Market volatility (MVL)	262	.0069	.0058	.0158	.0031	.0029
Oversubscription ratio (OVER)	262	26.2773	12.5800	227.0100	.0000	39.5128

Table II(1)(a) : Descriptive summary of dependent variable and independent variables (long-run share performance of IPOs) with window period T+1 month

Dependent variables	N	Mean	Median	Maximum	Minimum	Standard deviation
BHAR (VW_3)	297	-.0188	-.0012	.0295	-.5426	.1613
Independent variables	**N**	**Mean**	**Median**	**Maximum**	**Minimum**	**Standard deviation**
Panel A : Behavioural Characteristics						
IPO market sentiment ($MIMSI^{PCA-LR}$)	283	-.4118	-.0312	1.5659	-2.7246	1.4059
IPO market sentiment ($MIMSI^{sPCA-LR}$)	283	.4118	.0312	2.7246	-1.5659	1.4059
IPO market sentiment ($MIMSI^{PLS-LR}$)	283	.7799	.8020	1.3085	.2534	.2332
Panel B : Issue Characteristics						
Initial return (IR)	297	.2624	.1333	2.6200	-.5055	.5126
Offer size (OSIZE)	296	17.4008	17.1251	22.5569	15.3683	1.3190
Panel C : Firm Characteristics						
Firm age (FAGE)	297	20.1144	19.0000	57.0000	1.0000	11.0972
Board size (BSIZE)	297	7.1818	7.0000	13.0000	4.0000	1.8141
Major shareholder ownership (MAJOR)	297	62.2206	63.9500	80.5600	30.4400	10.6778
Panel D : Market Characteristics						
Market volatility (MVL)	297	.0070	.0058	.0158	.0031	.0030
Oversubscription ratio (OVER)	297	25.9843	13.1100	227.0100	.0000	38.6728

Table II(1)(b) : Descriptive summary of dependent variable and independent variables (long-run share performance of IPOs) with window period T+3 month

Dependent variables	N	Mean	Median	Maximum	Minimum	Standard deviation
BHAR (VW_6)	321	-.0147	-.0012	.0242	-.1841	.1293
Independent variables	**N**	**Mean**	**Median**	**Maximum**	**Minimum**	**Standard deviation**
Panel A : Behavioural Characteristics						
IPO market sentiment ($MIMSI^{PCA-LR}$)	307	-.4597	-.0634	1.5384	-2.7246	1.3720
IPO market sentiment ($MIMSI^{sPCA-LR}$)	307	.4597	.0634	2.7246	-1.5384	1.3720
IPO market sentiment ($MIMSI^{PLS-LR}$)	307	.7832	.8020	1.3085	.2597	.2222
Panel B : Issue Characteristics						
Initial return (IR)	321	.2567	.1315	2.4642	-.4270	.5029
Offer size (OSIZE)	320	17.3952	17.1154	21.6726	15.4530	1.3267
Panel C : Firm Characteristics						
Firm age (FAGE)	321	20.2056	19.0000	57.0000	2.0000	11.3757
Board size (BSIZE)	321	7.2367	7.0000	13.0000	4.0000	1.9669
Major shareholder ownership (MAJOR)	321	61.2377	62.7800	79.3800	28.6700	11.0698
Panel D : Market Characteristics						
Market volatility (MVL)	321	.0069	.0057	.0152	.0028	.0029
Oversubscription ratio (OVER)	321	25.3900	12.8800	212.5900	.0000	37.8495

Table II(1)(c) : Descriptive summary of dependent variable and independent variables (long-run share performance of IPOs) with window period T+6 month

