IMPACT OF IPO LOCKUP EXPIRATIONS AND ITS DETERMINANTS: MALAYSIAN EVIDENCE

By

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ABSTRACT

This dissertation examines the impact of lockup expiration and its determinants in Malaysia using 292 IPOs during the period 2003-2012. Impact of lockup on abnormal returns, impact of lockup on abnormal trading volume, impact of regulatory changes on abnormal returns, and determinants of share price behavior as a proxy of abnormal returns at lockup expiration are the four study objectives. The research hypotheses are tested using event study method and multiple regressions. Results show the existence of significant negative abnormal returns surrounding the date of lockup expirations, hence contradicting evidence of the efficient market hypothesis. Further, this study also finds the existence of abnormal trading volumes. Both of these results are in line with those of the US studies. Meanwhile, there are two lockup regimes involved in this study arising from regulatory change that takes effect on 1 May 2003 and 3 August 2009, referred to as Regime #1 and Regime #2, respectively. However, the results show that the change in lockup regulation does not have an impact on the abnormal returns at lockup expiration. Furthermore, the variables identified in the regression analysis are lockup regime, fractions of insiders buying and selling before and after expiration, company size and age, offer price, underwriter, auditor, and technology company. Results show that company size, fraction of insider selling and buying after lockup expiration are the significant factors in relations to abnormal returns which is driven by Regime #1. Implications of the study to SC are improving the present regulation by imposing the minimum requirement and allowing for longer lockup period to be determined between underwriter and IPO issuer, to Bursa Malaysia in posting the upcoming lockup expiration dates on their website to alert investors, and to research houses by starting coverage on earnings forecast and providing recommendations surrounding lockup expiration.

Keywords: IPO, Lockup Provisions, Event Study, Market Efficiency, Insider Trading

ABSTRAK

Disertasi ini mengkaji impak dan penentu bagi penamatan tempoh sekatan jualan di Malaysia menggunakan 292 IPO bagi tempoh 2003-2012. Impak sekatan jualan terhadap pulangan tidak normal, impak sekatan jualan terhadap jumlah dagangan yang tidak normal, impak perubahan kawal selia terhadap pulangan tidak normal, dan penentu gelagat harga saham sebagai proksi pulangan tidak normal pada tamat tempoh sekatan jualan adalah empat objektif kajian ini. Hipotesis kajian diuji dengan menggunakan kaedah kajian peristiwa dan regresi berganda. Keputusan kajian yang menunjukkan kewujudan signifikan pulangan negatif tidak normal pada tarikh tamat tempoh sekatan jualan, memberikan bukti yang bercanggah dengan hipotesis pasaran cekap. Di samping itu, kajian ini juga menunjukkan kewujudan jumlah dagangan yang tidak normal. Kedua-dua dapatan ini selaras dengan kajian-kajian yang telah di jalankan di Amerika Syarikat. Sementara itu, terdapat dua rejim sekatan jualan terlibat dalam kajian ini berikutan perubahan peraturan kawal selia berkuat kuasa pada 1 Mei 2003 dan 3 Ogos 2009, dikenali sebagai Rejim #1 dan Rejim #2. Namun, dapatan kajian menunjukkan bahawa perubahan dalam peraturan sekatan jualan tidak memberi kesan terhadap pulangan tidak normal ketika tamat tempoh sekatan jualan. Selanjutnya, pemboleh ubah yang dikenal pasti dalam analisis regresi adalah rejim sekatan jualan, bahagian dagangan dalaman yang berjual-beli sebelum dan selepas tamat tempoh sekatan jualan, saiz dan usia syarikat, harga tawaran, penaja jamin, juruaudit, dan syarikat teknologi. Hasil dapatan menunjukkan bahawa saiz syarikat, bahagian jualan dagangan dalaman dan bahagian belian dagangan dalaman selepas tamat tempoh sekatan jualan merupakan faktor-faktor signifikan dalam hubungan dengan pulangan tidak normal yang didorong oleh Rejim #1. Implikasi kajian terhadap SC adalah penambahbaikan pengawalan semasa, iaitu dengan mengenakan sekatan minimum dan membolehkan tempoh sekatan jualan yang lebih panjang ditentukan antara penaja jamin dan penerbit IPO; terhadap Bursa Malaysia, adalah penyiaran tarikh-tarikh penamatan sekatan jualan akan datang di laman sesawang mereka untuk perhatian pelabur; dan terhadap firma penyelidikan, adalah penyediaan liputan awal berkaitan unjuran pendapatan dan cadangan sekitar tamat tempoh sukatan jualan.

Kata kunci: IPO, Peruntukan Sekatan Jualan, Kajian Peristiwa, Pasaran Cekap, Dagangan Dalaman

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LIST OF ABBREVIATIONS

ACE	Access, Certain, Efficiency
AAR	Average Abnormal Return
CAR	Cumulative Abnormal Return
CAAR	Cumulative Average Abnormal Return
CMSA	Capital Market Services Act
IPC	Infrastructure Project Company
IPO	Initial Public Offering
KLCI	Kuala Lumpur Composite Index
KLSE	Kuala Lumpur Stock Exchange
MAR	Market adjusted returns model
MENA	Middle East and North Africa
MESDAQ	Malaysian Exchange of Securities Dealings and Automated Quotation
MM	Market model
SC	Securities Commission
SEBI	Securities and Exchange Board of India
SPAC	Special Purpose Acquisition Company
UK	United Kingdom
US	United States
VIF	Variance Inflation Factor

CHAPTER ONE

INTRODUCTION

1.1 Background

An initial public offering or IPO of equity is the event where a company's share is offered for sale the first time to the public. It is the process of the company's official transition from private to public status. Both the terms IPO and "going public" are being used interchangeably. In this route, companies create new shares, or an existing shareholder offers for sale a certain proportion of shares they owned, resulting in the changing of the ownership structure. These shares are first sold on the primary market, followed by the secondary market on the listing date or the debut on the stock exchange.

In Malaysia, the two common types of IPOs are the "public offer" and the "offer for sale". The former is related to new issue of shares whereas the latter involves the existing shares which have not been traded before by the existing shareholders. Some companies are also making a mixture of both the public offer and the offer for sale resulting in a "combination offering". In connection with the combination offering, the share sale is both partially from the issuing company and the existing shareholders. In terms of the absolute holdings, the existing shareholders are not affected in a public offer since new shares are being offered but their percentage of shareholdings in the company will be reduced. In contrast, under an offer for sale, both the absolute holdings and the

percentage of shareholdings of the existing shareholders in the company are affected and reduced.

There are several reasons as for why companies go public. Apart from becoming better known, the common ones as indicated in the prospectuses are to enable the company to gain access to the capital market to raise funds for future expansion, diversification and continued growth, to comply with the National Development Policy requirements in respect of Bumiputera equity participation, and to provide the opportunity for investors to participate in the equity and continuing growth of the company. However, companies that become public are subjected to more scrutiny from both the regulators and investors.

An important component of IPOs is the lockup. IPO lockup refers to the restricted period during which the founders and pre-IPO shareholders (insiders[1]) are prohibited from selling their shareholdings after the IPO. Once the lockup period expires, insiders are free to liquidate their locked-up shares. This could lead to a significant impact on the market because the number of shares available in the market increases dramatically. Generally, most IPOs have a lockup provision and the terms of the lockup and its expiration date are disclosed in the IPO prospectus.

The existence of the lockup period can be observed mainly in relation to the asymmetric information between IPO insiders and those of the new shareholders, thereby creating adverse selection and moral hazard problems. Lockup provisions could signal

[1] Insiders usually include founding members, owners, directors and officers.

the solution to the adverse selection problem, resulting from information asymmetries at the time of the share issue, and also alleviate the moral hazard problem by alignment of the IPO insiders and new shareholders during the lockup period. Since lockup is conducted to prevent the company's insiders from taking advantage of other investors by selling their shares soon after an IPO, this limits the significant decline of the company's share price after the IPO listing. Moreover, lockup restrains the excessive supply in the market, and also a way to keep the important insiders of the company in the execution of the company's strategy. Therefore, lockup provision would increase the marketability of the IPO, thereby increasing its likelihood of success.

In the US, companies issuing IPOs voluntarily enter into a lockup agreement with their underwriters. Both the issuing company and the underwriter decide the lockup period and include it in the underwriter's agreement. The lockup begins on the first day that the IPO trades and ends an average of six months. On the other hand, lockup agreements in the UK, which is commonly known as lock-in agreements, are often complex, and there is a great deal of contractual diversity across issuers. The majority of companies have lockup agreements ranging from six months to about three years. As for Malaysia, share lockup is commonly known as moratorium on shares, and it is regulated by the Securities Commissions (SC). Lockup period falls under the qualitative criteria for primary listing of local and foreign companies[2]. The item on lockup often can be found under the "approval and conditions" section in the company's prospectus. Under

[2] There are three criteria under the primary listing of local and foreign companies namely, quantitative criteria, qualitative criteria and additional criteria for foreign companies.

the present lockup provision, all IPO companies listed on ACE Market[3] and Main Market[4] are subjected to a six-month lockup period.

The existence and effects of lockup periods are fueled primarily by the observation of the market reaction at the expiration of the lockup period. The pioneering work on lockup expirations is found in well-known studies originated from the US (e.g., Ofek & Richardson, 2000; Brav & Gompers, 2000, 2003; Field & Hanka, 2001; Bradley *et al.*, 2001; Brau *et al.*, 2004), and the UK (e.g. Espenlaub *et al.*, 2001). However, since Brav and Gompers (2003) plea for more research that exploits the variation in international lockup options, studies from international equity markets have begun to emerge. For example, studies in Europe are done by Nowak (2004), Goergen *et al.* (2006) and Boreiko and Lombardo (2013), in India by Mahajan and Singh (2011), in the MENA region by Hakim *et al.* (2012), and in Canada by Kryzanowski and Liang (2008).

In this context, after an extensive search, it is found that little has been done in the Malaysian market relating to IPO share lockups (e.g., Che-Yahya *et al.*, 2013 & Mohd-Rashid *et al.*, 2014) compared to the voluminous research in the US. Given that IPO lockup is also prevalent in Malaysia; its effect on market behavior at the lockup expiration can be examined both outside the US and the UK.

[3] The revamp of MESDAQ Market with effect 3 August 2009. It is an alternative sponsor-driven market designed for companies with growth potential from all business sectors.
[4] The merging of Main Board and Second Board, effective 3 August 2009. It provides an ideal platform for established companies to raise funds.

1.2 Problem Statement

In relation to lockup periods, Field and Hanka (2001) indicate that the lockup expiration dates are discussed extensively in The Wall Street Journal and even posted on several websites for the upcoming expiry dates. Moreover, many IPO prospectuses warn of the possibility that insiders would flood the market with large sell orders and share price could fall dramatically. Thus, market participants are paying close attention to the event. In contrast, the unlock dates are not widely discussed and observed in the Malaysian market. However, in supporting of the share moratorium expiration, three related articles are found in The Edge Financial Daily dated 3 December 2010 entitled "Moratorium fails to curb massive selling on K-Star", dated 26 January 2012 on "Bumi Armada dips after moratorium ends", and dated 26 December 2012 on "FGV falls as cornerstone investors free to sell".

Based on these three articles, the continuous two trading days of heavy selling on K-Star (a total of about 54 million shares were traded) which equivalent to 20% of its issued share capital could partly be due to the lifting of the six-month moratorium imposed on its promoters and other shareholders. As for Bumi Armada, a large volume of 3.98 million shares were traded one day after the six-month moratorium on its cornerstone investors[5] was lifted. Meanwhile, it is reported that FGV's share price fell 1.3% to its IPO level of RM4.55 per share on trading volume of 1.3 million shares at noon on the expiration day of its lockup period. It is also been observed that the price has started to fall a day before the unlock day.

[5] Those investors who take lion's share (big share) of offering such as IPO.

Another related article is also found appearing on 22 December 2014 in The Edge Financial Daily entitled "Icon Offshore plunges 21% as IPO Lock-up expires". For Icon Offshore, it was the second-largest decliner on the exchange on that day and also was the third most-active share. According to the article, the main reason for the sell down could be attributed to the expiry of the IPO lock-up or moratorium period. The news on Icon Offshore continues the following day entitled "Icon falls 10% on continued sell down". The article reports that the share price fell as much as 7.5 sen or 10% as the shareholders continued to sell following expiry of the company's IPO lock-up or moratorium period. The share was again heavily traded as the second most active entity across the exchange.

Following those reported articles, it is interesting to investigate the existence of abnormal returns in relation to IPO lockup expiration in the Malaysian market. Furthermore, if promoters and major shareholders liquidate their locked shares after the expiration of the lockup period, trading volume would also increase. Investors may view abnormal trading activities after the lockup expiration as an indicator of insider confidence. The higher volume of insider sales following lockup expiration is perceived as a sign of low insider confidence, which can be interpreted to be a bad signal regarding the company's prospect. Hence, this study also examines the impact on trading volume following the lockup period expiration.

The existing Malaysian evidence of IPOs can be found focusing on the underpricing (e.g., Dawson, 1987; Loughran *et al.* 1994; Yong, 1996; Hiau-Abdullah &

Taufil-Mohd, 2004; Chong & Puah, 2009), long-run performances (e.g., Mohamad *et al.*, 1994, Paudyal *et al.*, 1998; Jelic *et al.*, 2001; Yong *et al.*, 2001; Corhay *et al.*, 2002; Taufil-Mohd, 2007; Ahmad-Zaluki *et al.*, 2007, 2011) and flipping activity (e.g., Yong, 2010 & Che-Yahya *et al.*, 2013). Meanwhile, studies on IPO lockups can be observed focusing on the relationship between lockup and the underpricing of Malaysian IPOs. Wan-Hussin (2005) examines 154 IPOs between August 1996 and June 2000 and finds that the greater the burden of lockup imposed on the directors, the higher is the Malaysian IPO underpricing. Taufil-Mohd (2007) investigates 546 IPOs from the period 1990 to 2002 and uses aspects of regulations protective mechanisms in relation to underpricing. He finds that an IPO with the majority shareholders providing a lockup provision does not lead to a decrease in underpricing.

More recent studies on lockup are conducted by Che-Yahya, Abdul-Rahim and Yong (2013) and Mohd-Rashid, Abdul-Rahim and Yong (2014). The former examines the influence of lockup provision on flipping activity. Using 280 IPOs listed on Bursa Malaysia for the period 2000 to 2010, they find a significant positive relationship between flipping activity and the lockup ratio. The result suggests that the lockup period does not work in reducing the flipping activities. On the other hand, the latter examines the influence of lockup provisions in terms of lockup length and percentage of shares retained on IPO initial returns. The result only shows that the length of lockup period is significantly positive in explaining the IPO initial returns.

As mentioned, share lockups are mandatory in Malaysia, both in terms of percentage of shareholding and the length of the lockup period. Thus, there is no lockup agreement between the underwriter and the issuing company. In contrast, lockup in the US is not regulated but companies issuing IPOs voluntarily enter into a lockup agreement with their underwriters. Hence, the period of lockups and the number of shares to be retained varies among the IPOs. There has been a marked trend towards standardized lockup periods of 180 days in the US. Field and Hanka (2001) show that the typical lockup last for 180 days, however, the period also tends to be varies such as 90, 270, and 365 days. Moreover, the underwriter can at any time and without notice, release the shares that are locked under the agreement.

Similar to the US, lockup agreement in the UK is also undertaken between the underwriter and the issuing company. However, contrary to the US, there is great diversity in lockup agreements. Espenlaub *et al.* (2001) highlight some major differences between UK and US lockup agreements. First, while the US IPO lockup periods are mostly standardized at 180 days, the UK IPO lockup periods have a substantial variation ranging from 158 days to 1,095 days after the IPO. Second, expiry dates of UK lockups are frequently related to some company event such as the announcement of annual or interim results or publication of financial accounts. This gives UK directors some discretion over the precise timing of the lockup expiry. Third, there are also differences in terms of legal restrictions faced by company insiders regarding share trading around announcements of price-sensitive information.

While there are no minimum lockup requirements in the UK, Goergen *et al.* (2006) find that most of the companies in other European market imposed a minimum lockup. For example, the stock markets in Milan and Amsterdam have minimum lockup period of one year. They also report that French companies have a choice of the length of lockup period and percentage of shares locked whereas companies in Germany can choose the lockup length. As opposed to the US, major European markets use staggered lockup contracts (Goergen *et al.*, 2006). In addition, Boreiko and Lombardo (2013) show that the voluntary lockup clauses in Italian IPO are extremely versatile and complicated. Virtually, it is both impossible for a common investor to deduce the exact number of shares to be released at the expiry date and to identify the lockup expiration date. In the neighboring country, the Singapore Stock Exchange specifies minimum lockup periods of six and twelve months respectively, for the Main Board and SESDAQ[6] companies. The actual lockup period can be longer and is finally determined by both the underwriter and the issuer. Moreover, there is staged lockup in certain IPOs in Singapore (Chong & Ho, 2007).

Different lengths of lockup periods and different percentages of shares locked observed in different countries indicate that there might be some unique features in each country that might affect the trading behavior by insiders, price reaction and factors that significantly explains the behavior of share prices at the lockup expiration. In addition, given the dissimilar regulations and variation on lockup contracts, would the expiration of lockup period in Malaysian IPOs differ from those observed in the international

[6] SESDAQ is the second board for Singapore shares. It stands for Stock Exchange of Singapore Dealing and Automated Quotation.

markets? Although, previous studies have mentioned the lockup agreements that contained in the prospectuses, none has indicated the exact number or proportion of shares locked as in the case of Malaysia. Hence, it is a unique feature of this study in relations to IPO lockups.

It is observed that there are regulatory changes pertaining to IPO lockup in Malaysia. Prior to 1 May 2003, the substantial shareholders and/or promoters[7] are not allowed to sell their shareholdings amounting to 45% of the enlarged issued and paid-up capital of the company for one year from the listing date. Thereafter, they are permitted to dispose up to a maximum of 1/3 of their shareholdings per year. With effect 1 May 2003, the SC's guidelines have been revised and accordingly, the lockup provision remained the same in terms of lockup length and the percentage of the shareholdings. However, all the shares under the moratorium are allowed for disposal at the expiration of the lockup. Meanwhile, following the new regulatory framework on 3 August 2009, the length of the lockup period has been reduced from one year to six months. As for the percentage of the shareholdings, the number of shares under the moratorium has been revised from 45% to the entire shareholdings of the promoters and major shareholders. However, this study focuses on the lockup provisions with effect on 1 May 2003 and 3 August 2009, which are known as Regime #1 and Regime #2, respectively.

Furthermore, previous studies on IPO lockup report significant share price decline at the expiration of the lockup, but it is not clear as to whether the negative abnormal

[7] Persons who are in over-all control of the company (usually the principal owners or founders), who are instrumental in the formulation of a plan or program pursuant to which the securities are offered to the public and those named in the prospectus as promoters.

returns reflect the actual sell trades by insiders. Thus, this study also focuses on the insiders' behaviour through the transactions done by the substantial shareholders (promoters) who are under the moratorium, in terms of acquiring and disposing of shares from the listing date until one month after the lockup ends. As insiders can provide signals to the market through their trading of unlocked shares, this is a way to further confirm the roles of lockup as a tool to signal company quality and a commitment device to alleviate agency problems.

In line with the semi-strong form of the Efficient Market Hypothesis (EMH), the expiry dates of the lockups are public knowledge at the time of the IPOs. Thus, there should be no predictable share price movements at the expiry of the lockup periods. At the end of the lockup period, shareholders who are subjected to lockup are likely to sell their locked-up shares. It is therefore reasonable to expect a permanent and large shift in the supply of shares in the market. If the demand curve for shares is downward sloping, the share price will be depressed by such a shift in supply. Ofek and Richardson (2000) argue that since the date of the lockup expiration is known when the company goes public, this price impact should be captured by the market immediately after the IPO starts trading. Thus, on average, the abnormal return around the unlock date should be zero.

In contrast to the above predictions, studies in the US have documented significant abnormal returns and abnormal trading volume around the lockup expiration period (e.g., Ofek & Richardson, 2000; Field & Hanka, 2001; Bradley *et al.*, 2001;

Garfinkle *et al.* 2002). However, there are studies which support the EMH theoretical assertions of the semi-strong form. For example, Espenlaub *et al.* (2001), Goergen *et al.* (2006) and Boreiko and Lombardo (2013) find statistically insignificant negative abnormal returns around the lockup expiry date in the UK, Europe and Italy, respectively.

Brav and Gompers (2003) indicate that their work leaves several questions unanswered. For example, what is the experience with lockups internationally? Is the trading behavior by insiders and price reaction at expiration similar? Brav and Gompers (2003) further find that the average abnormal return that they document at lockup expiration needs to be fully explored and several articles including Field and Hanka (2001) have documented the price decline as well but its existence has not been fully explained. Thus, Brav and Gompers (2003) suggest that future study should provide deeper insights into the reasons why this price decline exists and whether it is temporary or permanent.

It is noted that several other researchers examine the divergence of IPO lockup agreements because some IPO companies agree to lockup their shares for a much longer period while some others lockup more of their shareholdings. Gao and Siddiqi (2012) find evidence that lockup agreements are used to control agency costs but not to signal company quality. Brau *et al.* (2005) find that companies with larger size, prestigious investment bankers, venture capital backing, and reputable auditors have shorter lockup period. Brav and Gompers (2003) find that companies which have high information asymmetry, have longer lockup periods. Mohan and Chen (2001) verify that the lockup

length conveys valuable information pertinent to the issuer's risk. Any departure from a 180-day lockup period suggests more uncertainty regarding a company's value. In the same line, Chong and Ho (2007) find that companies with greater asymmetric information and moral hazard problems have longer lockup lengths. Hoque (2011) finds strong evidence for information asymmetry for the choice of the lockups in the UK. His study is consistent with Goergen *et al.* (2006) where they indicate that higher information asymmetry is related to more strict lockups in France and Germany. In this regard, the Malaysian market would not be experiencing the divergence of IPO agreements since its lockup provision is imposed by the regulator. Therefore, this study is unable to directly examine the existence of a relationship between lockup length or proportion of shares locked and the degree of information asymmetry in Malaysian market.

In essence, this study is aimed to fill the gap within the literature by assessing the effects of mandatory lockup provisions, motivating by the following reasons. First, none of the Malaysian studies have investigated the market reaction. Hence, this study adds to the existing literature by focusing on the market reaction to the expiration of the lockup period in terms of share prices, trading volumes and determining factors. Since the expiry of lockup period adds a considerable number of potential sellers to the market, this event could cause abnormal trading performance and significant price decline. Second, empirical studies in the international equity markets have reported mixed evidence in terms of supporting or contradicting the semi-strong form of the EMH, thus inducing further examination in this study. Third, there have been regulation changes pertaining to lockup provision since it started to be effective on 3 May 1999. The latest revision in

2009 which is the present lockup provision is obviously the most restrictive and vigilant where all IPO companies are subjected to lockup provisions. Such action can be regarded as a concern on the part of the regulators. Therefore, impact of changes in regulation will be incorporated in the present study. However, this study focuses on the possible price impact of a single IPO lockup expiration.

1.3 Research Questions

This study deals with three issues. The first issue looks into the possibility of abnormal market performance in terms of increasing in trading volume and declining in stock price surrounding the expiration of the lockup period. The second issue investigates the effects of changes in regulation on abnormal returns. Finally, the third issue seeks the determining factors of the market reaction to the lockup expiration. With those ideas put forward, the study focuses in answering the following questions:

1. Does a significant abnormal return at the expiry of the lockup period exist in Malaysian IPOs?
2. Is there a significant impact on trading volume at the expiration of the lockup?
3. Do the changes in regulation affect the abnormal returns?
4. What are the factors in determining the market reaction to the lockup expiration?

1.4 Research Objectives

The literature on IPO lockups have focused around the event at the expiration of the lockup period. Therefore, this study adds to the existing literatures of share price reactions to IPO lockups by the following objectives:

1. To investigate the existence of the abnormal returns at the expiration of lockup period.
2. To assess whether higher trading volume exists at the lockup expiration.
3. To examine the impact of changes in regulation on the abnormal returns.
4. To determine the factors that significantly explains the behavior of share prices at the expiration of the lockup.

1.5 Scope of the Study

As discussed earlier, studies on IPO lockups are limited especially in the Malaysian market. Thus, this study focuses on examining the market reactions around the lockup expiration involving both the different mandatory lockup lengths and percentages of shareholdings. The study employs data from the Bursa Malaysia and is restricted to IPO listings from the period 1 May 2003 to 31 December 2012. It covers the impact of regulatory change on mandatory lockup which takes effect on 1 May 2003 and 3 August 2009, respectively. All companies listed on the MESDAQ, Second Board, and Main Board, and later ACE and Main Markets are included except IPOs by financial and investment companies, infrastructure project company (IPC) and special purpose

acquisition company (SPAC). In addition, the study only focuses on the impact of first lockup expirations, whereas for companies with multiple lockup expirations, in the case of IPO companies listed on ACE and MESDAQ Markets, are not explored. Meanwhile, due to mandatory lockup provisions imposed in the Malaysian market, IPO companies are not allowed to choose the lockup length and the percentage of shares to be retained. Therefore, information content of lockup provisions in relation to signaling and commitment hypotheses would not be observed.

1.6 Significance of the Study

The significant of the study can be observed in relation to practical and theoretical contribution. On the practical contribution, the study will benefit regulators, stock analysts and public investors. In connection to regulators, Brav and Gompers (2003) suggest whether voluntary lockup contracts should be regulated. In this case, Malaysia provides a setting where lockup contracts are regulated. If in the US the lockup length and percentage of shares locked have a signal mechanism between insiders and outside investors, it is interesting to see the price reaction at the expiration of lockup period in Malaysia. Regulators therefore, could reduce the negative wealth effect to investors during the releasing process by improving the existing rules and regulations pertaining to IPO lockups. Furthermore, insider trading activity surrounding the expiration of the lockup period can be more informative to regulators since IPO insiders differ from the insiders of established public companies. The former is restricted from selling activity during the lockup period whereas the latter does not have such a restriction. Moreover,

since lockup period allows acquisition but not disposing of share, the ability of these insiders in timing their sales is limited. Hence, their sales are concentrated into the period after the lockup expires.

For stock analysts and research houses (e.g. Maybank IB Research, CIMB Equities Research, MIDF Research, Affin Hwang Capital, AllianceDBS Research, Kenanga IB Research, PublicInvest Research, JF Apex Securities Research), they can play a major role around the lockup expirations by posting the lockup dates, issuing more favorable recommendations and start coverage especially for high quality companies. In line with this, public investors can be more attentive to market trading activity surrounding the releasing period and be guided to the information available in the IPO prospectus. Since information asymmetry is higher for IPO companies as compared to established public companies, investors must depend heavily on IPO prospectus which may contain only one to three years of financial statements. Meanwhile, liquidity effect as a result of an increase in trading volume can be observed as the restriction shares are released at the end of the lockup period. Hence, market liquidity is expected to lead to better trading sentiment especially for retail investors due to more affordable price of the shares.

As far as the theoretical contribution is concerned, the study will add to the existing literature on IPO lockups using recent IPOs listed on Bursa Malaysia. Specifically, it provides further contribution regarding the effects of lockup expirations

and its overall impact on the market efficiency theory. The results would support or contradict the theoretical assertions of the semi-strong form of EMH.

1.7 Structure of the Thesis

The remaining chapters of the thesis are organized as follows: Chapter 2 begins with an overview of the regulatory entities in Malaysian capital market, specifically the Securities Commission and the Bursa Malaysia. This is followed by details discussion on lockup provisions in Malaysia where several amendments have taken place since it started to be effective in 1999. The chapter also looks into the related theories on IPO lockups, specifically the efficient market hypothesis, signaling hypothesis and commitment hypothesis. Finally, the chapter reviews the available literature on IPO lockup provisions. The discussion concentrates on the market reaction around the expiration of lockup period. In addition to citing evidence from the US and the UK where voluntary lockup agreements are adopted, the literary work also includes evidence from other international equity markets including of those engaging in mandatory lockup provisions.

Chapter 3 covers the research methods and lists the testable hypotheses. The discussion explains the data sources and sample description beginning from the gathering of the data collection procedures. Finally, the chapter discusses both the event study and the multiple regression methodology as the proposed analyses.

Chapter 4 provides discussion of the analyses and the empirical findings. The chapter begins with the description of the sample of the study and followed by the discussion of the findings of the event-day abnormal returns and abnormal trading volume at lockup expiration. Further, the discussion in the chapter offers the descriptive statistics for the independent variables and finally reports the findings for multiple regression analysis.

Lastly, Chapter 5 presents a synthesis of the research findings and conclusions. It begins with the recapitulation of the study by describing the overview of the study and followed by summary of the main findings. In addition, the chapter outlines the contribution of the study and discusses the limitations of the research. The chapter ends with suggested recommendations for future research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter consists of five main sections. Section 2.2 begins with the regulatory entities in Malaysian capital market. It is divided into two subsections namely, the Securities Commission Malaysia (SC) in section 2.2.1, and the Bursa Malaysia Berhad (Bursa Malaysia) in Section 2.2.2. This is followed by Section 2.3, which discusses the Malaysian IPOs share lockup scenario.

Then, Section 2.4 presents the related theories on IPO lockup. This section is divided into three subsections; Section 2.4.1 discusses the efficient market hypothesis, Section 2.4.2 engages in the signaling hypothesis based on information asymmetry, and Section 2.4.3 discusses the commitment hypothesis based on agency theory.

In Section 2.5, the related empirical literature on IPO lockups is presented. This section is divided into two subsections. Section 2.5.1 discusses the market reaction to lockup expiration whereas Section 2.5.2 shows the determining factors of market reaction to lockup expiration. Finally, this chapter ends with a chapter summary in Section 2.6.

2.2 Regulatory Entities

The Securities Commission Malaysia (SC) and the Bursa Malaysia (BM) are the regulatory bodies for companies wishing to be listed on Bursa Malaysia. Hence, a company seeking to list on the Bursa Malaysia must obtain the approval from these two regulatory bodies.

2.2.1 Securities Commission Malaysia (SC)

The SC was established on 1 March 1993 as a self-funding statutory body with investigative and enforcement powers under the Securities Commission Act 1993. Among its main regulatory functions include: supervising exchanges, clearing houses and central depositories; registering authority for prospectuses of corporations; regulating all matters relating to securities and futures contracts; regulating the take-over and mergers of companies; and ensuring proper conduct of market institutions and licensed persons. Underpinning all these functions is the SC's ultimate responsibility of protecting the investor. Apart from discharging its regulatory functions, the SC is also obliged by statute to encourage and promote the development of securities and futures markets in Malaysia.

Following the new framework which takes effect on 3 August 2009, the rules and processes for equity fund-raising have been streamlined in order to provide greater certainty, shorter time-to-market and lower regulatory costs. Under the new framework,

the SC's review of corporate proposals focuses on the followings: compliance with minimum requirements; standards of corporate governance; resolution of conflicts of interest; preservation of public interest; and adequacy of disclosures to enable investors to make informed investment decisions. In addition, SC's approval under section 212 of the Capital Market Services Act 2007 (CMSA) would only be required for the following substantive corporate proposals in the Main Market: initial public offerings (IPOs); acquisitions resulting in a significant change in business direction or policy of a listed corporation (reverse take-over and back-door listings); secondary listings and cross listings; and transfer of listings from the ACE Market to the Main Market.

A 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 would be no prescribed minimum operating history or profit track record requirements for entry to the alternative market, as the sponsors would be empowered to assess the suitability of listing applicants. The current system of requiring the services of a sponsor for a period of at least three years by the listed issuer is maintained. As part of the effort to inject both breadth and depth to the Malaysian capital market, the SC and Bursa Malaysia are also introducing the listing of special purpose acquisition companies (SPAC), shell companies without operations that goes public with the intention of merging with or acquiring operating companies or businesses with the proceed of their IPO. The listing of SPACs would promote private equity activity, spurring corporate transformation and encouraging mergers and acquisitions.

2.2.2 Bursa Malaysia Berhad

Bursa Malaysia Berhad (Bursa Malaysia) is formerly known as the Kuala Lumpur Stock Exchange (KLSE), which was incorporated on 14 December 1976. Following the demutualization exercise on 14 April 2004, KLSE was renamed and currently is known as Bursa Malaysia. The purpose of the demutualization exercise is to enhance the competitive position and to respond to global trends in the exchange sector by making Bursa Malaysia more customer-driven and market oriented. Subsequently, Bursa Malaysia was listed on the Main Board on 18 March 2005.

Bursa Malaysia is an exchange holding company approved under Section 15 of the Capital Markets and Services Act 2007. It operates fully-integrated exchange, offering the complete range of exchange-related services including trading, clearing, settlement and depository services of shares and other securities (e.g., loan stocks, debentures stocks, bonds and warrants) issued by companies listed on the bourse. It is also responsible for the surveillance of the market place and for the enforcement of its listing requirements, which detail out the criteria for listing, disclosure requirements and standards to be maintained by listed companies.

Prior to 3 August 2009, Bursa Malaysia comprises the Main Board, the Second Board, and The Malaysian Exchange of Securities Dealing and Quotation Berhad (MESDAQ). The Main Board is the funding and investing avenue for bigger capitalized companies whereas smaller companies seek to be listed on the Second Board. MESDAQ

provides a means for high growth and technology related companies in Malaysia to raise capital. It was absorbed into Bursa Malaysia on 18 March 2002.

On the 3 August 2009, Bursa Malaysia and SC jointly launched a new framework for listings and equity fund-raisings in one of the most comprehensive reforms to the country's capital market. The reforms are aimed at allowing efficient access to capital and investments, as well as making Bursa Malaysia a more attractive platform for Malaysian and foreign companies. The new framework also entails the merging of Bursa Malaysia's Main Board and Second Board into a single board for established companies. In addition, it involves transforming the current MESDAQ Market into an alternative market open to companies of all sizes and from all economic sectors. The merged Main Board and Second Board are now known as the "Main Market" while MESDAQ Market is currently known as the "ACE Market" which is short for "Access, Certain, Efficiency".

Along with the new structure, there is also a significant shift in the regulatory approach with regards to listings and equity fund-raising. This shift to a more market-based regulatory approach is to ensure greater efficiency and competitiveness without compromising on investor protection. Enabling blocks have been put in place to enhance the standards of due diligence, disclosures and corporate governance.

Meanwhile, there are quantitative and qualitative criteria which applied to both local and foreign companies under the listing criteria of Bursa Malaysia for both Main and ACE markets. At the same time, an additional criterion is also imposed for foreign

companies. Under the quantitative criteria, aspects such as profit test, market capitalization test, IPC test, and equity requirement are grouped together under this category. However, aspects like sponsorship, core business, management continuity and capability, lock-up period, and financial position and liquidity are found under the qualitative criteria. On the additional criteria, some aspects that fall under this category are place of incorporation, approval of regulatory authorities of foreign jurisdiction, accounting and auditing standards, and valuation of assets.

As for the secondary listing of foreign companies, only qualitative criteria is required, whereas for the listing of SPAC, it only involves the key listing criteria such as management team credibility, minimum funds raised, lock-up period, management of proceeds and qualifying acquisition. The listing criteria are indicated as in Figure 2.1.

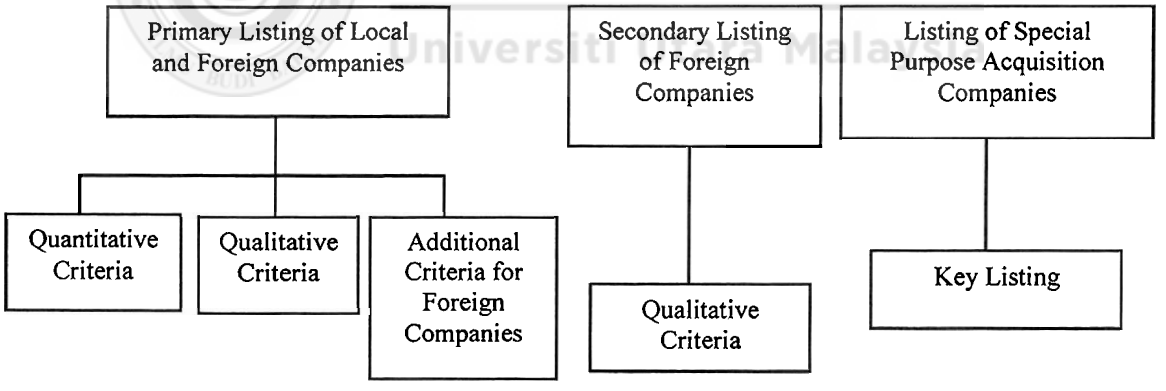

Figure 2.1
Summary of the relevant listing criteria
Source: www.bursamalaysia.com/market/listed-companies/lising-on-bursa-malaysia/

Meanwhile, on the listing statistics for the period 2003 to 2008, there were 298 new listings on Bursa Malaysia of which 79, 89, and 130 companies representing the

Main Board, the Second Board and the MESDAQ Markets, respectively. The number of new listings for the period 2009 to 2012 stands at 88 of which 66 and 22 companies were listed on the Main Market and the ACE Market, respectively. The listing statistics of new companies for periods 1 January 2003 to 29 September 2015 are presented in Table 2.1.

Table 2.1
Listing statistics of new companies on Bursa Malaysia

Number of New Listings (as at 29 September 2015)			
Year	**Main Market**	**ACE Market**	**Total**
2015	7	3	10
2014	12	3	15
2013	16	1	17
2012	14	3	17
2011	17	11	28
2010	23	6	29
2009	12	2	14
	Main Board	**Second Board**	**MESDAQ Market**	
2008	7	8	8	23
2007	15	8	3	26
2006	10	8	22	40
2005	16	17	46	79
2004	15	26	31	72
2003	16	22	20	58

Source:
www.bursamalaysia.com/market/listed-companies/initial-public-offerings/listing-statistics

2.3 IPO Share Lockups in Malaysia

In Malaysia, the IPO lockup or moratorium on shares is mandatory and it is regulated by the Securities Commissions Malaysia (SC). Lockup starts to take effect in the Malaysian market on 3 May 1999, and since then it has undergone some changes on 1

May 2003 coupled with the latest amendment that takes place on 3 August 2009. Nevertheless, the latest two lockup regimes are examined in this study. The first period is effective from 1 May 2003 which is known as Regime #1, while the second period is known as Regime #2 with effect on 3 August 2009.

Prior to 3 August 2009, under the Policies and Guidelines on Issue/Offer of Securities and SC's Guidelines for Initial Public Offerings and Listings on the MESDAQ Market, SC in approving the listing of the company, has imposed a moratorium on the disposal of shares held by the major shareholders / promoters of the company. All major shareholders of MESDAQ companies, Second Board companies and certain Main Board companies involved in property development or construction, infrastructure project and those companies applying for listing under the market capitalization route are subjected to share lockup.

In relation to the amount of shareholding locked-up and the length of the lockup, Main Board companies with core businesses in property development or construction, infrastructure project companies (IPCs), Second Board companies, MESDAQ companies, and companies listed under the market capitalization route, the affected shareholders will not be allowed to sell, transfer or assign their shareholdings amounting to 45% of the nominal issued and paid-up capital for one year from the date of admission or after listing.

In addition, thereafter, the affected promoters are allowed to sell, transfer or assign up to a maximum of one third per annum (on a straight line basis) for MESDAQ companies whereas for the infrastructure project companies (Main Board), additional requirement is also imposed after the one year period, whereby 50% of the lockup shares will be released from the moratorium per annum on a straight-line basis upon the infrastructure project achieving one full financial year of audited operating revenue. The infrastructure project company or the affected shareholder should apply to the SC for the lifting of the moratorium upon achievement of the audited operating revenue requirement.

For Regime #1, the lockup provisions that are disclosed in the IPO prospectus basically take the form of the following in connection to the Main Board or Second Board, and the MESDAQ Market, respectively:

Pursuant to the SC's Guidelines, Promoters/shareholders will not be allowed to sell, transfer or assign their shareholdings representing 45% of the issued and paid-up capital for a period of one (1) year from the date of admission to the Official List of the Second Board of the KLSE. Thereafter, the shareholders are not subjected to any moratorium requirement.

Pursuant to the Listing Requirements, Shares held by the Promoters amounting to 45% of the nominal issued and paid-up capital of the Company at the date of admission of the Company to the Official List of MESDAQ Market are to be placed under moratorium. The Promoters will not be allowed to sell, transfer or otherwise dispose of any part of their interest in the Shares under the moratorium within one (1) year from the date of admission of the Company to the Official List of MESDAQ Market, and thereafter, they are permitted to sell, transfer or otherwise dispose of up to a maximum of one third per annum of their respective shareholdings under moratorium on a straight-line basis.

Following the new guideline, effective 3 August 2009, all major shareholders of ACE Market and Main Market companies are subjected to share lockup. In relation to the amount of shareholdings locked and the length of the lockup, the affected shareholders/promoters will not be allowed to sell, transfer or assign their entire shareholdings of the issued share capital for a period of six month after listing. For infrastructure project company (IPC), the moratorium will be lifted immediately at the end of the six months if the IPC has generated one full financial year of audited operating revenue. For IPC which has yet to generate one full financial year of audited operating revenue, the promoters must retain their shareholdings amounting to 45% of the issued and paid-up share capital of the applicant. Upon achieving one full financial year of audited operating revenue, the moratorium on the 45% shareholding will be lifted.

Meanwhile, for special purpose acquisition company (SPAC), a moratorium will be imposed on the securities held by the management team of the SPAC. Members of the management team are not allowed to sell, transfer, or assign their entire interest in the securities of the SPAC as at the date of listing of the SPAC on Bursa Malaysia, from the date of listing until the completion of the qualifying acquisition. Upon completion of the qualifying acquisition, members of the management team are allowed to sell, transfer or assign up to a maximum of 50% per annum (on a straight-line basis) of their respective interest in the securities under moratorium.

As for Regime #2, the lockup provisions that are published in the IPO prospectus usually take the form of the following in relation to the Main Market and the ACE

Market, respectively:

In accordance with Paragraph 5.29 of the SC Guidelines, our Promoters will not be allowed to sell, transfer or assign their entire shareholdings in our Company for six (6) months from the date of our admission to the Official List of the Main Market of Bursa securities.

Pursuant to Rule 3.19 of the Listing Requirements, a moratorium will be imposed on the sale, transfer or assignment of Shares held by our Promoters as follows:

(a) The moratorium applies to our Promoters' entire shareholdings for a period of six (6) months from the date of admission to the ACE Market;

(b) Upon expiry of the six (6) months period stated above, we must ensure that our Promoters' aggregate shareholdings amounting to at least 45% of our Company's nominal issued and paid-up share capital remain under moratorium for another period of six (6) months; and

(c) Thereafter, our Promoters may sell, transfer or assign up to a maximum of 1/3 per annum (on a straight line basis) of our Shares held under moratorium.