Dependent variables	N	Mean	Median	Maximum	Minimum	Standard deviation
BHAR (VW_9)	333	-.0190	-.0017	.0226	-.3590	.1183
Independent variables	N	Mean	Median	Maximum	Minimum	Standard deviation
Panel A : Behavioural Characteristics						
IPO market sentiment ($MIMSI^{PCA\text{-}LR}$)	321	-.4398	-.5140	1.5424	-2.7246	1.3504
IPO market sentiment ($MIMSI^{sPCA\text{-}LR}$)	321	.4398	.5140	2.7246	-1.5424	1.3504
IPO market sentiment ($MIMSI^{PLS\text{-}LR}$)	321	.7789	.7972	1.3085	.2534	.2161
Panel B : Issue Characteristics						
Initial return (IR)	333	.2465	.1086	2.4642	-.4285	.4982
Offer size (OSIZE)	332	17.3647	17.1100	21.6726	15.4530	1.3248
Panel C : Firm Characteristics						
Firm age (FAGE)	333	20.4534	19.0000	57.0000	3.0000	20.4534
Board size (BSIZE)	333	7.2522	7.0000	13.0000	4.0000	1.9626
Major shareholder ownership (MAJOR)	333	60.0905	61.9000	77.0300	26.3100	11.5915
Panel D : Market Characteristics						
Market volatility (MVL)	333	.0071	.0060	.0158	.0029	.0030
Oversubscription ratio (OVER)	333	25.3259	13.0500	212.5900	.0000	37.5596

Table II(1)(d) : Descriptive summary of dependent variable and independent variables (long-run share performance of IPOs) with window period T+9 month

Dependent variables	N	Mean	Median	Maximum	Minimum	Standard deviation
BHAR (VW_12)	337	-.0178	-.0017	.0306	-.3090	.1316
Independent variables	N	Mean	Median	Maximum	Minimum	Standard deviation
Panel A : Behavioural Characteristics						
IPO market sentiment ($MIMSI^{PCA\text{-}LR}$)	327	-.4018	-.0634	1.5384	-2.7246	1.3267
IPO market sentiment ($MIMSI^{sPCA\text{-}LR}$)	327	.4018	.0634	2.7246	-1.5384	1.3267
IPO market sentiment ($MIMSI^{PLS\text{-}LR}$)	327	.7731	.7972	1.3085	.2597	.2082
Panel B : Issue Characteristics						
Initial return (IR)	337	.2495	.1097	2.4642	-.4270	.4951
Offer size (OSIZE)	336	17.3570	17.1062	21.6726	15.4530	1.3172
Panel C : Firm Characteristics						
Firm age (FAGE)	337	20.5430	19.0000	58.000	3.0000	11.2182
Board size (BSIZE)	337	7.2818	7.0000	13.0000	4.0000	1.9641
Major shareholder ownership (MAJOR)	337	59.4947	61.5300	77.0300	24.5500	12.1221
Panel D : Market Characteristics						
Market volatility (MVL)	337	.0071	.0059	.0159	.0028	.0031
Oversubscription ratio (OVER)	337	25.6585	13.1100	212.5900	.0000	37.5447

Table II(1)(e) : Descriptive summary of dependent variable and independent variables (long-run share performance of IPOs) with window period T+12 month

Dependent variables	N	Mean	Median	Maximum	Minimum	Standard deviation
BHAR (VW_24)	347	-.0169	-.0025	.0183	-.2789	.1466
Independent variables	N	Mean	Median	Maximum	Minimum	Standard deviation
Panel A : Behavioural Characteristics						
IPO market sentiment ($MIMSI^{PCA\text{-}LR}$)	346	-.2354	.1242	1.5424	-2.7246	1.2486
IPO market sentiment ($MIMSI^{sPCA\text{-}LR}$)	346	.2354	-.1242	2.7246	-1.5424	1.2486
IPO market sentiment ($MIMSI^{PLS\text{-}LR}$)	346	.7597	.7971	1.3085	.2597	.1904
Panel B : Issue Characteristics						
Initial return (IR)	347	.2601	.1315	2.4642	-.4270	.5001
Offer size (OSIZE)	346	17.3107	17.0315	21.6726	15.4530	1.3076
Panel C : Firm Characteristics						
Firm age (FAGE)	347	21.2190	19.0000	59.0000	4.0000	11.4145
Board size (BSIZE)	347	7.2997	7.0000	13.0000	5.0000	1.9149
Major shareholder ownership (MAJOR)	347	57.3398	59.5900	79.3800	19.7900	13.6128
Panel D : Market Characteristics						
Market volatility (MVL)	347	.0071	.0059	.0159	.0032	.0031
Oversubscription ratio (OVER)	347	26.0010	13.3400	212.5900	.0000	37.4485

Table II(1)(f) : Descriptive summary of dependent variable and independent variables (long-run share performance of IPOs) with window period T+24 month

Dependent variables	N	Mean	Median	Maximum	Minimum	Standard deviation
BHAR (VW_36)	341	-.0207	-.0030	.0419	-.4202	.1454
Independent variables	**N**	**Mean**	**Median**	**Maximum**	**Minimum**	**Standard deviation**
Panel A : Behavioural Characteristics						
IPO market sentiment ($MIMSI^{PCA-LR}$)	341	.0451	.3209	1.5384	-2.4679	1.1292
IPO market sentiment ($MIMSI^{sPCA-LR}$)	341	-.0451	-.3209	2.4679	-1.5384	1.1292
IPO market sentiment ($MIMSI^{PLS-LR}$)	341	.7320	.7883	1.1747	.2597	.1734
Panel B : Issue Characteristics						
Initial return (IR)	341	.2530	.1133	2.4642	-.4270	.5009
Offer size (OSIZE)	340	17.3366	17.0208	21.6726	15.5019	1.3327
Panel C : Firm Characteristics						
Firm age (FAGE)	341	22.2170	20.0000	60.0000	5.0000	11.2587
Board size (BSIZE)	341	7.4457	7.0000	13.0000	4.0000	1.9191
Major shareholder ownership (MAJOR)	341	55.2314	57.6100	81.8800	12.9200	14.6677
Panel D : Market Characteristics						
Market volatility (MVL)	341	.0072	.0058	.0159	.0025	.0032
Oversubscription ratio (OVER)	341	25.9002	13.0500	212.5900	.0000	37.7409

Table II(1)(g) : Descriptive summary of dependent variable and independent variables (long-run share performance of IPOs) with window period T+36 month

Dependent variables	N	Mean	Median	Maximum	Minimum	Standard deviation
BHAR (VW_48)	345	-.0087	-.0027	.0953	-.1123	.0776
Independent variables	**N**	**Mean**	**Median**	**Maximum**	**Minimum**	**Standard deviation**
Panel A : Behavioural Characteristics						
IPO market sentiment ($MIMSI^{PCA-LR}$)	345	.2579	.5859	1.5384	-2.3141	1.0243
IPO market sentiment ($MIMSI^{sPCA-LR}$)	345	-.2579	-.5859	2.3141	-1.5384	1.0243
IPO market sentiment ($MIMSI^{PLS-LR}$)	345	.6994	.7474	1.0412	.2597	.1590
Panel B : Issue Characteristics						
Initial return (IR)	345	.2539	.1250	1.9411	-.4270	.4882
Offer size (OSIZE)	344	17.3062	16.9943	21.4814	15.5786	1.2872
Panel C : Firm Characteristics						
Firm age (FAGE)	345	23.1565	21.0000	61.0000	6.0000	11.3454
Board size (BSIZE)	345	7.3507	7.0000	14.0000	4.0000	1.9828
Major shareholder ownership (MAJOR)	345	53.3379	55.9700	81.6230	7.3500	16.4937
Panel D : Market Characteristics						
Market volatility (MVL)	345	.0076	.0063	.0158	.0025	.0034
Oversubscription ratio (OVER)	345	25.1438	13.2000	212.5900	.0000	36.7126

Table II(1)(h) : Descriptive summary of dependent variable and independent variables (long-run share performance of IPOs) with window period T+48 month

The above table provide descriptive summary of independent variables in terms of total number of observations 'N', mean value, median value, minimum, maximum and standard deviation. The dummy variables (i) underwriter reputation, (ii) hot issue market, and (iii) board listing are excluded from the table.