From the above-mentioned lockup provisions discussed, it is noted that there are staggered lockups for certain IPOs which applied to both regimes. However, this study focuses only on the expiration of the first lockup period.

2.4 Related Theory on IPO Lockups

Theories related to IPO lockups can be classified into efficiency market hypothesis, signaling hypothesis based on information asymmetry, and commitment hypothesis based on agency theory. The abnormal returns of IPO shares upon the expiration of the lockup could support or contradict the market efficiency hypothesis. As for signaling hypothesis, lockup period could act as a signal to reduce the level of information asymmetry between IPO issuers and investors. In line with the commitment

hypothesis, lockup period could provide a commitment device to alleviate moral hazard problems.

2.4.1 Efficient Market Hypothesis (EMH)

According to Fama (1970), a market in which prices always fully reflect available information is called efficient. Fama continued to rank the three forms of market efficiency in terms of the information that concern analysts: (i) the weak form, (ii) the semi-strong form, and (iii) the strong form. In the weak form of the hypothesis, the information component is historical stock prices or trading volume. In the semi-strong form, the information the analysts are concerned with is whether the market adjusts to other information that is available to the public. Lastly, in the strong form, researchers testing market efficiency are concerned with certain investors who possess monopolistic access to certain information. Ofek and Richardson (2000) argue that since the date of the lockup expiration is known when the company goes public, this price impact should be captured by the market immediately after the IPO starts trading. Thus, on average, the abnormal return around the unlock date should be zero.

In the same line, Brav and Gompers (2000) and Bradley *et al.* (2001) assert that, as the date of the lockup expiration is public information, the share price should reflect rational expectations formed by market participants regarding the event. Unexpectedly high or low share disposals by shareholders after the expiry of the lockup periods may cause positive or negative abnormal returns for individual share. Nevertheless, provided

that market expectations are unbiased, the abnormal return, on average, should be zero around the lockup release.

2.4.2 Signaling Hypothesis Based on Information Asymmetry

According to signaling hypothesis, there is information asymmetry between IPO issuers and investors. Leland and Pyle's (1977) signaling hypothesis indicates that insider ownership can be considered as a signal of a company's quality. Later, Courteau (1995) extends Leland and Pyle's (1997) signaling model that focuses on retained ownership by introducing the length of lockup period to which the owner commits in the prospectus as a signal of company value. Courteau (1995) develops a model and shows that higher quality companies are more likely to have longer lockups as an indication of their superior quality.

Brav and Gompers (2003) test the signaling hypothesis developed by Courteau (1995) by choosing IPO offer price revision, the probability of dividend initiation, and frequency of seasoned equity offering (SEO) as measures of company quality. They do not find that higher quality companies have longer lockup period, thus their results reject the signaling hypothesis for lockups. However, Brau *et al.* (2005) find support for both the signaling and commitment hypotheses after revisited findings of Brav and Gompers (2003). Their empirical evidence indicates that lockups should be shorter when the degree of asymmetric information is small. Hogue (2011) find that higher information

asymmetry leads to absolute-date lockups as opposed to relative-date lockups[8], and single lockups as opposed to staggered lockups.

2.4.3 Commitment Hypothesis Based on Agency Theory

According to Jensen and Meckling (1976), higher managerial ownership concentration leads to better alignment of interests between owners and outsiders, thus fewer agency costs. In line with Jensen and Meckling's (1976) theoretical model of agency costs, Brav and Gompers (2003) argue that lockup agreements serve as a commitment device to alleviate moral hazards problems. As a result, IPOs that have a higher chance of experiencing agency problems should commit to longer lockup periods during which the public is convinced to buy their shares. Brav and Gompers (2003) empirical results support the commitment hypothesis. However in their study, they have used variables of information asymmetry to test agency hypothesis. For example, they find that smaller companies, which have high information asymmetry, have longer lockup periods that they attribute to a higher potential for an agency problem. But this is not necessarily the case. Insiders of small companies may work hard, while insiders of large companies may be more likely to take advantage of outside shareholders.

[8] Absolute-date lockups are set in terms of calendar dates whereas relative-date lockups are set in terms of corporate events.

2.5 Related Empirical Studies on IPO Lockups

The existence of IPO lockups has attracted the attention of researchers over the last fifteen years. It is observed that studies published on the lockup periods or lockup agreements are mostly documented for the US markets as compared to other countries. In addition, lockup period literature can be divided into two main categories. The first category involves the motives behind lockup agreement usage (e.g. Brav & Gompers, 2003; Brau *et al.,* 2005; Yung & Zender, 2010; Gao & Siddiqi, 2012) whereas the second category studies the price effect and trading activity surrounding the lockup expiration initiated by the pioneering work of Field and Hanka (2001), Bradley *et al.* (2001), Brav and Gompers (2000), and Ofek and Richardson (2000). However, this study focuses on the latter category which engages in market reaction to lockup period expiration together with its determinants.

2.5.1 Market Reaction to Expiration of Lockup Period

Since the terms of a lockup period are reported in the IPO prospectus, investors are well informed about the possible increase in supply surrounding the expiration of the lockup period. In line with this, Ofek and Richardson (2000) suggest that the impacts of lockup expiration should already be reflected in both the offer price and price movement shortly following the IPO. Hence, if the market is efficient, no abnormal return should be found around the release period. Following are the previous studies focusing on lockup

period impact on company's share returns and trading volume. It begins with the literature survey in the US market and followed by other international equity markets.

Ofek and Richardson (2000) conduct a study regarding the volume and price patterns around the lockup expiration day. They provide evidence that share prices fall around the end of the lockup period. Using a sample of 1,053 companies over the period 1996 -1998, specifically they find that on the lockup expiry date the share price decline, on average by -1.15% and the average trading volume increases by about 61% over the 41-day event window (-20, +20). In the days following the lockup expiration, the abnormal trading volume subsides whereas price reversal does not occur. The authors also provide evidence that the lockup effect is not arbitrageable. Trading costs, the difficulty of shorting newly-public shares, and short-term capital gains faced by original shareholder can help explain this fact. Furthermore, they argue that the share price decline is somewhat consistent with a downward sloping curve for shares and certain variables, such as share price volatility, have clear predictive power for the magnitude of the drop.

Brav and Gompers (2000) study a sample of 1,948 IPOs with lockup agreements in three major US stock exchanges for the period 1988-1996. They find support for the notion that lockups serve as a commitment mechanisms at the time of the IPO. Insiders of companies that are associated with greater informational asymmetries locked-up their shares for a longer period of time. They calculate abnormal returns for each IPO over the 21-day event window (-10, +10) as the difference between the IPO company's buy-hold

return and the benchmark buy-hold return. There is statistically significant abnormal return at lockup expiration of -1.2% and it is larger for companies that locked-up a greater fraction of their shares and companies that are backed by venture capitalists. This price drop is inconsistent with rational expectations on the part of investors. At the same time the volume increases substantially from 3.4% to 34.6%. They conduct various sensitivity analyses and find that their results are not driven by the change in the bid-ask spread or by disappointing earnings announcements around the unlock date.

In their study of the expiration of IPO share lockup, Field and Hanka (2001) examine the IPO's share price and trading volume around the lockup expiration day. For a sample of 1,948 IPOs that went public from 1988 to 1997, they find a statistically significant share price drop of -1.5% for the three-day event window ranging from the day before to the day after the release date. In addition, they also find that the cumulative abnormal return for the 7-day event window (-5, +1) is significantly negative. While lockups are in effect, there is little selling by insiders but around the scheduled unlock day, there is on average a permanent 40% increase in trading volume. The abnormal return and volume are much larger for companies that are financed by venture capital. Field and Hanka (2001) carry further robustness checks and find that their results are not influenced by sample-selection bias or by the method of abnormal-return estimation. Furthermore, they verify for persistence of these results over the period of their sample and find that the price drop is significant in six of the ten-years considered in the sample period.

To lend a more extensive insight, Field and Hanka (2001) have proposed several potential reasons to explain the negative abnormal returns around the lockup expirations from five perspectives: (i) the negative abnormal return may be resulted from an increase in the proportions of trades at the bid by insiders, (ii) the company with lockup agreement may face price pressures from insiders sell orders around the lockup expiration, (iii) it could be explained by increased transaction costs caused by insider trades, (iv) downward sloping demand curve for shares and permanent price drops, and (v) there is a consistent worse-than-expected insider sale upon lockup release. However, only the last three propositions are inconsistent with market efficiency. The propositions imply that the market consistently fails to anticipate the predictable events on the expiry day.

With the goal of adding lockup expirations literature from earlier studies (Ofek & Richardson, 2000; Brav & Gompers, 2000; Field & Hanka, 2001), Bradley, Jordan, Roten, and Yi (2001) provide a detailed analysis of share price reactions to IPO lockup expirations. Based on a sample of 2,529 IPOs for the period 1988-1997, they find that on average, lockup expirations are associated with abnormal returns of -0.74% on the day of the lockup release. For a 3-day window (-1, +1) they find a return of -1.39% and the cumulative abnormal return over the 5-day event window (-2, +2) surrounding period is -1.61%. A cross-sectional analysis of the companies in their sample shows that these negative returns are mostly due to companies with venture capital backing with high-tech venture-capital-backed companies being the hardest hit. Regardless of the industry, non-venture-capital-backed companies lose relatively little value. For the venture-backed sample, the largest losses occur for "high-tech" companies and companies with the

greatest post-IPO stock price performance, the largest relative trading volume in the period surrounding expiration, and the highest quality underwriters are the most significant determinants of expiry lockup returns.

In the same year, Mohan and Chen (2001) investigate the information content of lockup provisions in IPOs by looking at various reasons for the existence of lockup provisions. Using a sample of 729 US IPOs during the period of 1990-1992, they find that the lockup period signals the issuer's riskiness and also find that a lockup period of 180 days seemed to be the norm. Using an event window (-250, +250), surprisingly, they do not find any statistically significant negative returns at the time of the expiry of lockup agreements. Moreover, they conjecture that trading activities conducted shortly after the expiration of the lockup period signal the true company value. Their empirical findings support their contention that thin trading activities are perceived by the market as good news (high quality-company), while heavy trading is regarded as bad news (low quality-company).

Since the underwriter can at any time, and without notice, release the shares that are locked under the agreement, Keasler (2001) examines the influence of an underwriter's early lockup release on shareholders wealth whereby occasionally the underwriter grants permission and allows early sales by locked-up shareholders. In a sample of 45 companies largely consists of technology offerings for the period 1998 to 2000, Keasler (2001) finds that most of the companies receiving early release are backed by venture capital and experience an increase in market capitalization after their IPO.

There are significant negative abnormal returns associated with the early lockup release announcement, and negative returns are greater for venture backed IPOs. In the 5-day event window (-2, +2), results show that on and following the scheduled lockup release (after an early release), abnormal returns are negative but not significant. However, abnormal returns are significantly negative both following the early lockup release and before the scheduled lockup release. In addition, negative abnormal returns at the lockup expiration day for scheduled lockup found in previous studies are reduced for companies announcing the early lockup release.

Garfinkle, Malkiel, and Bontas (2002) provide further evidence that newly issued IPOs generate abnormally negative performances during the lockup expiration date. In the study of the effect of underpricing and lock-up provisions in IPOs, they observe not only a peak of an 81% increase in trading volume on the day right after the unlock date, but also a permanent statistically significant increase in trading volume of 47.5%. They also examine the daily excess returns around the unlock date in the period from -50 to 50 to be highly statistically significant negative peak on the unlock date. For the 3-day event window (-1, +1), cumulative excess returns is negative 4.47% in a sample of 775 companies that went public between 1997 and 1999. According to them, prices begin to fall prior to the end of the lockup period as the market anticipates the selling that is likely to follow and there is a substantial negative excess return for shareholders who buy new issues in the open market immediately after the IPO.

Managers usually do not sell any of their own shares in an initial public offering but instead wait until the end of the lockup period. In their study, Aggarwal, Krigman, and Womack (2002) develop a model in which managers strategically underprice IPOs to maximize personal wealth from selling shares at lockup expiration. Using a sample consisting of 618 companies for the period beginning 1994 to 1999, they test whether share returns from the IPO to the expiration of the lockup period are increasing in information momentum. They measure share returns as buy-and-hold return from the IPO's first-day closing price to through 180 days following the IPO. They argue that if IPO companies underprice more, which can generate more information momentum, they can attract more attention to the company's share and thereby shift the demand curve for the share outwards. As a result, this will allow managers to sell their holdings at a higher price at lockup expiry than they could otherwise obtain. They find that underpricing is positively related to research coverage and research coverage is positively associated with share returns and insider selling at lockup expiry. Their evidence is consistent with the model developed.

Tolia and Yip (2003) classify IPOs into four categories: Cold IPOs, Cool IPOs, Hot IPOs and Extra Hot IPOs. They investigate whether the share price around the expiration day of IPO lockup is different for 'hot' and 'cold' IPOs.[9] Using a sample consisting of 407 IPOs with lockup agreement expiring between October 1999 and September 2000, and event window (-60, +60), they observe that the market reacts negatively to the event on the day when lockup period expires. Their result differs

[9] Following Krigman *et al.* (1999), Tolia and Yip (2003) define 'hot' IPO's as IPO with first day return between 10% and 60%, while 'cold' IPO's as IPO with zero or negative first day returns.

slightly from the findings of Field and Hanka (2001) in that a sharp decline in share prices around the unlocked day is not observed. Although on the expiration day of the lockup agreement they witness a decline in the share prices for all four categories of IPOs, only the decline for the "hot" IPOs is statistically significant. The results are robust even after controlling for various specifications of the market index.

In another work, Ofek and Richardson (2003) argue that short sale constraints and heterogeneous market beliefs may lead to optimally-biased Internet shares. By exploring the behavior of 305 Internet IPOs share prices during the period January 1998 to April 2000, the cumulative abnormal returns is -2% for 2-day event window (-1, 0) and -4.11% over a longer 5-day event window (-4, 0) which is even greater. Also, they find that there is a large jump in volume at the lockup end, and though this volume drops thereafter, it remains above the pre-lockup period. The magnitude of the volume increase by 56.65% on and after the lockup day is higher than the 35% - 45% as previously reported in other studies (e.g., Bradley *et al.,* 2001; Field & Hanka, 2001; Brav & Gompers, 2000, Ofek & Richardson, 2000).

In addition, Ofek and Richardson (2003) also show that institutional investor holding is lower for Internet shares, indicating heterogeneity in market beliefs. Given the greater investor heterogeneity and short sale constraint for Internet shares, they find that Internet shares are more over-priced when lockups are in effect, and their price drops more significantly compared with non-Internet shares when lockup expires. They link the unprecedented level of lockup expiration and insider selling to the burst of the

Internet share bubble in early 2000. However, the price drop for IPOs shares around lockup release is a general phenomenon prevailing both in Internet and non-Internet shares. For most shares, short sale constraints do not bind. In fact, the short interest outstanding increases significantly as the lockup expiration approach. Geczy, Musto, and Reed (2002) show that the negative price impact (underperformance) around lockup expiration is significant even for IPO shares that are cheap and easy to borrow. Consequently, the behavior of pre-expiration buying of IPO shares remains to be explained when there is clear information about future price drop.

In their study on the role of lockups in IPOs, Brav and Gompers (2003) explore three potential explanations for the existence of lockups. Using a final sample of 2,794 for the period 1988-1996, their results support the commitment hypothesis. Companies' insiders that are associated with greater potential for moral hazard lockup their shares for a longer period of time. In addition, they also examine the market price reaction at the time of the lockup expiration. For a 21-day event window (-10, +10), BHARs are calculated. It is observed that for event window (-1, +2), abnormal returns are large and negative, and prices drop by almost 1.5% around the expiration of the lockup. As for the abnormal trading volume around the event period, those on event window (-3, -1) are marginally significant. However, from day +1 onward, the abnormal volume is statistically significant peaking at 56%.

Discussing the price abnormality around the lockup release further, there are more literatures supporting the evidence. By examining market reaction to the expiration of

IPO lockup provisions, Brau, Carter, Christophe, and Key (2004) find that the expiration of share lockups has important share-price implications. For a sample of 3,049 IPOs during 1988-1998 observed, they find a negative return of 0.38% on the day of the expiry of the lockup. For a 21-day event window (-10, +10), the authors find a statistically significant negative abnormal return of 1.94%. They argue that the negative abnormal returns are consistent with theoretical predictions based on information asymmetries and decreased incentive alignment between insiders and other shareholders. Using the percentage of shares locked up and the size of companies as proxies for information asymmetry, they find evidence that greater informational asymmetry is associated with negative abnormal returns. Specifically, percentage of shares lockup, venture capital backing, the percentage of management ownership in the company after the offer, and the size of the company are significantly related to the cumulative abnormal returns.

Using a different approach, Gao (2005) uses intraday data to explore the trading activity and the information environment around IPO lockup expiration. The significant price drop for IPO shares upon lockup expiration seems to contradict the market efficiency hypothesis. In the final sample of 2,422 IPOs with lockup provisions from 1993-2002, the cumulative abnormal returns are statistically significant of -1.63% for a 5-day event window (-2, +2) which is very similar to the results in previous studies (e.g., Field & Hanka, 2001; and Ofek & Richardson, 2000). The price drop around the unlock day is significant positive correlated with VC backing, analysts' earnings forecast bias and forecast dispersion. Further, Gao (2005) finds that information asymmetry of IPO shares experiences small change after the expiration of the lockup period. This suggests

that insider trading on lockup expiry is unlikely to be driven by private information but instead insiders sell their holding for the purpose of diversification. As for trading volume, it increases more dramatic for companies with VC backing. This is similar to the shares with VC backing that have a more significant price drop than non-VC backed companies.

Yung and Zender (2010) examine the moral hazard and asymmetric information as the motivation for IPO lockups. The study includes a sample of 4025 IPOs between 1988 and 2006 using a 2-day event window (-1, 0) and 5-day event window (-2, +2) as an alternative. They find that the cumulative abnormal returns are negative which is consistent with Bradley *et al.*'s (2001) findings and these negative returns are most prominent in the VC-backed and reputable underwriter subsamples. They also indicate that companies with certified reputable underwriter show a reduction in the severity of asymmetric information relative to other companies and therefore will be more likely to see moral hazard as the motivation for the use of lockup agreement. In contrast, for those companies that are unable to obtain high reputation underwriter certification, it is relatively more likely that asymmetric information is the motivation for the use of the lockup agreement.

Table 2.2 below summarizes some of the previous studies in the US in relation to the market reaction at the expiration of the lockups. It is noted that most of these studies indicate a significant negative abnormal returns together with higher trading volume at the expiration of the lockup period.

Table 2.2
Summary of selected prior studies on market reaction to lockup expiration in the US

Author	Country	Sample & Period	Methods	Event Window	Findings
Ofek & Richardson (2000)	US	1996 – 1998 (1,053 IPOs)	Market adjusted return	(-1, 0)	Significant negative CARs, trading volume increases
Brav & Gompers (2000)	US	1988 – 1996 (1,948 IPOs)	Market adjusted return	(-2, +2)	Significant negative BHARs, trading volume increases
Field & Hanka (2001)	US	1988 – 1987 (1,948 IPOs)	Market adjusted return	(-1, +1)	Significant negative CARs, trading volume increases
Bradley, Jordan, Roten & Yi (2001)	US	1988 – 1997 (2,529 IPOs)	Market model	(-2, +2)	Significant negative CARs, trading volume increases
Garfinkle, Malkiel & Bontas (2002)	US	1997 – 1999 (775 IPOs)	Market adjusted return	(-1, +1)	Significant negative CARs, trading volume increases
Ofek & Richardson (2003)	US	1998 – 2000 (305 IPOs)	Market adjusted return	(-4, 0)	Significant negative CARs, trading volume increases
Brav & Gompers (2003)	US	1988 – 1996 (2,794 IPOs)	Market adjusted return	(-2, +2)	Significant negative BHARs, increased trading volume
Brau, Carter, Christophe & Key (2004)	US	1988 – 1998 (3,049 IPOs)	Market model	(-4, 0)	Significant negative CARs, trading volume increases
Gao (2005)	US	1993 – 2002 (2,422 IPOs)	Market adjusted return	(-2, +2)	Significant negative CARs, trading volume increases
Yung & Zender (2010)	US	1988 – 2006 (4025 IPOs)	Market adjusted model	(-1, 0)	Significant negative CARs

Meanwhile, studies outside the US can be found in countries such as the UK, Europe, Asia and Canada that have been carried out by several other researchers. Espenlaub, Goergen and Khurshed (2001) study the IPO lock-in agreement in the UK. The sample consists of 188 IPOs by UK-incorporated companies on the London Stock Market during the period of January 1992 to December 1998 with clear-cut expiry dates. The average abnormal returns are cumulated over several periods: first, for the 81-day

event window (-40, +40) and second, for 11-day event window period (-10, +10). In examining the returns performance of the shares around the lockup expiry day, they find that the abnormal returns around the expiry in most cases are not statistically significant. The magnitude of the fall on the days immediately around the expiry day is between 0.5% and 2.5%, which is comparable to US studies. There are also some interesting differences between high-tech and other companies, with high-tech companies apparently losing more value in the period immediately around lockup expiry than other companies, albeit insignificant.

Espenlaub, Goergen, Khurshed, and Remenar (2002) study the selling trading activity by directors around the time of the expiry of the lockup agreements in UK IPOs. Using a sample of 94 UK IPOs for the period 1992-1996, the cumulative abnormal returns are calculated based on several event windows; (-5, +5), (-10, +10), (-15, +10), (-15, +15) and (-20, +20) since the process of determining the exact lockup expiry is not always easy. In addition, as a robustness check these returns are calculated over two alternative event windows: (-15, +15) and (-20, +20). Their results indicate that the average cumulative abnormal return around the lockup expiry is negative and significantly different from zero for both the directors and other initial shareholders.