(ii) Results of OLS regression model to explain long-run share performance of IPOs with window periods T+1 month, T+3 month, T+6 month, T+9 month, T+12 month, T+24 month, T+36 month and T+48 month

<u>T+1 month</u>

Table II(2)(a) provides the estimation of equation by using OLS regression model with $MIMSI^{PCA-LR}$. The R-squared is 0.1480 indicates that 14.80% of the total variance in the IPO's long-run share performance is accounted for independent variables. Board size (BSIZE) is statistically significant at 10%.

Table II(2)(a) provides the estimation of equation by using OLS regression model with $MIMSI^{sPCA-LR}$. The R-squared is 0.1480 indicates that 14.80% of the total variance in the IPO's long-run share performance is accounted for independent variables. Board size (BSIZE) is statistically significant at 10%.

Table II(2)(a) provides the estimation of equation by using OLS regression model with $MIMSI^{PLS-LR}$. The R-squared is 0.1427 indicates that 14.27% of the total variance in the IPO's long-run share performance is accounted for independent variables. Board size (BSIZE) is statistically significant at 10%.

<u>T+3 month</u>

Table II(2)(a) provides the estimation of equation by using OLS regression model with $MIMSI^{PCA-LR}$. The R-squared is 0.2116 indicates that 21.16% of the total variance in the IPO's long-run share performance is accounted for independent variables. Offer size (OSIZE), oversubscription ratio (OVER), and board listing (BLIST) are statistically significant at 10%.

Table II(2)(a) provides the estimation of equation by using OLS regression model with $MIMSI^{sPCA-LR}$. The R-squared is 0.2116 indicates that 21.16% of the total variance in the IPO's long-run share performance is accounted for independent variables. Offer size (OSIZE), oversubscription ratio (OVER), and board listing (BLIST) are statistically significant at 10%.

Table II(2)(a) provides the estimation of equation by using OLS regression model with $MIMSI^{PLS-LR}$. The R-squared is 0.2020 indicates that 20.20% of the total variance in the IPO's long-run share performance is accounted for independent variables. Offer size (OSIZE), oversubscription ratio (OVER), and board listing (BLIST) are statistically significant at 10%.

<u>T+6 month</u>

Table II(2)(a) provides the estimation of equation by using OLS regression model with $MIMSI^{PCA\text{-}LR}$. The R-squared is 0.1536 indicates that 15.36% of the total variance in the IPO's long-run share performance is accounted for independent variables. There is no statistically significant variables in the analysis.

Table II(2)(a) provides the estimation of equation by using OLS regression model with $MIMSI^{sPCA\text{-}LR}$. The R-squared is 0.1536 indicates that 15.36% of the total variance in the IPO's long-run share performance is accounted for independent variables. There is no statistically significant variables in the analysis.

Table II(2)(a) provides the estimation of equation by using OLS regression model with $MIMSI^{PLS\text{-}LR}$. The R-squared is 0.1453 indicates that 14.53% of the total variance in the IPO's long-run share performance is accounted for independent variables. There is no statistically significant variables in the analysis, saved for IPO market sentiment ($MIMSI^{PLS\text{-}LR}$) is statistically significant at 10%.