In examining the announcement effect of directors' sales, Espenlaub *et al.* (2002) find a substantial increase in share sales by the directors in the weeks immediately after the lockup period. Interestingly and unexpectedly, the sub-sample of the companies that reported directors' sales in the period of interest have positive average cumulative

abnormal returns, albeit not statistically significant, whereas the sub-sample of companies without sales have negative returns. They also find that companies with a good stock performance before the expiry are more likely to have directors' sales and they suggest that the directors' sales are not related to IPO signaling.

Espenlaub, Goergen, Khurshed and Renneboog (2003) examine the impact of venture-capital backing of UK IPOs companies on the characteristics of the lockup agreements entered into by the existing shareholders, and on the abnormal returns realized around the expiry of the directors' lockup agreements. Using a sample of 186 UK IPOs issued during the period from 1992 to1998, they find that lockup agreements in the UK show much more variety in terms of the contractual detail than the US agreements. Lockup periods are particularly long for venture-backed high-tech companies. By contrast, for companies not in the high-tech sector, venture capital backing appears to reduce the directors' lockup periods.

In examining the proportion of lockup directors' share, Espenlaub *et al.* (2003) find it to be significantly higher in venture capital-backed companies as compared to companies without venture capital backing in the sample of companies not classified as high-tech. They also examine the share price performance of IPOs with and without venture capital backing around the time of the expiry of the lockup agreements. For the narrow one to three day event windows around the expiry date, significant cumulative average abnormal returns for the venture capital-backed shares range from -1.2% to -1.6% while the corresponding CAARs for the shares without venture backing range only

from -0.2% to -0.8%. The findings of significantly lower abnormal returns for venture capital-backed IPOs compared to others is consistent with the results reported by US studies (Brav & Gompers, 2000; Field & Hanka, 2001; Bradley *et al.*, 2001).

In Germany, Nowak (2004) examines the expiration of mandatory and voluntary lockup provision. Using 142 IPOs with 172 lockup expirations for the period 1997 to 1999, he finds significant negative abnormal returns and a 25% increase in trading volume surrounding the lockup expiration. The negative abnormal returns are larger for companies with high volatility, superior performance between the IPO date and the lockup expiration date, low free float and are venture-backed capital. In addition, the negative price reaction is found to be significantly stronger for the expiration of voluntary lockup agreements compared to the mandatory provisions at the expiration of the lockup period.

Similar study regarding lockup period in Germany is undertaken by Bessler and Kurth (2004). They study the performance of venture-backed IPOs with the objective of investigating the potential conflicts of interest for the "Neuer Markt". Using a sample of 307 for the period 1998 – 2001, they find that among others, venture-backed IPOs with standard six months lockup period have a strong out-performance during the first six months of trading and a significant underperformance thereafter. In cases of longer lockup periods for example twelve or eighteen months, the initial outperformance continues but does not increase any further. However, for bank venture-backed IPOs the opposite results are observed.

In Taiwan, Chen, Chen, Blenman and Bin (2005) examine the effect of IPO lockup agreements on IPO price performance and trading volumes surrounding the lockup expiration on the Taiwan Stock Exchange (TSE). They indicate that IPO companies in Taiwan are subjected to mandatory lockup periods of at least two years with multiple lockup provisions. Using a sample of 127 Taiwan-incorporated companies listed on TSE during the period from 1995 to 1999, they find that the expiration day effects are temporary. IPO investors on average suffer a significant wealth loss prior to the lockup expiration together with abnormally high trading volumes. Following the lockup expiration date, there are significant returns reversal along with significant trading volume. In addition, information technology companies show greater abnormal returns at lockup expiration compared to other types of companies.

Angenendt, Goergen and Renneboog (2005) unveil the diversity in lockup agreements of companies listed on the Nouveau Marche stock exchange in France. Using a sample of 147 IPO companies for the period 1996 to 2005, they use market model to calculate the abnormal returns. They relate the abnormal returns and the abnormal volume at the expiry dates of the different types of lockup contracts to the degree of underpricing, venture-capitalist reputation and underwriter reputation. They find that abnormal returns and the trading volume increase at the lockup expiry event window (-5, +5). This is especially pronounced at the expiry dates of insider lockup contract as insiders (executives and founders) are legally required to be locked-up. Surprisingly, they do not find significant abnormal returns at the expiries of venture capital contracts, even though trading volume increases at their lockup expiry. There is also no evidence of

a positive (negative) relation between abnormal returns (abnormal volume) and more stringent lockup contracts.

Another study for both Germany and France markets are undertaken by Goergen, Renneboog and Khurshed (2006). They analyze the characteristics of lockup agreements of IPOs on the Neuer Markt in Germany from 1997 to 2000 and Nouveau Marche in France from 1996 to 2000. They find that the characteristics of the lockup agreements for both markets are substantially different even though they are part of the same EuroNM network. The shareholders of companies characterized by more uncertainty are locked-up for longer and for a higher proportion of their shares. Venture capitalists in both French and German IPOs prefer a quick exit after the floatation, thus they have short lockup agreements. In contrast, executive and non-executive directors who retain shares after the floatation are locked-up for longer periods.

The study shows that although the French regulator offers two types of minimum lockup specifications, the market perceives a different between the two contracts as the choice is influenced by the type of the company and the type of shareholders. In addition, a majority of French and German companies voluntarily choose lockup contracts which are more stringent than the legal requirements and to some extent, this advocates against the use of regulation and the move towards the US or UK approach of no regulation. On market reaction to the expiry of lockup contracts, Goergen *et al.* (2006) use 11-day event window (-5, +5) and market-model approach to examine any

abnormal returns occurring around the expiry date. They find that abnormal returns are not significant for both France and Germany.

Kryzanowski and Liang (2008) study the lockup designs, transparency and market behavior for Canadian IPO share release. The initial sample consists of 97 companies that issued common shares during their IPOs and were listed on the Toronto Stock Exchange (TSX) during the period from January 1997 through December 2005. Using a 21-day event window (-10, +10), they find similar results as in Field and Hanka (2001) and Bradley *et al.* (2001) for Canadian high-tech companies with significant negative cumulative abnormal returns immediately around unlock days. However, lower abnormal trading volumes and relative spreads are found after unlock days for only the sample of IPOs with escrow[10] lockups with stipulated non-zero lockup length.

Meanwhile, in Hong Kong IPO market, Goergen, Mazouz and Yin (2010) examine the price, volume and spread effects associated with the expiration of lockup agreements. The Hong Kong share market imposes mandatory lockup periods where disposals of shares by controlling shareholders are restricted for a period of twelve months from the date of the IPO. In addition, the shareholders are allowed to buy additional shares as well as sell these newly purchased shares. Using a sample of 272 IPOs between 1999 and 2005, they find insignificant abnormal returns as opposed to an increase in trading volume. They attribute the absence of a price reaction to the

[10] Escrow provision is where certain shares are not allowed to be traded or transferred for a specified time. However, the shares are usually held by a third party in trust.

controlling by one or two non-institutional shareholders who prefer not to sell their shares after the expiration of the lockup.

In a more recent study, Boreiko and Lombardo (2013) examine the pattern of lockup clauses in Italian IPO for the period from January 1999 to December 2008 concentrating their diversity across years and shareholder classes. Using a sample of 167 IPOs, they find that the lockups are considerably longer and heterogeneous than the US or European evidence. The lockups duration and size show evidence in favour of the moral hazard hypothesis but not for signaling hypothesis, which is inconsistent with the study of Brav and Gompers (2003). In addition, they find that the cumulative buy-and-hold abnormal returns (BHARs) for the 21-day event window (-10,+10) is significantly negative only for VC-backed IPOs. As for share trading volume, lockup expiration has led to 30% increase and the effect is mostly confined to VC-backed companies.

Hoque (2011) analyses heterogeneous lockup agreements from London Stock Market between January 1999 and 2006 using 831 IPOs with complete data. He compares and contrasts absolute-date lockups with the relative date lockups and single lockups versus staggered lockups. At the lockup expiration effect of event window (-2, +2) using market model, he finds that the cumulative abnormal returns are -2.18% for absolute as opposed to -0.79% for relative lockups, -1.51% for single lockups as opposed to -0.97% for staggered lockups. These share price behavior is consistent with asymmetric information, certification and agency hypothesis. In addition he finds strong

evidence for information asymmetry and certification (VC and prestigious underwriters) and partial support for agency explanation for the choice of the lockups.

In India, Mahajan and Singh (2011) examine the impact of lockup period expiration on share prices and trading volume during the period from 2003 to 2009. They indicate that lockup period in India is fixed and mandatory for all IPO companies where its agreements are regulated by the Securities and Exchange Board of India (SEBI). In addition, there is only single lockup period where no companies can shorten or extend the length of the lockup period. Using a sample consisting of 165 IPOs, they find that CARs for the 21-day event window (-10, +10) show insignificant impact on share prices. In addition, the trading volume of Indian companies at the unlock date has not produced much impact.

In the Middle East and North Africa (MENA) region, Hakim, Lypny and Bhabra (2012) examine the stock market reaction to IPO lockup expiration. They indicate that the lockups are set by regulators (mandatory) and the common lockup period is two years. Using a sample of 60 IPO companies from January 1999 to December 2008, they find that the share prices of most MENA companies decline significantly upon lockup expiration much the same as they do in the US. In addition, longer lockups are associated with smaller declines where it occurs in non-family owned company. Moreover, they also report that family companies under longer lockup are highly likely to experience reduced trading activity, with bigger declines (or smaller increases) in trading volume than family companies under short lockup.

Finally, focusing on a single sector of IPO, Chen, Fok, and Lu (2011) analyze the lockups in real estate invest trusts (REIT) IPOs between 1980 and 2006 in the US. Using 169 equity REIT IPOs, they find that lockup periods for REIT IPOs do not cluster at 180 days but tend to cover longer periods and vary overtime. Their results support the commitment device hypothesis whereby REIT managers tend to use lockup agreements to alleviate moral hazards problems and protect post-IPO investors. In addition, using the 11-day event window (-5, +5), they find no significant negative abnormal returns around the expiry date for the whole sample. This is in line with the fact that REITs are not backed by venture capitalists and its insiders do not sell their holdings for their diversification benefit. Table 2.3 below summarizes some of the studies outside the US in relation to lockup expiration.

Table 2.3
Summary of selected past studies on market reaction to lockup expiration outside the US

Author	Country	Sample & Period	Methods	Event Window	Findings
Espenlaub, Goergen, & Khurshed (2001)	UK	1992 - 1998 (188 IPOs)	Market adjusted return	(-5, +5)	Insignificant negative CARs
Nowak (2004)	Germany	1997-1999 (142 IPOs)	Market model	(-10, +10)	Significant negative CARs, trading volume increases
Goergen, Renneboog, & Khurshed (2006)	Germany	1997 - 2000 (268 IPOs)	Market model	(-5, +5)	Insignificant negative CARs
	France	1996 - 2000 (138 IPOs)			
Kryzanowski & Liang (2008)	Canada	1997 - 2005 (97 IPOs)	Market model	(-10, +10)	Insignificant negative CARs
Hoque (2011)	UK	1999 - 2006 (831 IPOs)	Market model	(-2, +2)	Significant negative CARs
Mahajan & Singh (2011)	India	2003 - 2009 (165 IPOs)	Market model	(-10, +10)	Both insignificant negative CARs & trading volume

Table 2.3 (continued)

Author	Country	Sample & Period	Methods	Event Window	Findings
Hakim, Lypny & Bhabra (2012)	MENA	1999 - 2008 (60 IPOs)	Market adjusted return	(-5, +5)	Significant negative CARs
Boreiko & Lombardo (2013)	Italy	1999 - 2008 (161 IPOs)	Market model	(-10, +10)	Insignificant negative BHARs, trading volume increases

In summary, overall US studies have shown significant abnormal returns at the expiration of the lockup period with venture backed IPOs have greater price drop. In addition, their findings have resulted in increasing trading volume. However, studies conducted outside the US have reported mostly insignificant abnormal returns.

2.5.2 Determinants of Market Reaction to Lockup Expiration

Cross-sectional studies on market reaction to lockup expiration determinants have verified the correlation between the abnormal returns and certain factors. The discussions in this section examine the importance of these factors as they are associated with significant price decline upon the unlock date. Table 2.4 summarizes the related past studies on the determinants of market reaction at the expiration of the lockup period. Brav and Gompers (2003) examine the determinants of the price decline at lockup expiration by using 5-day BHARs (-2, +2) as the dependent variable. Among the independent variables used are underwriter ranking, market value, percentage of the shares locked, the ratio of tangible assets to total assets, market to book ratio, a dummy variable for venture-financed company, length of the lockup and IPO underpricing. Their

results indicate that the negative abnormal return at the expiration of the lockup is higher in the percentage of shares locked. In line with the greater amount of shares sold for companies that locked a larger fractions of their shares, the larger price decline is consistent with a larger increase in the supply of shares.

Brav and Gompers (2003) also find that companies with low book-to-market ratios have larger price declines which is associated with fast growing companies and that the presence of high quality underwriters leads to a lower decline at the expiration of the lockup. Finally, companies that are venture capital-backing have price drops that are more than 2% greater than other companies. According to Gompers and Lerner (1998), many venture capitalists are required to distribute their shares to their limited partners (investors in the VC fund) as soon as the lockup expires. As such, venture capital-backed companies may be associated with a larger number of shares entering into the market on the unlock date.

Meanwhile, using a 3-day CARs (-1,+1) as dependent variable, Field and Hanka (2001) use technology company, venture backing company, fraction of post-IPO shares locked up, and quality underwriters as the independent variables. Both the technology and venture backing companies are dummy variables, whereas underwriter quality is measured by the underwriter's percentage market share, and the fraction of post-IPO shares locked up is proxy by the fraction of post-IPO shares retained by the pre-IPO shareholders. Their results show that the negative abnormal return is almost three times larger for companies that are venture capital sponsored than non-venture capital

sponsored companies. The evidence suggests that venture capitalists sell more aggressively than other pre-IPO shareholders. The negative abnormal return is also larger for technology companies but the effect is confined to companies that are not venture sponsored. As for companies with high-quality underwriters, the effect is marginally positive significant and is highly sensitive to the choice of the event window.

In enhancing further to Field and Hanka's (2001) study, Bradley *et al.* (2001) add some additional variables in examining the determinants of the price decline at the lockup expiration. Using a 5-day CARs (-2, +2) as the dependent variable, the independent variables used are size, length of lockup period, percentage of shares locked, post-IPO share price performance, abnormal volume, and standard deviation of market model residuals. In addition, dummy variables are for venture capital-backed, high-tech, reputable underwriter, and SEO companies. In examining the whole sample, Bradley *et al.* (2001) find that the VC, high-tech, post-IPO share price performance and percentage of shares locked appear to be significantly negative. Company size is significantly positive which indicates that larger companies suffer smaller declines in value. They also conclude that there are significant differences in the VC and non-VC backed samples. For the VC-backed group, the largest losses occur for high-tech companies and companies with the greatest post-IPO share price increases, the largest relative trading volume surrounding the expiration period, and the highest quality underwriters.

In determining the abnormal return factors, Brau *et al.* (2004) have also shed light on the characteristics that affect the market returns around the lockup expiration date.

Using a 5-day CARs (-4, 0) as the dependent variable, the independent variables considered in the study among others include percentage of shares locked, lockup length, underwriter reputation, size, growth, percentage of management ownership after offer, and unit issue indicator. As for dummies, these variables include the VC, previous leveraged buyout and finance related companies. The results show that the percentage of shares locked, VC backing, and the percentage of management ownership in the company after the offer, a unit issue indicator, and size are significantly related to the cumulative abnormal return.

Outside the US, studies in relation to determinants factors can be observed in Taiwan, Canada and MENA region. In Taiwan, Chen *et al.* (2005) use an 11- day CARs (-5, +5) as dependent variable while information technology (IT) company, company size and cumulative abnormal trading volume as the independent variables. The results show that CARs are more negative for companies in the information technology sector. The significant negative coefficients for IT company are statistically significant. Similarly, the effect of company size shows a statistically significant negative coefficient with abnormal returns. However, the abnormal trading volumes show a positive coefficient in relations to CARs, albeit statistically significant. Meanwhile, in Canada, Kryzanowski and Liang (2008) use a 3-day CARs (-1, +1) as dependent variable whereas size, book runner reputation, high-tech company and SEO companies as the independent variables. The results show that only high-tech and SEO companies variables are statistically significant with negative and positive coefficients, respectively.

Moreover, in MENA region, Hakim *et al.* (2012) examine the factors that influencing the abnormal returns by using a 3-day CARs (-1, +1) as the dependent variable. The dependent variables are family company, company size, run-up in share price, abnormal volume, book-to-market ratio, fraction of shares on offer that are primary, cash flow margin, and post-IPO volatility. The results show that only run-up and post-IPO volatility variables are statistically significant with positive and negative coefficients, respectively. *A* summary of related prior studies on the determinants of market reaction at the expiry of the lockup period is shown in Table 2.4 below.

Table 2.4
Summary of previous studies on determinants of market reaction at lockup expiration

Author	Dependent Variable	Independent Variables	Significant Price Decline
Brav & Gompers (2003)	5-day BHARs (-2, +2)	- Underwriter ranking - % of Shares locked - Tangible assets to total assets ratio - Book to market ratio - Cash flow margin - Length of lockup - IPO underpricing - Dummy (VC)	- larger % of shares locked - low book-market ratio - VC-backed companies
Field & Hanka (2001)	3-day CARs (-1, +1)	- Dummy (Tech) - Dummy (VC) - Underwriter Quality - Fraction of post-IPO shares locked - Size	- VC-backed companies - tech for non-venture
Bradley, Jordan, Roten, & Yi (2001)	5-day CARs (-2, +2)	- Dummy (VC) - Dummy (High-tech) - Dummy (Underwriter reputation) - Size (total market capitalization) - Lockup length - Dummy (SEO) - % Share locked - Post-IPO stock price performance	- VC-backed companies - high-tech - smaller size company - larger % of shares locked
Brau, Carter, Christophe, & Key (2004)	5-day CARs (-4, 0)	- Lockup length & % of Shares locked - Underwriter reputation & VC - Inverted offer price - Log of total assets (size) - Market to book ratio after offer - % of management ownership	- larger % of shares locked - VC-backed companies - % of management ownership - smaller size company

Table 2.4 (continued)

Author	Dependent Variable	Independent Variables	Significant Price Decline
Chen *et al.* (2005)	11-day CARs (-5, +5)	- Dummy (IT company) - Size - CATV	- IT company - Size - CATV
Kryzanowski & Liang (2008)	3-day CARs (-1, +1)	- Size - Book runner reputation - Dummy (High-Tech) - Dummy (SEO)	- High-Tech - SEO
Hakim *et al.* (2012)	3-day CARs (-1, +1)	- Family company - Run-up in share price - abnormal volume - Size - book-to-market ratio - Cash flow margin - Fraction of share on offer - Post-IPO volatility	- Run-up in share price - Post-IPO volatility

2.6 Chapter Summary

The chapter provides a general overview of the two regulatory entities in Malaysian capital market namely, the Securities Commission and the Bursa Malaysia. In addition, it briefly outlines the new regulatory framework which takes effect from 3 August 2009, and among others are the rules and processes for equity fund-raising that have been streamlined in order to provide greater certainty, shorter time-to-market and lower regulatory costs. The new framework also entails the merging of Bursa Malaysia's Main Board and Second Board into Main Market whereas ACE Market is the restoration of MESDAQ Market.

On the Malaysian IPO share lockup, there are two regimes observed in the form of SC regulation that companies are subjected to moratorium on shares. Effective 1 May 2003 the lockup length is one year and 45% of the shareholding. With effect 3 August, 2009, the lockup period is reduced to 6 months while the percentage of shares locked is increased to the entire shareholding of the promoters/major shareholders. Hence, the regulation change on lockup provision will be explored.

The related theories and empirical evidence in relation to IPO lockup have been reviewed. The semi-strong form of EMH relates to the price effect upon the expiry of the lockup period. However, the signaling and commitment hypotheses deal with lockup period as a signal to reduce the level of information asymmetry and as a commitment device, respectively. Meanwhile, the earlier work on the relevance of different models in explaining market reaction to lockup expiration has also shed some light on the methods for this thesis. Examining through some of the body of literatures in this area, it is observed that some of the earlier tests performed find consistency with the claimed market efficiency hypothesis while others show conflicting evidence. In determining the factors that associated with the significant price decline, it is noted that some of the variables are VC-backed companies, high-tech companies, percentage of shares locked and company size.

In sum, the review on IPO lockup literature has offered several issues that may be reflected in the Malaysian market. Therefore, the literature gap can be observed by examining the effect of lockup expirations for Malaysian IPO and its overall impact on

the market efficiency theory since there has been no established literature documented. In addition, two lockup regimes as well as the buying and selling trading activity by the IPO insiders before and after the unlock date will also add to the aforesaid IPO lockup period evidence cited in the literature. Specifically, this study adds to the literature by examining the effect on share prices and trading volumes at the expiration of lockup period that has not been documented in prior studies in Malaysian market. To assess potential determinants of the market reaction when lockup expires, the new variables include lockup regime, fraction of insiders selling and buying before and after lockup expiry, auditors as well as other variables that are found in previous studies such as company size, market-to-book value, underwriter, offer price and company age.

CHAPTER THREE

RESEARCH METHODS

3.1 Introduction

This study focuses on examining the market reaction around the expiration of the lockup period for IPOs in Malaysia. Following both the introduction to the study and the review of the literature in Chapter 1 and Chapter 2 respectively, this chapter discusses the research methods. Since it is a market event, event study method is employed. IPO lockup is studied from two perspectives, namely share price performance and trading volume at the expiration of the lockup period. In addition, the determining factors to market reaction at lockup expiration are carried out using a multiple regression analysis method. Section 3.2 describes the data sources and sample description while Section 3.3 discusses the variables and hypotheses of the study. This is followed by the research design and methods in Section 3.4., and this chapter ends with a summary in Section 3.5.

3.2 Data Sources and Sample Description

This study examines Bursa Malaysia IPO companies which are listed from 1 May 2003 to 31 December 2012 in order to investigate their share price reactions at the expiration of the lockup periods. It focuses only on new issues involving ordinary shares. The justification for using the sample of listed IPOs from 1 May 2003 to 31 December

2012 is that the study covers the two mandatory lockup periods (i.e. effective 1 May 2003 to 2 August 2009 and from 3 August 2009 to 31 December 2012). Prior to 1 May 2003, the lockup regime has different provision which is excluded from the present study. The date 1 May 2003 is chosen as a starting period since it represents the beginning of the compulsory lockup period for the first regime. In addition, it requires 6 months following the IPO to capture the effect of the lockup expiration for the second regime. Hence, this study is conducted using a more recent sample to obtain evidence particularly on the abnormal returns and trading volume at the lockup expiry. Since all data are secondary in nature, the potential sources to be used in obtaining the data are both the Bursa Malaysia website database and the DataStream database.

All companies making initial public offerings between 1 May 2003 and 31 December 2012 are identified via Bursa Malaysia website. The identities of the IPO companies for the first regime, from 1 May 2003 to 2 August 2009 were obtained from the Bursa Malaysia Main Board, Second Board and MESDAQ Market. The lockup provision is one year from the date of admission with the promoters having 45% shares being locked-up. As for the second regime, from 3 August 2009 to 31 December 2012, the listed companies were gathered from the Main Market and the ACE Market with lockup provision of six months after listing and the retention of the entire shareholdings of the promoters or major shareholders.

Information on each IPO such as listing date, issuer name, date of incorporation, offer price, number of shares offered, auditor, underwriter, board listed and percentage of

shares locked-up were hand-collected mainly from companies' prospectuses as well as from the company announcements and annual reports that are available electronically on Bursa Malaysia website. The companies that were listed under the Finance, Trust, REITs, and Closed-End Funds sectors are excluded because the data are not comparable with those of non-financial companies. These companies also have different statutory requirements in preparing companies' annual reports. In addition, companies that were listed under infrastructure project company (IPC) and special purpose acquisition company (SPAC) sectors are also excluded[11]. Data on the daily share prices, daily trading volumes, and other company characteristics measurement were obtained from DataStream database.

3.2.1 Data Collection Process

As mentioned earlier, the data sources used in this study were obtained from both the Bursa Malaysia website database and the DataStream database. These databases provide information needed on individual companies and can be easily downloaded electronically. The first step taken in the data collection process was to obtain the list of companies that made an IPO and subsequently listed on the Bursa Malaysia during the period 2003 to 2012. The list was gathered via company announcements from Bursa Malaysia's website in the form of IPO prospectus summary.

[11] Both IPCs and SPAC have special moratorium regulations. For IPCs, the moratorium will be lifted after the company has generated one full financial year of audited operating revenue. As for SPAC, a moratorium will be imposed on the shares held by the management team. They are not allowed to sell the shares until the company completes the qualifying acquisition within the permitted time frame.

From the list, information such as issuer's name, offer price, number of shares issued, and listing board sought were easily collected. This is followed by identifying the listing date and the sector of which the company was listed in the company's prospectus. For company with tentative listing date appeared in the prospectus, confirmation on the exact date of the listing was gathered through the company's announcements under Initial Public Offering of Bursa Malaysia website. It is noted that for period 2009 to 2012, similar information was available and easily access from IPO summary of Bursa Malaysia website, namely issuer name, issue price, number of shares issued, listing sought (board & sector), and listing date.

Next, the list of companies was confirmed with the listing statistics available at Bursa Malaysia's website under Initial Public Offerings of listed companies. In order to collect the individual companies' data, the possibility of a change in a company's name was checked whereby the list of change of name was obtained from Bursa Malaysia website and cross-checked with the individual company's profile announcements. This action was necessary as several companies have changed their names once or more than once as the previous names would not appear in the DataStream database. The list of companies was then matched with the company's name together with the code available from DataStream. Thereafter, the daily share prices, daily share volumes and market index were collected from the DataStream database. In addition, this study has imposed several data conditions. Specifically, the IPOs had to satisfy the following criteria in order to remain in the final sample: (i) an offering involving new ordinary shares only; (ii) the company to remain listed throughout the expiration of the lockup period; (iii) the

company must be incorporated in Malaysia; and (iv) lockup period has to be either fall under Regime #1 or Regime #2.

3.2.2 Sample of the Study

As discussed in Chapter 2, Subsection 2.3, there are two mandatory lockup regimes in this study. Under the first regime, all major shareholders of MESDAQ companies, Second Board companies and certain Main Board companies involved in property development or construction, and infrastructure project are subjected to share lockup. On the other hand, all major shareholders of ACE Market and Main Market companies are subjected to share lockup under the second regime. After taking into account of the above-mentioned mandatory lockup imposed on both the first and second regimes, there has been 328 potential numbers of IPOs that are subjected to lockup. The final sample of this study is derived after the last exclusion of IPC and SPAC[12] companies, making it 292 IPOs. It is noted that two companies which have lockup period of 5 years and 2 years were excluded, namely Trans-Asia Shipping Corporation Berhad and Can-One Berhad, respectively. From the final sample, 222 IPOs (76%) fall under the first regime whereas the remaining IPOs of 70 (24%) represent the second regime. The highest and lowest sample is observed in 2005 and 2009, respectively. It is observed that the sample size is not surprisingly much smaller than the sample size used for similar studies in the US. However, the sample size is still considered sufficiently large in providing reliable results. A summary of the sample selection is presented in Table 3.1.

[12] Malaysia's first special purpose acquisition company in the sample, Hibiscus Petroleum Bhd made its debut on Bursa Malaysia on 25 July 2011. SPAC is allowed to be listed on Main Market only.

Table 3.1

Sample selection of 292 IPOs listed from 2003 to 2012

Steps of data collection by year	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**Total**
Initial data on new listings	58	72	79	40	26	23	14	29	28	17	386
IPOs before 1 May 2013	13										373
Restructuring IPOs	0	1	1	0	0	1	0	0	1	1	368
Regime #1 (01/05/03 – 02/08/09) IPOs	45	71	78	40	26	22	3				
Regime #2 (3/8/09 – 31/12/12) IPOs	-	-	-	-	-	-	11	29	27	16	
Regimes #1 + #2 IPOs	45	71	78	40	26	22	14	29	27	16	368
Exclusion of companies not subject to lockup	7	10	7	4	8	3	0	0	0	1	40
Potential IPOs subject to lockup	**38**	**61**	**71**	**36**	**18**	**19**	**14**	**29**	**27**	**15**	**328**
Delisted prior to expiry	0	1	0	0	0	0	0	0	0	0	1
Different lock-up period	0	0	1	0	1	0	0	0	0	0	2
Finance, Trust, REITs, CEFs	0	1	7	4	5	0	0	2	1	2	22
Foreign companies	1	0	0	0	0	0	3	3	0	1	8
IPC & SPAC companies	2	0	0	0	0	0	0	0	1	0	3
Final sample (% sample)	**35 (92)**	**59 (97)**	**63 (90)**	**32 (89)**	**12 (67)**	**19 (100)**	**11 (79)**	**24 (83)**	**25 (93)**	**12 (80)**	**292 (89)**

3.3 Variables and Hypotheses

Interest on lockup periods and effect of their expirations on share prices have grown since evidenced by Brav and Gompers (2000, 2003), Ofek and Richardson (2000), Field and Hanka (2001), and Bradley *et al.* (2001). As discussed in chapter 2, the results from such event studies report significant negative abnormal returns and increased trading volume at the expiration of the lockup period, especially for studies using US data. In contrast, Espenlaub *et al.* (2001), Goergen *et al.* (2006), Boreiko and Lombardo (2013) and Mahajan and Singh (2011) report insignificant abnormal returns for the UK, Europe, Italy and India, respectively. Moreover, cross-sectional studies on market reaction to lockup expiration determinants have verified the correlation between the abnormal returns and certain factors, such as percentage of shares locked, company size, high-tech company and underwriter reputation. Hence, the relationship between dependent variable and independent variables, and the development of related hypotheses for the study are discussed in this section.

3.3.1 Market reaction to lockup expiration

According to Leland and Pyle (1977), managers will want to diversify their portfolios if they are risk averse. Hence, it is expected that insiders will liquidate their shares as soon as the lockup period expires. Ofek and Richardson (2000) suggest this so-called diversification hypothesis is the main reason for insiders to sell part of their shares at the expiry of the lockup period. Meanwhile, Field and Hanka (2001) suggest that just

like markets for most products, shares have downward sloping demand curve. These are especially true for those companies that are facing high uncertainty and asymmetric information. A supply shock shifts the equilibrium to a point where a higher number of shares are sold at a lower price. Field and Hanka (2001) also study the signaling effect of insider sales. If insiders sell more shares at the expiration of the lockup period than the market has anticipated, the market interprets this as a lack of insider confidence in the company. The combination of these reasons explains the negative abnormal returns and increased trading volume after the expiration of lockup period.

Moreover, there are two reasons why negative share price reactions might occur prior to the lockup expiry. First, in anticipation of the abnormal returns that are likely to occur after the lockup expiry, outside investors have an incentive to sell their shares already before the expiry in order to pre-empt the price pressure created by insiders' sales. Second, in the presence of downward sloping demand curves, share price will be lower and trading volume will be higher. However, Ofek and Richardson (2000) discard this argument as being weak, as this effect should then already be incorporated on both the issue price and price movement on the first trading day. Their argument is based on the semi-strong form of EMH, which states that all public information about a company is already reflected in its share price.

Therefore, this study predicts that there would be a negative abnormal performance and higher trading volume as the lockup period expired. This is inferred because as the shares of the IPO companies approach the expiration of the lockup period,

the restriction of insider shares expires and this allows the promoters or major shareholders (insiders) to sell their shares on the open market. Prior to this expiration, they are constrained from selling their shares and there is no collusion since promoters are usually consisting of several individuals or institutions. Because of the increase in volume of shares available for public trade and the likelihood that major shareholders will tend to diversify their holdings, it is conjectured that the shares would experience a significant negative performance event and significantly larger trading volume. This is in line with the mostly reported past studies, such as Field and Hanka (2001), Brav and Gompers (2003), and Brau *et al.* (2004). Hence, Hypotheses 1 and 2 predict the following:

H_1: **At the expiration of lockup, there are negative abnormal returns.**

H_2: At the expiration of lockup, there is greater increase in trading volume.

3.3.2 Factors influencing the level of abnormal returns

Following previous studies (e.g., Brav & Gompers, 2000 & 2003; Field & Hanka, 2001; Bradley *et al.*, 2001; Brau *et al.*, 2004), this study uses abnormal returns as the dependent variable. As for the independent variables, relevant IPO company characteristics are examined. These variables have received empirical support from existing literature as discussed in subsection 2.5.2 of Chapter 2. Specifically, the independent variables that are being considered in this study include lockup regime, insider trading, company size, growth opportunities, offer price, underwriter reputation, auditor reputation, company age and technology company. The independent variables

used are discussed in the following subsections and they are categorized into lockup parameters, trading by insiders (promoters), informational asymmetry and companies in technology sector.

3.3.2.1 Lockup parameters

The two lockup parameters included in the current study are the percentage of shares locked and the length of the lockup period. As mentioned earlier, this study incorporates two mandatory lockup periods. The first lockup regime has a provision of one year lockup length with 45% of shares retained, whereas the second lockup regime consists of six months lockup length with the retention of the entire percentage of shareholdings. Hence, the mandatory lockup length and the percentage of shares locked which comes hand in hand but in a different package for both Regime #1 and Regime #2 will result in dissimilar effects at the expirations of the lockups.

According to Brau *et al.* (2004), when insiders have less than 100% of their shares retained under lockup, they can provide signals to the market through their trading of unlocked shares. Hence, the informational asymmetries are reduced between themselves and the outside investors. The lower the proportion of shares retained in lockup, the greater the likelihood insiders can provide signals to the market place. Brav and Gompers (2003), Bradley *et al.* (2001) and Brau *et al.* (2004) find significant negative abnormal returns in relation to larger percentage of shares retained. In line with this, it is therefore predicted that the negative market reaction to the lockup expiration is greater

for companies with larger percentage of shares locked up which would occur in Regime #2.

As for the length of the lockup period, the longer the time lapse between the IPO listing date and the lockup expiration date, the more information that is likely to be available to investors. Hence, the informational asymmetries between insiders and outsiders are reduced. Brav and Gompers (2003), Bradley *et al.* (2001) and Brau *et al.* (2004) do not find significant relationship between lockup length and abnormal returns at the unlock day. In this regard, Regime #1 is expected to have a positive relationship with the abnormal returns. As mentioned earlier, this study deals with mandatory lockup whereby all IPO companies have to follow the same lockup provisions imposed on the length and proportion of shares locked. Hence, the relationship between these two lockup parameters cannot be applied and tested directly with the abnormal returns. For this reason, lockup regime is used instead and by putting these two parameters into perspective, the following hypothesis is developed:

H_3: At the expiration of the lockup period, the abnormal returns are less negative for lockup Regime #1.

3.3.2.2 Trading activities by promoters (insiders)

In this study, the definition of insiders is referred to as promoters as stipulated by the SC in the company's prospectus. Trading behaviour by insiders for both selling and buying from the listing date until one month after the expiration of the lockup is explored.

On the lockup expiration dates, previous studies report significant share price drop, but some is unclear as to whether the negative abnormal returns reflect the actual sell trades by insiders. Hence, this study captures all effect of insider trading consisting of both buying and selling surrounding the expiration date to further explain the market reaction at the expiration of the lockup. Meanwhile, all trades undertaken by insiders are tracked down via Bursa Malaysia website under the company announcements in terms of changes in substantial shareholder's interest (Form 29B). In addition, incorrect insider trading acquisitions and dispositions are checked by eliminating the duplicate entries.

Unlike in the US and the UK, the SC does mandate the lockups and therefore, early releases of shares under the moratorium by insiders are not allowed in Malaysia. According to Field and Hanka (2001) and Brau *et al.* (2005), insiders' sales can have a potential strong impact on the share price because this activity tends to convey bad news. Moreover, an increase in the supply of shares may cause the price to decline. Field and Hanka (2001) find that the abnormal return is significantly negative when insiders sell shares around the expiration of the lockup. Brav and Gompers (2000) find 60% of the companies have insider sales prior to lockup expiration and relate this in companies that are associated with less asymmetric information. They assume that these sales are made with underwriters consent and do not examine this event any further. Meanwhile, according to Angenendt *et al.* (2005), the executives are most likely to have greater information regarding the company's quality since they are in control of the company's daily operations. Thus, insider trading may increase agency problems due to unaligned

information between insider and outsiders which could lead to a negative impact on a company's value.

In line with the two lockup regimes involve in this study, insider selling before the expiration of the lockup can be observed in Regime #1 while in Regime #2 zero insider sales will take place due to the entire shareholdings are placed under the lockup period. Moreover, for IPOs in Regime #1, it is expected that the abnormal returns at the expiration date to be smaller compared to Regime #2 since insiders have already sold before the expiration of the lockup period for the unlocked proportion of their shares. However, at the expiration of the lockup period, insiders of both regimes can release their locked shares which could cause a large supply of shares in the market. Hence, the following hypotheses are developed:

H_{4A}: The abnormal returns at the expiration of the lockup are less negative by the insiders' sales before the event day.

H_{4B}: The abnormal returns at the expiration of the lockup are more negative by the insiders' sales after the event day.

As for the buying trading activity, it is expected that insiders' purchases are to be driven by the commitment and signaling effects as indicated by Brav and Gompers (2003) and Brau *et al.* (2005). These hypotheses suggest that companies that have good news or are less subjected to moral hazard should have lower abnormal returns at the expiration of the lockup. In line with this, insiders would engage in buying to support the price for companies which are doing badly since listing. Furthermore, if the IPO is a

good company, insiders would want to increase their holdings. This lead to the following hypotheses:

H_{4C}: The abnormal returns at the expiration of the lockup are less negative for insiders buy before the lockup expiry.

H_{4D}: **The abnormal returns** at the expiration of the lockup are less negative for insiders buy after the expiration of the lockup.

3.3.2.3 Informational Asymmetric

Asymmetric information refers to a situation in which one party has more information compared to the other party. As a result, the one with more information can take advantage over another. In relation with this, the evidence against the EMH in connection with significant abnormal returns on lockup expirations indicates the existence of information asymmetries. According to Brau *et al.* (2004), the date of lockup expiration has institutional characteristics that are similar to those at the IPO date, and asymmetric information has been considered as an important determinant of IPO underpricing. Thus, the same factors that affect underpricing are expected to explain lockup expiration. Similar with the IPO date, at the lockup expiration date there are strong informational asymmetries between insiders and outside shareholders.

In connection to IPO, Rock (1986) introduces an equilibrium model for large underpricing IPOs that rely on information asymmetry. He hypothesizes that information regarding the value of the IPO company is distributed asymmetrically among underwriters and issuing companies, and among informed and uninformed investors.

Rock (1986) further indicates that an informed investor is a person who has perfect information regarding the realized value of the new issue compared to others. Yung and Zender (2010) argue that all companies experience both moral hazard and asymmetric information risk at IPO. However, one risk will be more dominant and will become the main reason behind implementing a lockup agreement.

Consequently, the importance of informational asymmetry is severely increased at the lockup expiration date due to the opportunity to dispose all the shares by insiders, but the actual number that will be disposed is unknown. However, this is not the case in Malaysia since the percentage of shares locked under the lockup period is clearly stipulated in the company's prospectus. Hence, it is expected that greater informational asymmetry between inside and outside investors at the expiry of the lockup would lead to greater decline in share prices. Adopting Brau *et al.* (2004), Brav and Gompers (2003) and Field and Hanka (2001), some of the proxies for asymmetric information are size, growth opportunities, offer price, underwriter reputation, auditor reputation and company age. These variables are relevant since they have implications for the level of information asymmetry at the expiration of the lockup. Following are the detailed explanation of the variables.

Size With regard to size, Barry and Brown (1984) argue that larger companies are expected to have more information available to markets, hence there is less uncertainty surrounding the pricing of these companies. In addition, Loughran and Ritter (2000) indicate that larger companies are associated with less information asymmetry as more

analysts are following them and these companies are also better known to the market. Bradley *et al.* (2001) and Brau *et al.* (2004) find significant larger price decline for smaller companies. This is consistent with investors reacting more negatively when there is less information, and hence more uncertainty.

In relation to size, there are two variables that are used in connection to information asymmetry. The first one is the type of board that the IPO is listed on whereby companies listed on the Main Market are typically larger than those listed on the ACE Market. This variable is expected to be positive since hypothetically, the level of information asymmetry is lower in large companies, hence lower abnormal returns. Moreover, large companies are usually closely followed by analysts and investors. BOARD is used as a dummy variable representing the Main Market and the ACE Market of Bursa Malaysia, respectively.[13] BOARD is set equal to 1 when the company is listed on Main Market, zero otherwise if the company is listed on ACE Market of Bursa Malaysia. Therefore, the following hypothesis is developed:

H_5: **Main Market listed companies have less negative abnormal returns at the** expiration of the lockup period.

Following Brau *et al.* (2004), the second variable used is the proceeds from a company's IPO which is used as a proxy for company size. SIZE is calculated by multiplying the number of shares offered in the IPO with the offer price. Brau *et al.* (2004) find size to be significantly related to the abnormal returns whereas Brav and

[13] Main Board and Second Board companies are included in the Main Market while MESDAQ Market companies are combined with the ACE Market companies.

Gompers (2003), Field and Hanka (2001) and Bradley *et al.* (2001) find insignificant relationship. Hence, the following hypothesis is developed:

H_6: Larger size companies have less negative abnormal returns at the expiration of lockup.

Growth Opportunities According to Garfinkle (1993), there is more uncertainty regarding the valuation of high-growth companies. Following Brav and Gompers (2003) and Brau *et al.* (2004), the ratio of market-to-book of equity is used to measure growth opportunities. The ratio is derived by using the market value of a company divided by its book value. Market value of equity is the product of the company's share price and the number of shares outstanding, whereas book value of equity is the difference between the company's asset and total liability. A company's growth opportunity is an increasing function of its market-to-book ratio. Companies with a high market-to-book ratio are usually assumed to be associated with high growth opportunity companies. Brav and Gompers (2003) find that companies with high market-to-book ratios have larger price decline whereas Brau *et al.* (2004) find insignificant relationship between these two variables. Hence, the next hypothesis is anticipated as follows:

H_7: Companies with high market-to-book value have less negative abnormal returns at the expiration of the lockup period.

Offer Price Following Brau *et al.* (2004), and consistent with Beatty and Ritter (1986) and Tinic (1988), offer price data is used as a measure of uncertainty at the expiration of the lockup. Tinic (1988) explains that low priced shares tend to be issued by more

speculative companies (i.e., companies for which there is greater uncertainty). Thus, the offering price is expected to contain information about the risks of the IPO. However, Brau *et al.* (2004) find insignificant relationship between offer price and the abnormal returns. The offer price is inverted, with the prediction that there is a negative relationship between this variable and the abnormal returns at the expiration of the lockup. Therefore, the following hypothesis is developed:

H_8: Companies having higher offer price have less negative abnormal returns at the expiration of the lockup.