Independent variables	Dependent variable: BHAR (VW)			Dependent variable: BHAR (VW)			Dependent variable: BHAR (VW)		
	T+1 month			T+3 month			T+6 month		
	PCA	sPCA	PLS	PCA	sPCA	PLS	PCA	sPCA	PLS
MIMSI	.0135	-.0135	-.0348	.0240	-.0240	-.1160	.0124	-.0124	-.0402*
	(1.23)	(-1.23)	(-1.25)	(1.58)	(-1.58)	(-1.60)	(1.56)	(-1.56)	(-1.72)
IR	-.0084	-.0084	-.0095	-.0051	-.0051	-.0055	-.0104	-.0104	-.0111
	(-.75)	(-.75)	(-.76)	(-.86)	(-.86)	(-.93)	(-1.44)	(-1.44)	(-1.37)
OSIZE	-.0698	-.0698	-.0653	-.0680*	-.0680*	-.0636*	-.0472	-.0472	-.0438
	(-1.23)	(-1.23)	(-1.24)	(-1.72)	(-1.72)	(-1.72)	(-1.47)	(-1.47)	(-1.46)
UREP	.0651	.0651	.0611	.0518	.0518	.0481	.0429	.0429	.0392
	(1.00)	(1.00)	(.99)	(1.13)	(1.13)	(1.10)	(1.08)	(1.08)	(1.05)
FAGE	.0015	.0015	.0017	-.0008	-.0008	-.0008	.0009	.0009	.0010
	(1.18)	(1.18)	(1.16)	(-.93)	(-.93)	(-.84)	(1.08)	(1.08)	(1.09)
BSIZE	-.0070*	-.0070*	-.0070*	-.0027	-.0027	-.0024	-.0023	-.0023	-.0027
	(-1.73)	(-1.73)	(-1.69)	(-.86)	(-.86)	(-.70)	(-.98)	(-.98)	(-1.03)
MAJOR	-.0005	-.0005	-.0004	-.0011	-.0011	-.0009	-.0006	-.0006	-.0004
	(-1.02)	(-1.02)	(-.92)	(-1.54)	(-1.54)	(-1.46)	(-1.38)	(-1.38)	(-1.30)
MVL	-1.401	-1.401	-.9025	-.0137	-.0137	1.3460	.0645	.0645	.6952
	(-.79)	(-.79)	(-.53)	(-.01)	(-.01)	(.61)	(.06)	(.06)	(.51)
OVER	-.0001	-.0001	-.0001	-.0001*	-.0001*	-.0001*	-.0001	-.0001	-.0001
	(-.91)	(-.91)	(-1.00)	(-1.66)	(-1.66)	(-1.79)	(-1.38)	(-1.38)	(-1.48)
BLIST	.0330	.0330	.0266	.0459*	.0459*	.0463*	.0186	.0186	.0157
	(1.19)	(1.19)	(1.25)	(1.67)	(1.67)	(1.69)	(1.30)	(1.30)	(1.32)
Constant	1.2394	1.2394	1.1730	1.2500*	1.2500*	1.2320*	.8327	.8327	.7892
	(1.27)	(1.27)	(1.28)	(1.77)	(1.77)	(1.77)	(1.49)	(1.49)	(1.51)
F-statistics	.59	.59	.63	1.00	1.00	.98	1.02	1.02	1.02
R-squared	.1480	.1480	.1427	.2116	.2116	.2020	.1536	.1536	.1453
Root mean squared error	.1858	.1858	.1864	.1496	.1496	.1506	.1239	.1239	.1245
Observations	248	248	248	282	282	282	306	306	306

Table II(2)(a) : Long-run share performance of IPOs determinants based on OLS regression model with window period T+1, T+3 and T+6 month

T+9 month

Table II(2)(b) provides the estimation of equation by using OLS regression model with $MIMSI^{PCA\text{-}LR}$. The R-squared is 0.3062 indicates that 30.62% of the total variance in the IPO's long-run share performance is accounted for independent variables. IPO market sentiment (MIMSI) is statistically significant at 1%. Offer size (OSIZE), major shareholder ownership (MAJOR), and board listing (BLIST) are statistically significant at 5%. Whereas, initial returns (IR) and oversubscription ratio (OVER) are statistically significant at 10%.

Table II(2)(b), Model 4 (overall) provides the estimation of equation by using OLS regression model with $MIMSI^{sPCA\text{-}LR}$. The R-squared is 0.3062 indicates that 30.62% of the total variance in the IPO's long-run share performance is accounted for independent variables. IPO market sentiment (MIMSI) and offer size (OSIZE) are statistically significant at 1%. Major shareholder ownership (MAJOR), and board listing (BLIST) are statistically significant at 5%. Whereas, initial returns (IR) and oversubscription ratio (OVER) are statistically significant at 10%.

Table II(2)(b) provides the estimation of equation by using OLS regression model with $MIMSI^{PLS\text{-}LR}$. The R-squared is 0.3011 indicates that 30.11% of the total variance in the IPO's long-run share performance is accounted for independent variables. IPO market sentiment (MIMSI) and offer size (OSIZE) are statistically significant at 1%. Oversubscription ratio (OVER) and board listing (BLIST) are statistically significant at 5%. Whereas, major shareholder ownership (MAJOR) is statistically significant at 10%.

T+12 month

Table II(2)(b) provides the estimation of equation by using OLS regression model with $MIMSI^{PCA\text{-}LR}$. The R-squared is 0.2132 indicates that 21.32% of the total variance in the IPO's long-run share performance is accounted for independent variables. Initial returns (IR) and offer size (OSIZE) are statistically significant at 5%. IPO market sentiment ($MIMSI^{PCA\text{-}LR}$) and board listing (BLIST) are statistically significant at 10%.

Table II(2)(b) provides the estimation of equation by using OLS regression model with $MIMSI^{sPCA\text{-}LR}$. The R-squared is 0.2132 indicates that 21.32% of the total variance in the IPO's long-run share performance is accounted for independent variables. Initial returns (IR) and offer size (OSIZE) are statistically significant at 5%. IPO market sentiment ($MIMSI^{sPCA\text{-}LR}$) and board listing (BLIST) are statistically significant at 10%.

Table II(2)(b) provides the estimation of equation by using OLS regression model with $MIMSI^{PLS\text{-}LR}$. The R-squared is 0.2143 indicates that 21.43% of the total variance in the IPO's long-run share performance is accounted for independent variables. Initial returns (IR) and offer size (OSIZE) are statistically significant at 5%. IPO market sentiment ($MIMSI^{PLS\text{-}LR}$) and board listing (BLIST) are statistically significant at 10%.

T+24 month

Table II(2)(b) provides the estimation of equation by using OLS regression model with $MIMSI^{PCA\text{-}LR}$. The R-squared is 0.1236 indicates that 12.36% of the total variance in the IPO's long-run share performance is accounted for independent variables. IPO market sentiment ($MIMSI^{PCA\text{-}LR}$) is statistically significant at 5%. Initial returns (IR) is statistically significant at 10%.

Table II(2)(b) provides the estimation of equation by using OLS regression model with $MIMSI^{sPCA\text{-}LR}$. The R-squared is 0.1236 indicates that 12.36% of the total variance in the IPO's long-run share performance is accounted for independent variables. IPO market sentiment ($MIMSI^{sPCA\text{-}LR}$) is statistically significant at 5%. Initial returns (IR) is statistically significant at 10%.

Table II(2)(b) provides the estimation of equation by using OLS regression model with $MIMSI^{PLS\text{-}LR}$. The R-squared is 0.1291 indicates that 12.91% of the total variance in the IPO's long-run share performance is accounted for independent variables. Initial return (IR) is statistically significant at 10%.