Underwriter Reputation Since share lockups are mandatory in Malaysia, both in terms of the percentage of shareholdings and the length of the lockup, there is no lockup agreement between the underwriter and the issuer. However, a reputable underwriter provides a positive signal about issuer quality. Thus, companies offering new shares can certify their true value by hiring a prestigious investment bank. Underwriter reputation is another variable that is used as a proxy for lower information asymmetry. Brav and Gompers (2003) claim that higher underwriter rank is associated with higher company transparency. Carter and Manaster (1990) provide empirical support for the prediction that underwriter reputation is associated with marketing of lower risk IPOs. Beatty and Ritter (1986) find an investment bank with reputation-capital incentives to price the new issue as accurately as possible.

Since this study is based from Malaysian market, the choice of underwriter reputation is based on Malaysian evidence of Jelic *et al.* (2001) and Ahmad-Zaluki *et al.*

(2011). The number of IPOs with lockup provision an investment bank has underwritten for the period of 1 May 2003 to 31 December 2012 is used as a proxy to measure underwriters' reputation. Eighteen investment banks have been identified in the study but only six of them with 20 and more IPOs issues were considered to be the most prestigious. These banks are AmInvestment Bank Berhad, CIMB Investment Bank Berhad, OSK Investment Bank Berhad, Alliance Investment Bank Berhad, Kenanga Investment Bank Berhad, and RHB Investment Bank Berhad, or their pre mergers and acquisitions equivalents with 66, 43, 30, 25, 23 and 20 IPOs issues, respectively. Together, the six prestigious underwriters have managed approximately 70% of the IPOs in the sample.

On the other hand, Public Investment Bank Berhad, MIMB Investment Bank Berhad, Hwang-DBS Investment Bank Berhad, Maybank Investment Bank Berhad, Affin Investment Bank Berhad, Bank Islam Investment Berhad and Hong Leong Investment Berhad are among those considered to be less prestigious underwriters. Brav and Gompers (2003), Field and Hanka (2001) and Brau *et al.* (2004) find insignificant relationship between underwriter reputation and abnormal returns. Therefore, it is predicted that prestigious underwriters are associated with lower price drop; hence the following testable hypothesis is developed:

H_9: At the expiration of the lockup period, abnormal returns are positively related for IPOs with prestigious underwriters.

Auditor Reputation Auditors play an important role in IPOs in reducing the information asymmetry between insiders and potential investors (outsiders). Their reports on the reliability of the financial data are included in the prospectus. Michaely and Shaw (1995) indicate that the hiring of a reputable auditor can reduce the uncertainty surrounding the value of the company. Similarly, Aharony, Lin, and Loeb (1993) argue that high-quality auditors have greater incentives to provide accurate information in IPOs to avoid litigation costs and reputable damage. Similar to underwriter reputation, the choice of auditor reputation is based on Malaysian evidence. Following Ahmad-Zaluki *et al.* (2011), the Big 5 auditors are Arthur Andersen, Deloittes, Ernst and Young, KPMG, and PricewaterhouseCoopers, or their pre-merger equivalents. However, it is noted that the Big 5 has become the Big 4 after the demise of Arthur Andersen in 2002 following its involvement in the Enron scandal. This leads to the development of the next hypothesis:

H_{10}: At the expiration of the lockup period, abnormal returns are less negative for IPOs with prestigious auditors.

Company Age It can be argued that the longer the operating history of a company, the more likely it is to be based on a sound business model and to have a lower level of information asymmetry, suggesting a smaller effect at the lockup expiration. Similar to size, Chemmanur and Fulghieri (1995) indicate that the effect of information asymmetry is more serious for younger listed companies whereby these companies have little track record and low visibility than older companies. In addition, Brau *et al.* (2005) state that age has been associated with asymmetric information pertaining to company value since the studies by Barry and Brown (1984) and Ritter (1984). Following Ahmad-Zaluki *et al.*

(2011), company age is defined in terms of years which is the interval between the date of incorporation and the listing date. Therefore, to capture the effect of information asymmetries, this study includes age as one of the variables for investigating the cross sectional tests. Hence, the following hypothesis is developed:

H_{11}: At the expiration of the lockup period, abnormal returns are less negative for older companies.

3.3.2.4 Technology Company

High-tech companies are more difficult to value and are riskier from the market's point of view compared to non-technology companies. Companies in this industry may have difficult to value assets such as unique assets, projects in research and development, and new or unproven technologies. In the present study, technology companies are identified based on their admission to the Official List of the Exchange under the "Technology" sector on the listing date. Several previous studies (e.g., Field & Hanka, 2001; Bradley *et al.*, 2001; and Kryzanowski & Liang, 2008) find that high-tech companies are associated with significant negative abnormal return. However, Espenlaub *et al.* (2001) and Chen *et al.* (2005) find that although high-tech companies losing more value compared to those of non-tech companies, they do not experience significant negative abnormal returns. Hence, it is hypothesized that:

H_{12}: At the expiration of the lockup period, abnormal returns are more negative for technology company.

3.4 Research Design and Methods

To evaluate the market reaction at lockup expiry, the present study employs an event study method. This is because the analysis of change in performance of securities' price formation is considered as systematic events occurrence. Historically, researchers have applied the event study methods to measure performance reactions to a significant number of corporate events (e.g. stock splits, earnings releases, mergers and acquisitions, and dividend changes). Details of the event study and its research design is discussed in subsection 3.4.1 and 3.4.2, respectively.

3.4.1 Event Study

Event study methodology has been used extensively in the areas of finance, accounting and economics. Binder (1998) indicates that the event study is mainly used for two purposes: (i) to test whether the market efficiently carries any information to investors; and (ii) to investigate whether any event that occurs contains information that can affect the wealth of a company. Earlier research that uses event study can be traced back to 1968, with certain modifications to the event study methodology overtime.

The first event study that uses market model was undertaken by Fama, Fisher, Jensen, and Roll (1969), though the first to be published was by Ball and Brown (1968). Using the market model, these event studies provide evidence on the reaction of share prices to stock splits and earning announcements, respectively. In both cases, the market

appears to anticipate the information, and most of the price adjustment is complete before the event is revealed to the market. When news is released, the remaining price adjustment takes place rapidly and accurately. Fama *et al.* (1969) demonstrate that prices reflect not only direct estimates of prospective performance by the sample companies, but also information that requires more subtle interpretation as cited in Dimson & Mussavian (2000).

The reasons for choosing the event study approach to examine abnormal performance changes in response to IPO issuance are as follows. First, the event study method is chosen to examine some specific events that had already occurred, that is changes in the performance of a security presumably resulting from information pertaining to a specific event or occurrence. Second, judging by the number or research projects that have applied the methods, the event study method is the preferred method employed by researchers attempting to examine questions related to market efficiency, particularly the semi-strong form. Finally, the event study method has been around for so many years since Fama *et al.* (1969), which would suggest that the method is not in its infancy and is a reasonable tool of measurement.

3.4.2 Event Study Research Design

As the name implies, event study involves an empirical investigation of the relationship between security prices and economics events. In line with event studies,

Campbell, Lo, and MacKinlay (1997) state that the outlines of an event study can be viewed as having seven steps as follows:

i. Event definition – defines the event of interest and establishes the event window. An event window is a period of time during which the changes in share price of a company will be examined due to the release of new information. The event window might be the day of an announcement, or might spread over two days. However, the researcher can also study the pre-event and post-event effects on the share price, which will be carried out separately in the analysis.

ii. Selection criteria – determines the selection criteria for the company to be included in the sample. It is very helpful to provide a short description of the characteristics of the selected companies. It is also important to mention any biases that may occur in the sample selection.

iii. Measure the abnormal return. The abnormal return is calculated by looking at the difference between the actual ex-post-return of the share over the event window and the normal return of the company over the event window.

iv. Estimation procedure – estimates the market model parameter, which is also known as an estimation window, derived from a set of data taken before or after the event. The event will not be included in the estimation window in order to prevent any impact on the normal performance model parameter estimates.

v. **Testing procedure – design the testing framework for abnormal return.** It is necessary to delineate the null hypothesis and decide on the techniques used to calculate the abnormal return.

vi. Present the empirical results.

vii. Interpretation and conclusion.

However, according to Hiau-Abdullah (2000), the steps involved in the event study can be summarized into three major steps, which are presented in Table 3.1.

Table 3.2
Steps in event study analysis

Step 1	i. An event is identified ii. Define an event date iii. Select an event window
Step 2	i. Calculate the abnormal return for individual shares ii. Accumulate abnormal returns across industries iii. Estimate an average abnormal return for each day in the event window iv. Accumulate the average abnormal returns on each day across the event window
Step 3	Perform a statistical test on the average abnormal returns for each day and for the cumulative average abnormal returns across industries.

3.4.3 Models for Measuring Normal Return

To estimate share price reactions at lockup expiration, a quantitative method is used. This method involves estimation of the expected return model to calculate abnormal returns in the analysis period. The abnormal return is calculated by looking at the difference between actual returns and normal returns. In order to calculate the abnormal returns, the normal returns without the event must be estimated first.

There are three popular approaches to calculate the normal returns: (i) the mean adjusted returns; (ii) the market adjusted returns; and (iii) the market model. The mean adjusted return is the simplest method and has proven to be useful and accurate in

modeling normal return (e.g. Brown & Warner 1980, 1985). Data on the historical share prices is used to predict the future movement of the share. This method assumes that the ex-ante expected return is going to be constant through time, and to differ across shares and companies. The underlying assumptions for the mean adjusted return are similar to the capital asset pricing model (CAPM) whereby the interest rate and risk premium do not change over time and the efficient frontier is stationary. The mean adjusted return performs efficiently in a perfect world where investors are rational and the market is continuously in equilibrium. However, Hiau-Abdullah (2000) points out that the problem with using this method is that the abnormal return might be biased when the market is either going up or going down.

As for the market adjusted return, it is one of the simplest forms of residual analysis in estimating the share return. The method assumes that the ex-ante expected returns are the same for the entire shareholdings but not stagnant for a given share. Thus, the advantages of this method are its ability to estimate the systematic risk and that the right selection of estimation period can be avoided. Similar to the capital asset pricing model, the market adjusted return assumes that all shares have an undiversified risk of unity. However, this method has a tendency to produce greater share returns in comparison to the market return. This is because the calculation of the abnormal return is based on the difference between equally weighted share returns and the equally weighted market returns. Therefore, this method entails the possibility that the null hypothesis will be rejected regularly (Brown & Warner, 1980).

Meanwhile, the market model method has received much attention in past studies (e.g. Brown & Warner 1980, 1985; Coutts, Mills & Roberts 1995) and is also known as the single index market model. According to MacKinlay (1997), the market model assumes that there is a stable linear relationship between share returns and the market return. Similar to the two methods discussed earlier, the market model also has some limitations. Coutts, Mills and Roberts (1995) indicate that there is a misspecification problem in the market model. In their study of 56 companies in the Financial Times Stock Exchange 100 for a period of 10 years from January 1984, they find that there is a problem of heteroskedasticity, serial correlation and non-normality in the residual.

In addition, Kothari and Wasley (1989) claim the misspecification of the market model can be caused by size effects[14] and when there is clustering in the event date. Dimson (1979) found similar misspecification of the volatile size effect and interestingly, concludes that the bias of measure in relation to the size effect becomes larger when employing the capital asset pricing model in comparison to the market model. However, Brown and Warner (1980, 1985) and Dyckman, Philbrick and Stephan (1984) have shown some preference for the market model.

According to Brown and Warner (1980, 1985), although the results of the constant mean return are similar to those of the market model, the market model can refine the outcomes of the constant mean return model as it can reduce the variance of abnormal returns by eliminating the fraction that involves variation in the market returns.

[14] Size effect occurs when observation of the shares is based on either extremely large companies or extremely small companies.

Dyckman *et al.* (1984) concur with the conclusions of Brown and Warner (1980, 1985), as they agree that the mean adjusted return, market adjusted return and market model have the same ability to correctly detect abnormal returns.

It is observed that among these three models, market model and market adjusted return model are widely used in relation to IPO lockup expiration. However, upon closer reviews of the literature, market model is used more frequently compared to market adjusted return model. Previous studies that have used market model include Bradley *et al.* (2001), Brau *et al.* (2004), Goergen *et al.* (2006), Keasler (2001), Nowak (2004), Hoque (2011) and Boreiko and Lombardo (2013). On the other hand, market adjusted return model is used by other researchers such as Ofek and Richardson (2000), Gao (2005), Garfinkle *et al.* (2002) and Hakim *et al.* (2012). Similar to Mahajan and Singh (2011), this study employs both the market model and the market adjusted return model in examining the impact of lockup expiration.

3.4.4 Measure of Abnormal Returns

In order to achieve objective one, this study follows Brau *et al.* (2004) where the abnormal returns surrounding the expiration of the lockup is estimated using both market model (MM) and market adjusted return model (MAR). Equation (1) provides the standard market-model specification.[15]

[15] MAR model assumes that $\alpha_i = 0$ and $\beta_i = 1$, thus normal share return of a company during period t is equal to R_{mt}.

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \quad (1)$$

where:

R_{it} = *the return for company i on day t in estimation period;*

R_{mt} = *the average return for all companies in Bursa Malaysia on day t (Either FBM KLCI or broader FBM EMAS Index is used as the market index);*

α_i & β_i = *the intercept and the slope parameters for company i;*

ε_{it} = *the error term for company i on day t.*

Abnormal returns, for each company, are calculated by finding the difference between actual returns and expected returns for a given time period as shown in equation (2):

$$AR_{it} = R_{it} - (\alpha_i + \beta_i R_{mt}) \quad (2)$$

Abnormal returns are computed for windows of different lengths. Following Brau *et al.* (2004), Brav and Gompers (2003) and Hoque (2011), all windows lie within the period of 10 days before the day of the lockup expiration and 10 days after that day (21-day period). To ensure that the results are not affected by time variation in beta, an estimation approach is employed to measure abnormal returns. The approach relies on beta estimates obtained from regressing company daily share returns beginning 100 days prior and ending 11 days prior to the lockup date on the Bursa Malaysia KLCI and EMAS Index value-weighted return index.

Daily average abnormal returns for the lockup expiration date and the twenty surrounding days are calculated in equation (3) as follows:

$$AAR_t = (\frac{1}{N}) \sum_{i=1}^{N} AR_{it} \quad (3)$$

where N represents the number of securities in the sample. Cumulative average abnormal returns are constructed by aggregating average abnormal returns throughout the event window, beginning with $t = \tau_1$, and continuing through $t = \tau_2$, as shown in equation (4):

$$CAAR_{\tau_1 \tau_2} = \sum_{\tau=\tau_1}^{\tau_2} AAR_\tau \quad (4)$$

where τ_1 and τ_2 represent the beginning and ending days, respectively, over which the average abnormal returns are accumulated.

Next, the statistical test is carried out whereby abnormal returns must be examined to determine whether, on average, the event date (unlock date) has significantly affected the share price or there has been any market reaction to the expiration of the lockup period. Null hypothesis, H_0 can be tested by employing the following t-statistics as shown in equation (5):

$$\theta_1 = \frac{CAAR\,(\tau_1,\tau_2)}{var(CAAR((\tau_1,\tau_2))^{\frac{1}{2}}} \sim N\,(0,1) \qquad (5)$$

where,

$$var\big(CAAR(\tau_1,\tau_2)\big) = \sum_{\tau=\tau_1}^{\tau_2} var\,(AAR_\tau)$$

and for large estimation window, the variance is

$$var(AAR_\tau) = \frac{1}{N^2}\sum_{\tau=1}^{N}\sigma_{si}^2$$

where σ_{si}^2 is the residual variance from the market model's regression.

As a robustness check, market-adjusted model is also carried out in addition to the market model. Examples of studies that use market-adjusted model include Ofek and Richardson (2000), Field and Hanka (2001), and Garfinkle *et al.* (2002). For calculating the abnormal returns using market-adjusted returns, the equation (6) is presented below:

$$AR_{it} = R_{it} - R_{mt} \qquad (6)$$

where:

R_{it} = *the return for company i on day t in estimation period;*

R_{mt} = *the average return for all companies in Bursa Malaysia on day t (Either FBM KLCI or broader FBM EMAS Index is used as the market index).*

Statistical test is shown in the following equation (7):

$$t - stat_{t1,t2} = \frac{CAAR_{t1,t2}}{\sigma_{t1,t2}} \quad (7)$$

where,

$$\sigma^2{}_{t1,t2} = \frac{\sum(CAR_{it} - \text{CAAR})^2}{N - 1}$$

It is worth noting that this study is interested in the results of narrower event windows surrounding the event date. In general, the results for a very short period would be the same regardless of the methods used. Hence, the adjustment for thin trading is not conducted for this study.

3.4.5 Measure of Abnormal Volume

To achieve objective two in relations to the abnormal trading volume, method used in Field and Hanka (2001) is employed. Abnormal daily trading volume is measured relative to each company's pre-unlock mean daily trading volume over days -60 to -11 as shown in equation (8):

$$Abnormal\ Volume\ \omega_{i,T} = \frac{V_{i,T}}{\frac{1}{50}\sum_{t=-60}^{-11} V_{i,t}} \quad - \quad (8)$$

where $V_{i,T}$ is the trading volume (from DataStream) for company *i* on day T. The ratio of daily volume to its mean which is obtained earlier are then subtracted by one and averaged across companies to get an estimate of abnormal colume $AV_{i,T}$ across each day surrounding the unlock day.

3.4.6 Cross Sectional Multiple Regression

To achieve objectives three and four in considering the joint effects of the various issue and company characteristics investigated, multiple regression analysis is employed. It is used to assess the association between dependent variable and independent variables. Following Field and Hanka (2001), Kryzanowski and Liang (2008), Hoque (2011), and Hakim *et al.* (2012), the 3-day CARs (-1, +1) is the dependent variable. The independent variables considered are:

LREGIME	=	*Lockup Regime #1 = 1 and zero otherwise, where Regime #1 is IPO from 1 May 2003 to 2 August 2009;*
FRACSELL	=	*Fraction of insider sell before lockup expiry;*
FRACBUY	=	*Fraction of insider buy before lockup expiry;*
FRACSAFTER	=	*Fraction of insider sell after lockup expiry;*
FRACBAFTER	=	*Fraction of insider buy after lockup expiry;*
BOARD	=	*Companies listed on ACE Market = 1 and zero otherwise;*
LNSIZE	=	*Natural logarithm of the market capitalization based on the number of shares offered in the IPO times by the offer price;*

MTBV	=	*Market-to-book ratio, a proxy for growth opportunities;*
OFFPRICE	=	*IPO offer price;*
UNDER	=	*Dummy variable = 1 for prestigious underwriter and zero otherwise;*
AUDIT	=	*Dummy variable = 1 if company's auditor is highly prestigious and zero otherwise;*
AGE	=	*Company age in years;*
TECH	=	*Dummy variable = 1 for technology sector companies and zero otherwise;*
εi	=	*error term.*

The following estimation of the ordinary least squares (OLS) multiple regression model is used to examine the determinants of market reaction to lockup expiration whereas Figure 3.1 depicts the research framework on determinants of abnormal returns. The hypotheses together with the expected signs between the variables and abnormal returns are shown in Table 3.3.

$$CAR_i = \beta_0 + \beta_1 LREGIME_i + \beta_2 FRACSELL_i + \beta_3 FRACBUY_i + \beta_4 FRACSAFTER_i + \beta_5 FRACBAFTER_i + \beta_6 BOARD_i + \beta_7 LNSIZE_i + \beta_8 MTBV_i + \beta_9 OFFPRICE_i + \beta_{10} UNDER_i + \beta_{11} AUDIT_i + \beta_{12} AGE_i + \beta_{13} TECH_i + \varepsilon i$$

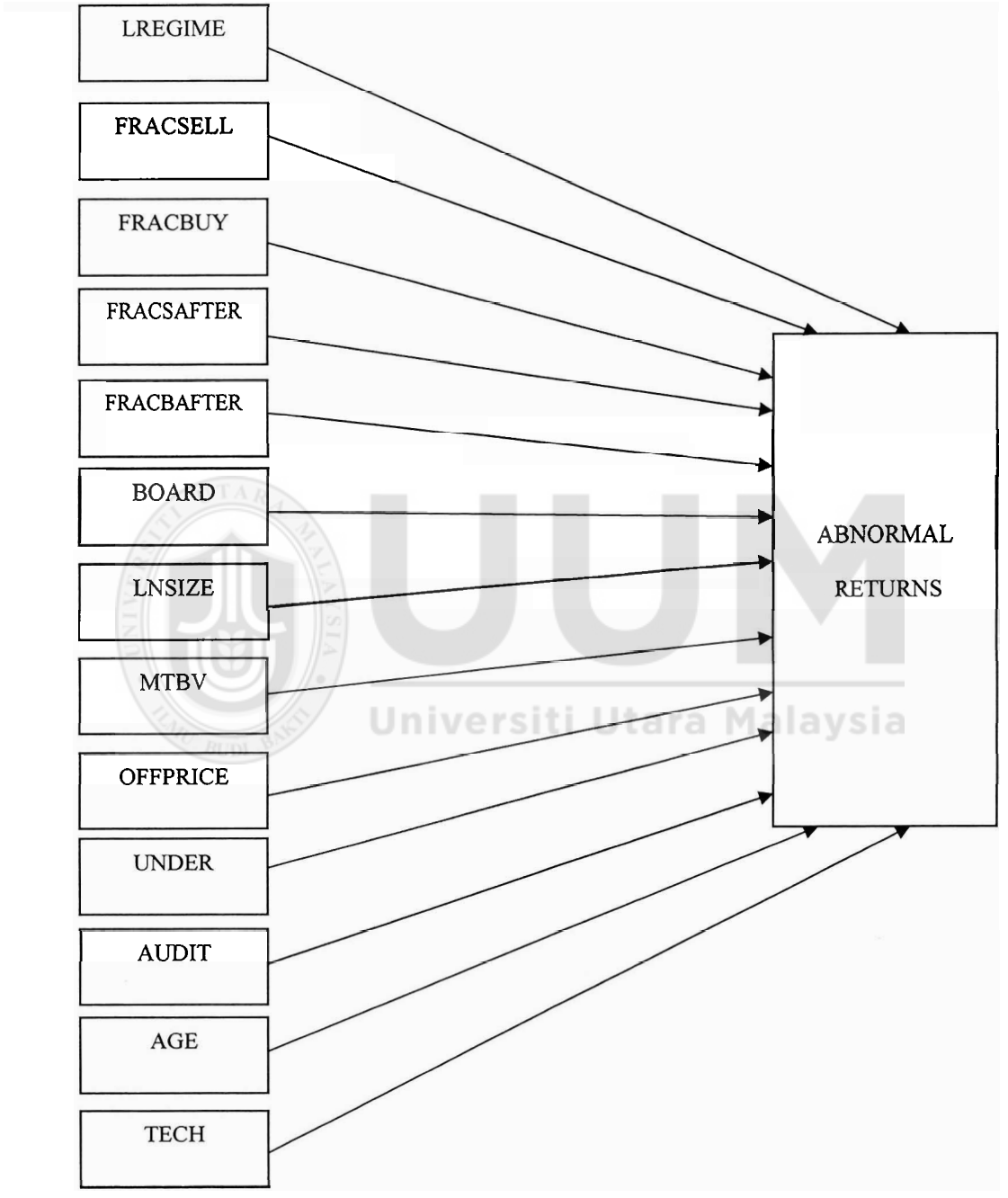

Figure 3.1
Research framework for determinant factors of abnormal returns.