Independent variables	Dependent variable: BHAR (VW)			Dependent variable: BHAR (VW)			Dependent variable: BHAR (VW)		
	T+9 month			T+12month			T+24 month		
	PCA	sPCA	PLS	PCA	sPCA	PLS	PCA	sPCA	PLS
MIMSI	.0183*** (3.08)	-.01830*** (-3.08)	-.0998*** (-3.21)	.0176* (1.92)	-.0176* (-1.92)	-.1090* (-1.94)	.0179** (2.05)	-.0179** (-2.05)	-.1280 (-1.54)
IR	-.0087* (-1.66)	-.0087* (-1.66)	-.0086 (-1.51)	-.0105** (-2.24)	-.0105** (-2.24)	-.0099** (-1.99)	-.0077* (-1.70)	-.0077* (-1.70)	-.0075* (-1.78)
OSIZE	-.0598** (-2.76)	-.0598*** (-2.76)	-.0569*** (-2.72)	-.0564** (-2.14)	-.0564** (-2.14)	-.0543** (-2.12)	-.0482 (-1.49)	-.0482 (-1.49)	-.0474 (-1.44)
UREP	.0382 (1.52)	.0382 (1.52)	.0343 (1.43)	.0296 (1.18)	.0296 (1.18)	.0255 (1.10)	.0356 (1.02	.0356 (1.02)	.0337 (.96)
FAGE	.0006 (1.08)	.0006 (1.08)	.0007 (1.10)	.0003 (.50)	.0003 (.50)	.0003 (.48)	-.0003 (-.66)	-.0003 (-.66)	-.0004 (-.82)
BSIZE	-.0043 (-1.27)	-.0043 (-1.27)	-.0045 (-1.37)	-.0029 (-.72)	-.0029 (-.72)	-.0029 (-.79)	.0026 (.76)	.0026 (.76)	.0026 (.79)
MAJOR	-.0007** (-1.96)	-.0007** (-1.96)	-.0006* (-1.67)	-.0004 (-.91)	-.0004 (-.91)	-.0004 (-.70)	-.0001 (-.18)	-.0001 (-.18)	-.00001 (-.02)
MVL	-.3218 (-.24)	-.3218 (-.24)	1.083 (.77)	-2.7348 (-1.41)	-2.7348 (-1.41)	-1.3883 (-.96)	-.2635 (-.17)	-.2635 (-.17)	1.0160 (.50)
OVER	-.00009* (-1.61)	-.00009* (-1.61)	-.0001** (-2.02)	-.0001 (-1.36)	-.0001 (-1.36)	-.0001 (-1.52)	-.00005 (-.88)	-.00005 (-.88)	-.00006 (-.98)
BLIST	.0345** (2.53)	.0345** (2.53)	.0345** (2.53)	.0364* (1.87)	.0364* (1.87)	.0389* (1.82)	.0319 (1.33)	.0319 (1.33)	.0316 (1.20)
Constant	1.066*** (2.79)	1.066*** (2.79)	1.070*** (2.80)	1.006** (2.09)	1.006** (2.09)	1.030** (2.06)	.7915 (1.44)	.7915 (1.41)	.8590 (1.41)
F-statistics	2.01***	2.01***	1.56	1.02	1.02	.87	1.61	1.61	1.23
R-squared	.3062	.3062	.3011	.2132	.2132	.2143	.1236	.1236	.1291
Root mean squared error	.1021	.1021	.1025	.1206	.1206	.1205	.1397	.1392	.1392
Observations	320	320	320	326	326	326	345	345	345

Table II(2)(b) : Long-run share performance of IPOs determinants based on OLS regression model with window period T+9, T+12 and T+24 month

T+36 month

Table II(2)(c) provides the estimation of equation by using OLS regression model with $MIMSI^{PCA\text{-}LR}$. The R-squared is 0.1839 indicates that 18.39% of the total variance in the IPO's long-run share performance is accounted for independent variables. IPO market sentiment ($MIMSI^{PCA\text{-}LR}$) and offer size (OSIZE) are statistically significant at 5%. Whereas, board listing (BLIST) is statistically significant at 10%.

Table II(2)(c) provides the estimation of equation by using OLS regression model with $MIMSI^{sPCA\text{-}LR}$. The R-squared is 0.1839 indicates that 18.39% of the total variance in the IPO's long-run share performance is accounted for independent variables. IPO market sentiment (MIMSI) and offer size (OSIZE) are statistically significant at 5%. Whereas, board listing (BLIST) is statistically significant at 10%.

Table II(2)(c) provides the estimation of equation by using OLS regression model with $MIMSI^{PLS\text{-}LR}$. The R-squared is 0.1952 indicates that 19.52% of the total variance in the IPO's long-run share performance is accounted for independent variables. IPO market sentiment (MIMSI) and offer size (OSIZE) are statistically significant at 5%. Whereas, board listing (BLIST) is statistically significant at 10%.

T+48 month

Table II(2)(c) provides the estimation of equation by using OLS regression model with $MIMSI^{PCA\text{-}LR}$. The R-squared is 0.0451 indicates that 4.51% of the total variance in the IPO's long-run share performance is accounted for independent variables. Market volatility (MVL) is significant at 1%.

Table II(2)(c), Model 4 (overall) provides the estimation of equation by using OLS regression model with $MIMSI^{sPCA\text{-}LR}$. The R-squared is 0.0451 indicates that 4.51% of the total variance in the IPO's long-run share performance is accounted for independent variables. Market volatility (MVL) is significant at 1%.

Table II(2)(c) provides the estimation of equation by using OLS regression model with MIMSI$^{PLS\text{-}LR}$. The R-squared is 0.0543 indicates that 5.43% of the total variance in the IPO's long-run share performance is accounted for independent variables. Market volatility (MVL) is significant at 10%.

Independent variables	Dependent variable: BHAR (VW)			Dependent variable: BHAR (VW)		
	T+36 month			T+48 month		
	PCA	sPCA	PLS	PCA	sPCA	PLS
MIMSI	.0216** (2.10)	-.0216** (-2.10)	-.1598** (-2.25)	.0094 (1.59)	-.0094 (-1.59)	-.0766 (-1.33)
IR	-.0060 (-1.07)	-.0060 (-1.07)	-.0081 (-1.47)	-.0028 (-.68)	-.0028 (-.68)	-.0028 (-.79)
OSIZE	-.0561** (-2.04)	-.0561** (-2.04)	-.0560** (-2.03)	-.0129 (-.70)	-.0129 (-.70)	-.0134 (-.70)
UREP	.0365 (1.21)	.0365 (1.21)	.0344 (1.11)	.0074 (.40)	.0074 (.40)	.0072 (.38)
FAGE	.0008 (.81)	.0008 (.81)	.0009 (.95)	.0006 (1.21)	.0006 (1.21)	.0006 (1.31)
BSIZE	-.0036 (-.91)	-.0036 (-.91)	-.0049 (-1.15)	-.0023 (-1.11)	-.0023 (-1.11)	-.0026 (-1.22)
MAJOR	.00005 (.16)	.00005 (.16)	.0002 (.70)	.00002 (.17)	.00002 (.17)	.00009 (.78)
MVL	-1.4977 (-1.10)	-1.4977 (-1.10)	-.0280 (-.02)	-1.994*** (-3.96)	-1.994*** (-3.96)	-1.2332* (-1.76)
OVER	-.00004 (-.57)	-.00004 (-.57)	-.0001 (-1.13)	-.000003 (-.08)	-.000003 (-.08)	-.00002 (-.31)
BLIST	.0360* (1.83)	.0360* (1.83)	.0306* (1.76)	.0056 (.43)	.0056 (.43)	.0055 (.39)
Constant	.9357** (2.02)	.9357** (2.02)	1.0444** (2.05)	.2242 (.73)	.2242 (.73)	.2816*** (.79)
F-statistics	1.26	1.26	1.29	2.84***	2.84***	2.82***
R-squared	.1839	.1839	.1952	.0451	.0451	.0543
Root mean squared error	.1335	.1335	.1326	.0770	.0770	.0767
Observations	340	340	340	344	344	344

Table II(2)(c) : Long-run share performance of IPOs determinants based on OLS regression model with window period T+36 month and T+48 month