Table 3.3
Hypotheses and expected sign in relations to multiple regressions

Variable	Expected sign
LREGIME – H3	Positive
FRACSELL – $H4_A$	**Negative**
FRACBUY – $H4_C$	**Positive**
FRACSAFTER – $H4_B$	**Negative**
FRACBAFTER – $H4_D$	**Positive**
BOARD – H5	**Positive**
LNSIZE – H6	**Positive**
MTBV – H7	**Positive**
OFFPRICE – H8	**Positive**
UNDER – H9	**Positive**
AUDIT – H10	**Positive**
AGE – H11	**Positive**
TECH – H12	**Negative**

3.5 Chapter Summary

To recapitulate, this chapter is summarized as follows: First, the sample comprises 292 non-financial IPOs companies which have been listed in the Bursa Malaysia from 1 May 2003 to 31 December 2012. Several restrictions have been imposed before the final sample size is derived. In addition to having the last exclusion of IPC and SPAC companies, the IPO company must remain listed throughout the expiration of the lockup period. All data are secondary in nature and collected from the companies' prospectuses and the DataStream database.

Second, the chapter also discusses the variables along with the associated testable hypotheses. Furthermore, it outlines the planned investigations by focusing the IPO lockup from the perspectives of market reaction to lockup expiration and its determinants factors. The first analysis seeks to investigate the existence of abnormal returns by employing the market model and the market adjusted returns model. This is followed by

the second analysis which explores the abnormal trading volume while the final analysis identifies the determinants of market reaction to lockup expiration using the multiple regression model.

In general, this chapter revolves around discussing the description of the relevant data, variables and a list of testable hypotheses on the related issues. It then discusses the research design and methods where it ends with the cross sectional multiple regressions. Hereafter, the chapters discuss the detailed analyses and the achieved results together with the conclusion and recommendations.

CHAPTER FOUR

EMPIRICAL FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter presents the results of market reaction at the lockup expiration for share price and trading volume, and the findings from the multiple regression analysis for the 292 IPOs, subsequently listed on Bursa Malaysia from 1 May 2003 to 31 December 2012.[16] The lockup expiration is tested using standard event-study method. Trading volume is conducted following the method used by Field and Hanka (2001) as stated in equation (8). Meanwhile, the results for multiple regression analysis are measured using the ordinary least squares (OLS) method.

The organization of this chapter is as follows: Section 4.2 describes the sample of the study. Section 4.3 provides and discusses the findings of the event-day abnormal returns at the expiration of the lockup. Section 4.4 focuses the abnormal returns between the Main Market and ACE Market, whereas an event-day abnormal return between lockup Regime #1 and Regime #2 is covered in Section 4.5. Section 4.6 discusses the event-day abnormal trading volume while Section 4.7 provides the descriptive statistics for the independent variables. Section 4.8 discusses the findings for multiple regression analysis. Finally, the chapter ends with a summary in Section 4.9.

[16] In regression analysis, only 290 IPOs could be used due to missing data.

4.2 Sample of the Study

Table 4.1 describes the sample used in this study for the period 1 May 2003 to 31 December 2012. The total IPOs issued with lockup provision were 292 companies, representing the Main Board, Second Board and MESDAQ Market. As a result of the new framework for listings and equity fund-raisings as of 3 August 2009, both the Main Board and Second Board are currently known as the Main Market while the MESDAQ Market is now known as the ACE Market. Companies under MESDAQ Market represent the highest number of IPOs whereas the Main Board companies have the lowest number being 121 and 16, respectively. This is in line with Regime #1's lockup provision whereby only certain Main Board companies are subjected to lockup provision as opposed to all Second Board companies and all companies under MESDAQ Market. As for the Main Market and ACE Market, all IPO listing is mandatory for lockup which falls under Regime #2. Table 4.1 below summarizes the sample for this study.

Table 4.1
IPOs lockup sample from 1/5/2003 – 31/12/2012

Board Listed	IPOs	Regime #1	%	Regime #2	%
Main Board	16	14	4.79	2	0.68
Second Board	86	85	29.10	1	0.34
MESDAQ Market	121	121	41.44	0	0
Main Market	48	1	0.34	47	16.10
ACE Market	21	1	0.34	20	6.85
Total Sample	**292**	**222**	**76%**	**70**	**24%**

Meanwhile, looking at the two regimes involve in this study, Regime #1 has a total of 222 companies whereas Regime #2 consists of 70 companies. In other words, about three quarters of the sample (76%) belongs to Regime #1. It is noted that two Main Board and a Second Board companies have been included under Regime #2 due to its

lockup provision. On the other hand, one Main Market and two ACE Market companies have been categorized under Regime #1 based on their lockup agreement.[17]

To further explore the lockup expiration among the boards listed, the final sample is divided into two groups. In line with the new listings framework, the first group consists of the Main Board, Second Board and Main Market. This group is categorized as the Main Market based on their issued and paid-up capital. The other group is the combination of the MESDAQ Market and ACE Market; hence this group is classified under the ACE Market. Hence, the total number of companies stands at 150 (51%) and 142 (49%), representing the Main Market and the ACE Market respectively.

4.3 Event-Day Abnormal Returns

In this section, the market price reaction around the lockup expiration is explored in line with objective 1. Results from the event study are presented in Table 4.2 over the 21 event days. The table illustrates the average abnormal returns (AARs) as well as the cumulative average abnormal returns (CAARs) using both the market model (MM) and market adjusted returns model (MAR). Since the AARs and CAARs using market EMAS index are in tandem with the KLCI index returns, only the results using KLCI index are presented for brevity.[18] This seems more appropriate and in line with KLCI being the most followed benchmark index of the Bursa Malaysia.

[17] The Main Board and Second Board companies are Samchem Holdings Berhad, Luxchem Corporation Berhad, and Handal Resources Berhad, respectively. Ivory Properties Group Berhad represents the Main Market while Ideal Jacobs and DSC Solution Berhad belong to the ACE Market.
[18] Refer to Appendix A.

Table 4.2

AARs and CAARs using Market Model and Market Adjusted Returns Model based on KLCI

Event Day	Market Model (MM) AAR (%)	p-value	CAAR (%)	Market Adjusted Returns (MAR) AAR (%)	p-value	CAAR (%)
-10	-0.22	0.2931	-0.22	-0.32	0.1069	-0.32
-9	0.41	**0.0475	0.19	0.37	0.2423	0.05
-8	-0.06	0.7640	0.13	-0.14	0.4887	-0.09
-7	-0.62	***0.0030	-0.49	-0.64	**0.0384	-0.73
-6	0.23	0.2707	-0.26	0.16	0.3859	-0.57
-5	0.12	0.5765	-0.14	0.07	0.6937	-0.50
-4	-0.22	0.2808	-0.36	-0.31	0.1527	-0.81
-3	-0.14	0.4893	-0.51	-0.23	0.3129	-1.04
-2	-0.14	0.5096	-0.65	-0.24	0.1777	-1.27
-1	-0.30	0.1493	-0.94	-0.39	*0.0765	-1.67
0	0.43	**0.0376	-0.51	0.40	0.1951	-1.26
1	-0.59	***0.0048	-1.10	-0.67	**0.0411	-1.93
2	-0.21	0.3147	-1.31	-0.30	0.2389	-2.23
3	-0.16	0.4406	-1.47	-0.22	0.4233	-2.45
4	0.21	0.3217	-1.26	0.15	0.5867	-2.30
5	-0.04	0.8492	-1.30	-0.17	0.4866	-2.47
6	0.25	0.2357	-1.05	0.10	0.6384	-2.37
7	-0.31	0.1396	-1.36	-0.37	*0.0904	-2.74
8	-0.01	0.9540	-1.37	-0.10	0.6732	-2.84
9	0.19	0.3670	-1.19	0.05	0.7872	-2.79
10	0.00	0.9905	-1.19	-0.17	0.4446	-2.96

***Significant at 1% level, **Significant at 5% level, *Significant at 10% level

As shown in Table 4.2, it reveals that the daily average abnormal returns for market model are significantly negative at 1% level on day -7 and day +1 with returns of -0.62% and -0.59%, respectively. However, on day -9 and day 0 the returns are significantly positive at 5% level with returns of 0.41% and 0.43%, respectively. Meanwhile, for the closer period surrounding the unlock day, the AARs are negative on day -4 through day +3, except on day 0. The negative returns range from -0.14% on days

-3 and -2 to -0.59% on day -1. Table 4.2 also tabulates the cumulative average abnormal returns (CAARs) around the expiration of the lockup. Virtually, CAARs are found to be negative and appear to be quite small from day -7 to day -4. However, from day -3 to day +10, the cumulative returns are larger where it peaks at -1.47% on day +3.

As mentioned earlier, Table 4.2 also provides AARs and CAARs using market adjusted returns model (MAR). The MAR employed in this study serves as a robustness test for the findings that have been found in the market model. The results are qualitatively the same for AARs on day -7 and day +1 but significantly negative at 5% level. However, for day -1 and day +7, abnormal returns are significantly negative at 10% level which does not occur when using the market model. Meanwhile, the results for CAARs are qualitatively similar from day -7 through day +10 where negative returns are observed. In line with the market model, larger cumulative returns can be seen from day -3 to day +10 where its highest is at -2.96% on day +10.

Furthermore, the cumulative average abnormal returns over the 21 event days are illustrated graphically in Figure 4.3 as measured by both market model and market adjusted returns model. Steeper fall can be observed from day -4 to day -1, and day +1 to day +3. In general, both models show similar results and trends with MAR having slightly greater negative returns. The reason for the slightly different pattern of results between these two models may be due to the beta which is taken one in the case of market adjusted model. Similar results are reported by Mahajan and Singh (2011) when

employing these two models. Therefore, further discussions pertaining to the results of this study are presented based on the market model employed.

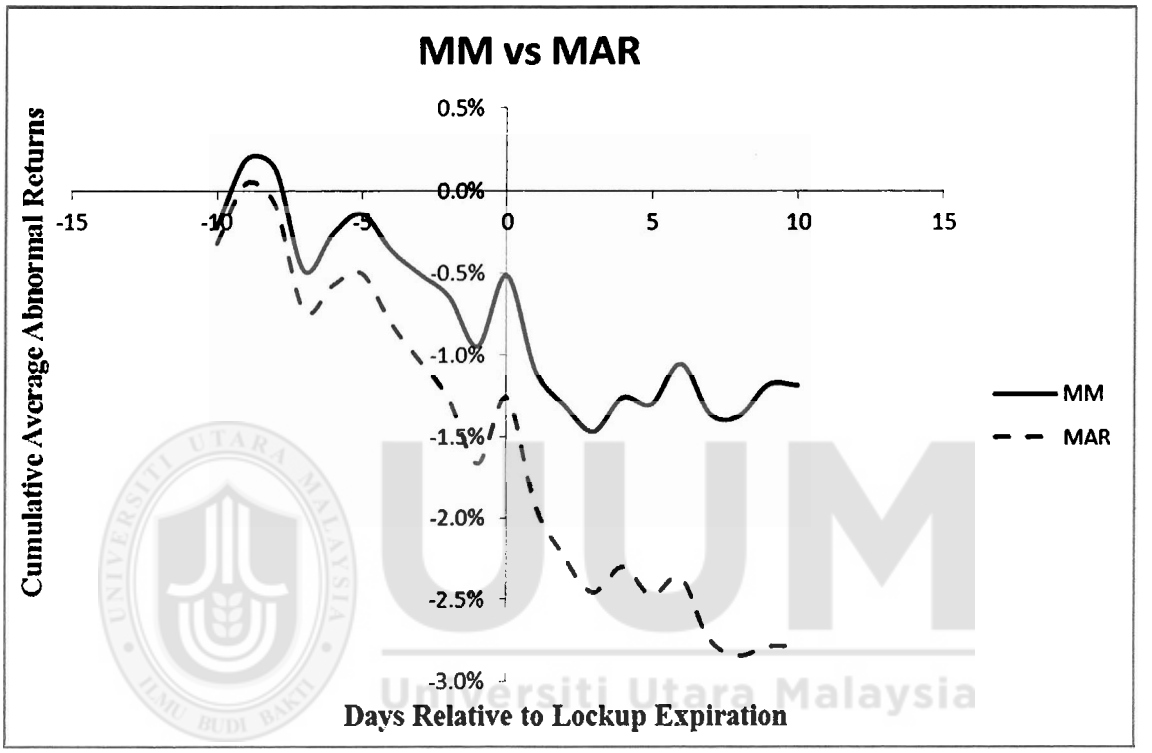

Figure 4.1
CAARs over 21 event days for market model and market adjusted return model

Next, Table 4.3 tabulates the cumulative average abnormal returns (CAARs) for several event windows using the market model. Different results are observed for CAARs at larger event windows as well as CAARs around the expiration date. Significant negative returns are recorded at smaller windows surrounding the event date for windows (-3, +3), (-2, +2) and (-1, +3). Only window (-3, +3) is significant at 5% level with return of -1.10%, whereas the other two windows are observed to be

significantly negative at 10% level with returns of -0.80% and -0.82% for windows (-2, +2) and (-1, +3) respectively.

Table 4.3
Cumulative Average Abnormal Returns for various event windows

	Market Model (MM)	
Event Window	**CAAR (%)**	**p-value**
(-10,+10)	-1.19	0.2117
(-10,-1)	-0.94	0.1504
(-5,+5)	-1.04	0.1294
(-5,-1)	-0.69	0.1384
(-3,+3)	-1.10	**0.0448
(-3,-1)	-0.58	0.1069
(-2,+2)	-0.80	*0.0853
(-1,+1)	-0.45	0.2077
(-1,+3)	-0.82	*0.0766
(-1,+5)	-0.66	0.2326
(-1,+10)	-0.54	0.4499

***Significant at 1% level, **Significant at 5% level, *Significant at 10% level

Following the discussions and interpretation of the results for the average abnormal returns (AARs), cumulative average abnormal returns (CAARs) based on the various event windows returns using the market model, results are further compared to the findings in other countries, especially the US. First, the positive average abnormal return is in contrast with the findings in the US where a negative unlock day average abnormal return is documented. Brav and Gompers (2003), Brau *et al.* (2004) and Bradley *et al.* (2001) indicate the returns of -0.12%, -0.38%, and -0.74%, respectively. However, immediately after the event day (day 1 to day 3), the returns are qualitatively the same (negative returns) with the studies in the US.

Secondly, despite AAR on day 0 has positive return, the cumulative average abnormal returns virtually show negative abnormal returns for days surrounding the event day. The negative CAARs for the 21 event days are also in line with studies as illustrated

by Brav and Gompers (2003) and Brau *et al.* (2004) in the US. However, their negative CAARs on day 0 are slightly larger at -1.08% and -1.90% respectively, as compared to this study with a return of -0.51% from day -10 to day 0.

Finally, the results for CAARs of various event windows are explored. It is observed that for event window of 3-day (-1,+1), the negative abnormal return is insignificant. Contrary to US studies (e.g., Field & Hanka, 2001; Bradley *et al.*, 2004; Garfinkle *et al.*, 2002), the abnormal returns are significantly negative at 1% level being -1.5%, -1.61% and -4.4%, respectively. However, for the five-day event window (-2, +2), the negative abnormal return is in line with the findings of Bradley *et al.* (2001) with returns of -1.61%, being significant at 1% level. In addition, for the other 5-day event window (-1, +3) the return of -0.82% is also significant at 10% level. Similarly, Ofek and Richardson (2000) also report the five day cumulative abnormal return but it is for window (-4, 0) amounting to -2.03%, which is significant at 1% level.

Furthermore, larger event window of 7-day (-3, +3) is significantly negative at 5% level with CAAR of -1.10%. The significant negative return is corresponding with the CAAR of -1.9% as reported by Field and Hanka (2001) for 7-day window (-5, +1) with significant level of 1%. Based on the results presented, this study therefore shows statistically significant negative abnormal returns at the expiration of the lockup period which is in line with the US studies. However, both the negative abnormal returns and the significant levels are slightly lower for this study with mandatory lockup provisions compared to those reported in the US with voluntary lockup agreements.

A possible explanation could be associated with the information content of the lockup provisions. Voluntary lockup agreements have more information content as the negotiations undertaken between companies and underwriters allows for the choice of the lockup length as well as the proportion of shares to be retained during the lockup period. In contrast, mandatory lockup agreements do not differentiate between companies since its lockup agreements are imposed by the regulators. Hence, no information content is obtained because no companies can shorten or extend the lockup length as well as retain higher or lower percentage of the shares locked-up.

In line with this, Hakin *et al.* (2012) find that prices decline at lockup expiration for mandatory lockup in the MENA region much the same as in the US. Consistent with the study reported by Nowak (2004), the drop in share price is significantly larger for the expiration of voluntary lockup agreements than for mandatory provision of lockup period. The existence of the significant negative abnormal returns surrounding the lockup expiration further indicates the contradicting evidence of the efficient market hypothesis.

4.4 Main Market versus ACE Market Abnormal Returns

As mentioned earlier, this study also explores the lockup expiration between the two groups which have been categorized under the Main Market and the ACE Market. Noting that listed companies under the ACE Market pose riskier elements due to their high growth, technology related and are of smaller size companies. All of these elements

indicate the investors' concern surrounding the unlock date, coupled with high uncertainties arising from less information available in the market. As such, these companies would encounter higher negative returns at the expiration of the lockup period. However, to confirm the statistical significance of the abnormal returns between these two groups at lockup expiration, both independent samples t-test with unequal variances and nonparametric test for independent samples using various event windows are carried out. Results of the statistical tests are tabulated in Table 4.4 as shown below.

Table 4.4
Independent sample t-test and nonparametric test for Main Market and ACE Market

Event Window	Main Market (%)	ACE Market (%)	p-value (Mean Difference)	p-value (Mann-Whitney)
(-10, +10)	-6.428	-5.940	0.947	0.446
(-10, -1)	-0.896	-5.787	0.316	0.871
(-5, +5)	-0.985	-5.899	0.335	0.227
(-5, -1)	-0.472	-5.708	0.281	0.791
(-3, +3)	-0.831	-6.181	0.297	0.815
(-3, -1)	-0.473	-5.484	0.307	0.534
(-2, +2)	-0.964	-5.416	0.375	0.173
(-1, +1)	-0.609	-0.289	0.775	0.582
(-1, +3)	-0.813	-0.832	0.990	0.433
(-1, +5)	-0.969	-0.326	0.695	0.118
(-1, 10)	-5.988	-0.287	0.300	0.423

***Significant at 1% level, **Significant at 5% level, *Significant at 10% level

From the Table 4.4, p-value for mean difference indicates statistical insignificant for all event windows between the Main Market and the ACE Market. Similarly, no statistical significance is observed for p-value in the Mann-Whitney nonparametric test. The results therefore show that there is no significant difference in cumulative abnormal returns at the lockup expiration between the Main Market and ACE Market.

4.5 Event-Day Abnormal Returns for Lockup Regimes

As mentioned earlier, there are two lockup regimes involve in this study. Regime #1 represents the lockup provision with effect from 1 May 2003 whereas Regime #2 belongs to the lockup provision starting from 3 August 2009, arising from the new framework in Malaysian capital market. Along with the new structure, there is also a significant shift in the regulatory approach with regards to lockup period by the Securities Commission. Hence, the impact of these regulation changes is further explored on the abnormal returns.

To provide further insight, statistical significance of the abnormal returns between these two regimes at lockup expiration needs to be examined. Similar tests that have been done for the Main Market and the ACE Market are carried out. First, the independent samples t-test with unequal variances is conducted. This is followed by the nonparametric test for independent samples whereby various event windows are used for both tests. Results of the statistical tests are tabulated in Table 4.5 are shown as below.

Table 4.5
Independent samples t-test and nonparametric test for lockup regimes

Event Window	Regime #1 (%)	Regime #2 (%)	p-value (Mean Difference)	p-value (Mann-Whitney)
(-10,+10)	-4.343	-12.052	0.505	0.731
(-10,-1)	-4.199	-0.343	0.234	0.629
(-5,+5)	-4.250	-0.598	0.292	0.402
(-5,-1)	-3.920	-0.159	0.235	0.641
(-3,+3)	-4.210	-0.968	0.337	0.774
(-3,-1)	-3.709	-0.376	0.292	0.620
	-3.704	-1.305	0.466	0.279
(-1,+1)	-0.313	-0.900	0.507	0.196
(-1,+3)	-0.693	-1.232	0.659	0.694
(-1, 5)	-0.522	-1.079	0.687	0.239
(-1,+10)	-0.336	-12.348	0.284	0.294

***Significant at 1% level, **Significant at 5% level, *Significant at 10% level

From Table 4.5, it is observed that p-value for mean difference indicates statistical insignificant for all event windows of Regime #1 and Regime #2. Likewise, no statistical significance is found for p-value in the Mann-Whitney nonparametric test. The results thus, indicate that there is insignificant difference in cumulative abnormal returns at the lockup expiration between Regime #1 and Regime #2. As such, the results prove that the change in lockup regulation does not have an impact in reducing the abnormal returns at the lockup expiration.

4.6 Event-Day Abnormal Trading Volume

The event-day abnormal trading volume is performed in order to examine whether the share price changes at the expiration of the lockup are associated with greater abnormal volume which is in line with objective two. The tendency of promoters (insiders) to dispose shares at lockup expiration allows for the investigation of the behavior of trading volume whether it is abnormally high surrounding the event. The results are illustrated in Figure 4.2 for day -60 through day +50. From the plotted graph, it is observed that nearly all event days prior to lockup expiration have lower abnormal trading volume, except for those from day -10 towards the unlock day whereby the abnormal volume starts to increase and show an upward trend, peaking on day -2. The abnormal volume remains positive and higher from day -10 throughout 50 days after the unlock date.

The results show that abnormal trading volume does not revert back to zero, indicating the trading volume has permanently changed after the expiration of the lockup period. At this time, insiders are free to sell their restricted shares and the heavy volume might due to the trades originated from insiders. The positive abnormal trading volume is corresponding with the evidence from the US studies (e.g., Field & Hanka, 2001; Garfinkle *et al.*, 2002; Brav & Gompers, 2003) of increasing trading volume at the expiration of the lockup. While outside the US, studies by Boreiko and Lombardo (2013), Goergen *et al.* (2010), Chen *et al.* (2005) and Novak (2004) also report increasing in trading volume in Italy, Hong Kong, Taiwan and Germany, respectively. Hence, this study indicates the existence of abnormal trading volume at lockup expiration.

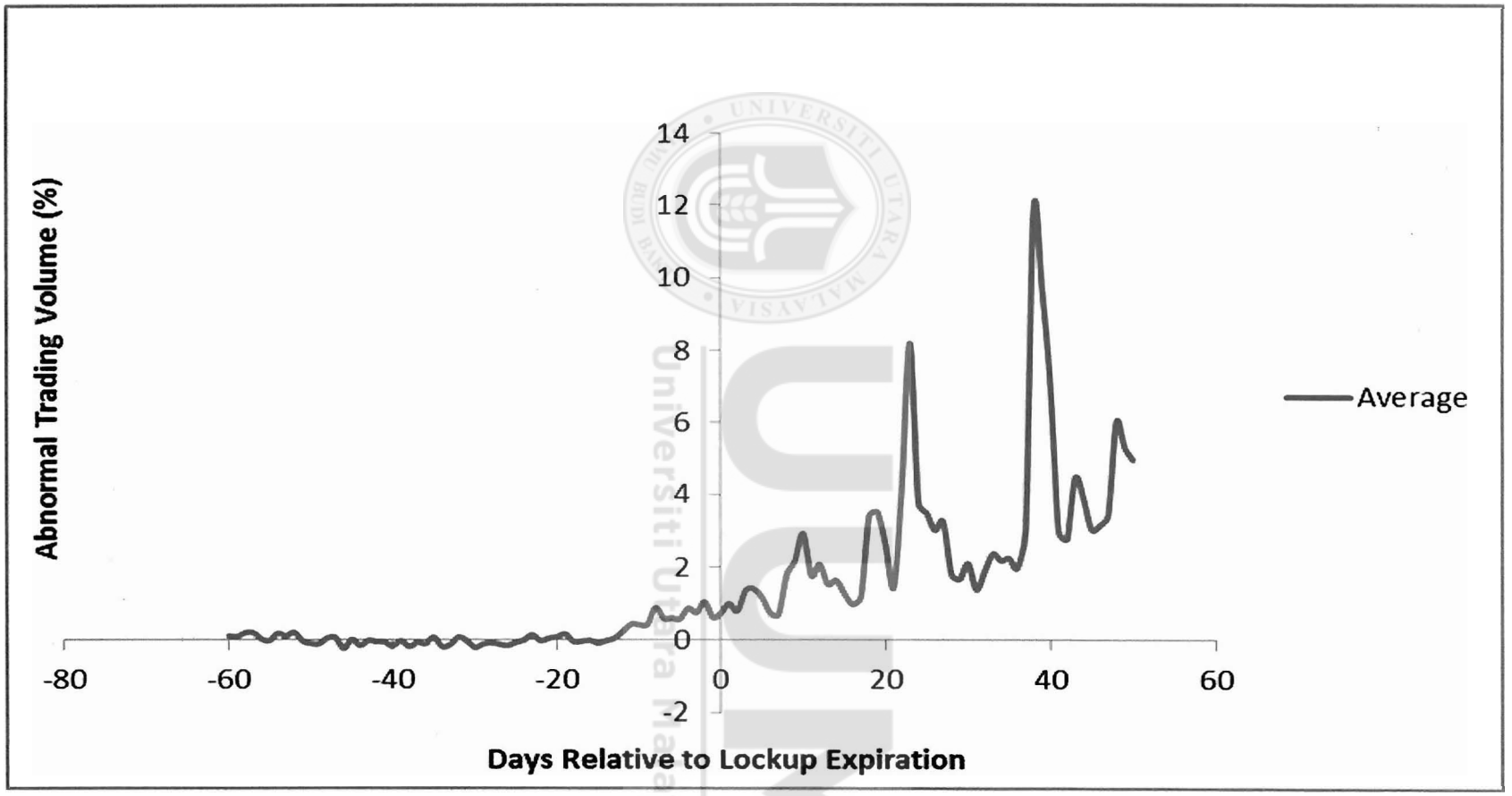

Figure 4.2
Abnormal trading volume around the lockup expiration day

4.7 Descriptive Statistics

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 4.6 summarizes the descriptive statistics for the independent variables. The table presents mean, median, minimum, maximum and standard deviation for all variables used in this study as shown below.

Table 4.6
Independent variables descriptive statistics (N=290)

Variable	Mean	Median	Minimum	Maximum	Std. deviation
LREGIME	0.759	1	0	1	0.429
FRACSELL	0.036	0	0	0.363	0.061
FRACBUY	0.010	0	0	0.289	0.025
FRACSAFTER	0.004	0	0	0.186	0.018
FRACBAFTER	0.001	0	0	0.034	0.003
BOARD	0.483	0	0	1	0.501
SIZE(MILLION)	695	70	8	40,400	3,8170
LNSIZE	18.388	18.069	15.840	24.420	1.262
MTBV*	2.031	1.375	-4.420**	29.450	2.540
OFFPRICE	0.837	0.650	0.1	5.200	0.725
UNDER	0.693	1	0	1	0.462
AUDIT	0.438	0	0	1	0.497
AGE(YEAR)	4.157	1.890	0.301	32.820	5.452
LNAGE	0.874	0.619	-1.199	3.491	0.959
TECH	0.290	0	0	1	0.454

*Two companies have been dropped from the sample due to missing data of MTBV, namely Systech Corporation and Pasukhas Group.
** Two dead companies, namely Wimems and eB Capital Berhad have negative total equity.

Looking at the lockup regime (LREGIME), it is observed that 76% of the companies belong to Regime #1. This is in line with the period of study whereby the lockup period for Regime #1 takes effect on 1 May 2003 until the lockup regime changes effective 3 August 2009. In connection to insider trading activity, the four related variables are the fractions of insiders sell and buy pre-lockup expiration, and the fractions of the insiders sell and buy post-lockup expiration. The mean for FRACSELL is 0.036 where its maximum value reaches up to 0.362 while the FRACBUY mean and maximum values

are 0.010 and 0.289, respectively. Meanwhile, for post-lockup expiration variables, both FRACSAFTER and FRACBAFTER have mean values of 0.004 and 0.001 while their maximum values reaching up to 0.018 and 0.003, respectively. Noting on the board listed (BOARD), 49% of the companies belongs to the MESDAQ and ACE Market, which is slightly less than the combined listing of companies on the Main Board, Second Board and the Main Market.[19] With respect to information asymmetry attributes, the mean for the natural logarithm of size (LNSIZE) of the market capitalization for the sample companies is RM695 million. The minimum and maximum values are RM8 million and RM40.4 billion representing HDM-Carlaw and Petronas Chemical, respectively. However, the mean and the median are about the same amounting to 18.39% and 18.07%, respectively. Another proxy for information asymmetry is the IPOs offer price (OFFPRICE) the mean is RM0.84 compared to the median of RM0.65. The range of the offer price is from a minimum of RM0.10 to a maximum of RM5.20 which belongs to HDM-Carlaw and Maxis, respectively.

Glimpsing through the companies' age from the date of incorporation until the listing date, the mean is about 4 years whereas the minimum and maximum ages are 0.3 years and 32 years, which belongs to MSM Malaysia Holdings and Ibraco Berhad, respectively. Based on the mean reported, 69% of the underwriters (UNDER) employed in facilitating the issuance of the IPOs are high prestige underwriters whereas 44% of the sample companies use reputable auditors. Only 29% of the sample companies are listed under the technology sector of Bursa Malaysia. The proxy for growth opportunity is the

[19] Following the reorganization of Bursa Malaysia on 3 August 2009, Main Board and Second Board have been merged in the Main Market while MESDAQ Market has become ACE Market.

market-to-book value where the mean is 2.03 with the maximum value reaches up to 29.45.

Some of the independent variables might be related which suggest the likelihood existence of multicollinearity. In order to test for multicollinearity, variance inflation factor (VIF) is examined. In general, as the extent of collinearity increases, the VIF increases. If no two variables are correlated, the VIF will be 1. As a rule of thumb, a variable is said to be highly collinear if the VIF of the variable exceeds 10 (Gujarati, 2003, p.362). As shown in Table 4.7, the VIFs vary from 1.07 (UNDER) to 3.21 (LNSIZE) with the mean of 1.60. Hence, it can be concluded that there is no serious multicollinearity problem in the multivariate analysis. In addition to VIF, the correlation matrixes of independent variables also do not show any high pair-wise correlations among the variables. None of the correlation coefficients between the variables are in the excess of 0.80. However, if the pair-wise correlation coefficients between the variables are in excess of 0.80, it may suggest multicollinearity (Gujarati, 2003, p.359). It is noted that the highest correlation is 0.788 between LNSIZE and OFFPRICE. In brief, both tests of VIF and correlations among the variables have indicated that no multicollinearity problem exists in the model.

Table 4.7
Correlation matrix among variables and multicollinearity test (Variance Inflation Factor - VIF)

Variables	REGIME	FRAC SELL	FRAC BUY	FRAC SAFTER	FRAC BAFTER	BOARD	LNSIZE	MTBV	OFFPRICE	UNDER	AUDIT	LNAGE	TECH	VIF
REGIME	1													1.34
FRACSELL	0.325[a]	1												1.47
FRACBUY	0.110[c]	0.377[a]	1											1.27
FRACSAFTER	0.091	0.177[a]	-0.009	1										1.11
FRACBAFTER	0.050	0.095	0.180[a]	0.194[a]	1									1.11
BOARD	0.222[a]	0.225[a]	-0.068	0.166[a]	0.067	1								2.07
LNSIZE	-0.392[a]	-0.182[a]	-0.048	-0.052	-0.008	-0.398[a]	1							3.21
MTBV	-0.061	-0.011	-0.088	0.067	-0.073	0.126[b]	0.231[c]	1						1.15
OFFPRICE	-0.264[a]	-0.103[c]	0.024	-0.087	-0.029	-0.500[a]	0.788[a]	0.139[b]	1					3.13
UNDER	-0.078	-0.165[a]	-0.077	-0.039	0.071	-0.030	0.118[b]	0.095	0.121[b]	1				1.07
AUDIT	0.011	0.074	0.074	-0.022	-0.036	-0.185[a]	0.256[a]	0.046	0.226[a]	-0.061	1			1.14
LNAGE	-0.179[a]	-0.067	-0.760	-0.940	-0.240	-0.127[b]	0.130[b]	-0.036	0.190[b]	0.081	0.138[b]	1		1.10
TECH	0.200[a]	0.285[a]	-0.027	0.180[a]	0.081	0.600[a]	-0.237[a]	0.058	-0.275[a]	-0.037	-0.073	-0.075	1	1.65
													MEAN VIF	**1.60**

[a] Significant level at 1%, [b] Significant level at 5%, [c] Significant level at 10%

4.8 Multiple Regression Analysis Findings

In line with objectives three and four, the results for multivariate regression analysis are measured using the ordinary least squares (OLS) method as proposed in Chapter 3 is illustrated by the model below:

$$CAR_i = \beta_0 + \beta_1 LREGIME_i + \beta_2 FRACSELL_i + \beta_3 FRACBUY_i + \beta_4 FRACSAFTER_i + \beta_5 FRACBAFTER_i + \beta_6 BOARD_i + \beta_7 LNSIZE_i + \beta_8 MTBV_i + \beta_9 OFFPRICE_i + \beta_{10} UNDER_i + \beta_{11} AUDIT_i + \beta_{12} AGE_i + \beta_{13} TECH_i + \varepsilon_i$$

where *i* refers to IPO_i, LREGIME is a dummy variable for Regime #1 which is equal 1 and 0 otherwise, FRACSELL is the fraction of promoters (insiders) selling before lockup expiration, FRACBUY is the fraction of promoters (insiders) buying prior to the expiration of the lockup period, FRACSAFTER is the fraction of promoters (insiders) selling after the event date, FRACBAFTER is the fraction of promoters (insiders) buying after the expiration of lockup, BOARD is a dummy variable for those companies listed on the Main Market which is equal 1 and 0 otherwise, LNSIZE is the company size which is measured by the natural logarithm of market capitalization based on offer price and number of share issued at listing date, MTVB is the market-to-book value which is measured by market value of equity 11days before the event date divided by book value, OFFPRICE is the issuing price of the IPOs, UNDER is the dummy variable for prestigious underwriter which equals 1 and 0 otherwise, AUDIT is the dummy variable

for reputable auditor of 1 and 0 otherwise, AGE is the company age in years, and TECH is the technology company listed under the technology sector of the Bursa Malaysia.

Meanwhile, the dependent variable (CAR) is the three-day cumulative abnormal returns of event window (-1, +1). Among previous studies which have used similar event window of (-1, +1) are Field and Hanka (2001), Hoque (2011) and Hakim *et al.* (2012). Table 4.8 presents the regression results using ordinary least squares (OLS) method.

Table 4.8
Multiple regressions for full model

Variable	Coefficient	t-statistics	p-value
INTERCEPT	0.1183	1.67	*0.095
LREGIME	-0.0007	-0.07	0.948
FRACSELL	0.0328	0.38	0.703
FRACBUY	0.0132	0.12	0.907
FRACSAFTER	-0.3905	-2.14	**0.033
FRACBAFTER	3.3651	3.08	***0.002
BOARD	-0.0238	-2.13	**0.034
LNSIZE	-0.0062	-1.47	0.144
MTBV	-0.0050	-1.12	0.263
OFFPRICE	0.0087	1.23	0.220
UNDER	0.0082	0.44	0.657
AUDITOR	0.0160	1.44	0.150
LNAGE	0.0005	0.14	0.887
TECH	-0.0254	-1.33	0.185
Number of observations	290		
R-squared	0.056		
Adjusted R-squared	0.012		
F-statistics	1.770		
Significance of F-statistics	0.047		

***Significant at 1% level, **Significant at 5% level,*Significant at 10% level
Notes: The dependent variable is the 3-day cumulative abnormal returns (-1, +1). The t-statistics and p-values are based on robust standard errors.

The regression equation is able to explain 5.6% of the variation in the dependent variable and the F-statistics for the equation is 1.77. The Adjusted R^2 of 1.2%, even though appeared small, it is comparable to other studies such as Brav and Gompers

(2003) and Brau *et al.* (2004) of 1.3% and 2.0%, respectively. Breusch-Pagan / Cook-Weisberg test which is carried out to look for heteroscedasticity yields significant result at 1% level (p-value = 0.0000). Hence, to overcome the heteroscedasticity problem, t-statistics are computed using robust standard errors. When each determining variable is examined individually while holding the remaining variables constant, the results show that only the coefficients for BOARD and FRACSAFTER are statistically significant at 5% level while FRACBAFTER is statistically significant at 1% level. The rest of the variables are observed to be statistically insignificant in relations to the abnormal returns.

The first variable included in the regression is the coefficient for lockup regime (LREGIME). The result indicates a negative but statistically insignificant (p-value = 0.967) relationship between cumulative abnormal returns and the lockup regime. It is expected to have a positive relationship with the dependent variable since insiders under Regime #1 have less than 100% (smaller proportion) of their shares retained coupled with longer lockup length. Brau *et al.* (2004) indicate that the lower the proportion of shares locked-up, the greater the chances insiders can provide signals to the market through their trading of unlocked shares. Thus, the informational asymmetries are reduced between insiders and outsiders. In addition, the lower proportion of shares locked should lead to a lesser need for diversification and investors should react accordingly to the smaller number of shares expected to be disposed at the expiration of the lockup. Moreover, the longer the time lapse between the IPO listing date and the lockup expiration date (longer lockup length), the more information is likely to be available to investors, hence reducing the informational asymmetries.

The result is dissimilar to Brau *et al.* (2004), Bradley *et al.* (2001) and Angenendt *et al.* (2005) where their results show insignificant positive relationship between lockup length and the abnormal returns. However, the results coincide with Hakim *et al.* (2012) whose results indicate insignificant negative relationship between these two variables. In terms of percentage of shares locked, the results of previous studies (e.g. Brau *et al.*, 2004; Bradley *et al.*, 2001; Field & Hanka, 2001; Brav & Gompers, 2003 and Angenendt *et al.*, 2005) indicate significant negative relationship between proportion of shares retained and the abnormal returns. However, the results of Hakim *et al.* (2012) find insignificant negative relationship between these two variables.

As stated earlier, the relationship between these two lockup parameters (lockup length and proportion of shares locked) cannot be applied and tested directly with the abnormal returns. Hence, lockup regime is used instead for this study. A possible reason is that lockup regimes in this study are mandated by the Securities Commission. Hence, the different lockup length and the different percentage of shares locked imposed in both regimes do not convey valuable information in relation to the issuer's risk. Accordingly, the proposed hypothesis H_3 of positive relationship between abnormal returns and lockup regime is rejected. However, to provide further insight between these two regimes in relation to abnormal returns, more tests are conducted by creating sub-samples which is reported in later part of the analysis.

The second coefficient, the fraction of insiders sell before the lockup expiry (FRACSELL) which can only occur under Regime #1, has a positive relationship with

the cumulative abnormal returns as expected, however it is statistically insignificant. A possible explanation might be that since insiders have already sold before the lockup expiration, the effect on abnormal returns should be smaller at the unlock day. The results are consistent with the findings of Hoque and Lasfer (2009) and Brav and Gompers (2003) who report insignificant price drop for early sell trading by insiders. However, Keasler (2001) finds significant abnormal returns prior to the expiration of lockup period compared to the abnormal returns following the lockup expiration. The insignificant result provides insufficient evidence in supporting the idea that the fraction of insiders sell before the lockup expiry has less influence on abnormal returns. Thus, the proposed hypothesis $\mathbf{H_{4A}}$ of positive relationship between abnormal returns and the fraction of insiders sell before the lockup expiration is rejected.

In contrast to FRACSELL, lockup period allows purchases by insiders for both Regime #1 and Regime #2. As for the fraction of insiders buy before the expiration of the lockup period (FRACBUY), the cross sectional results show insignificantly positive coefficient (p-value = 0.813) with the abnormal returns. Although it is not significant, the coefficient of this variable is positive as anticipated. In terms of buying trades, the results do not reaffirm the findings of Brav and Gompers (2003) and Brau *et al.* (2005). They indicate that insiders' acquisitions are to be driven by the commitment and signaling effects. Insiders who are committed would engage in buying to support the price for companies which are performing badly since its listing or they provide a signal of the quality companies by increasing their holdings.

However, the results are inconsistent with Hoque and Lasfer (2009) who find significant price drop for early buy insider trading. Hence, hypothesis $\mathbf{H_{4C}}$ which examines a positive relationship between abnormal returns and the fraction of insiders buy before the lockup expiry is rejected. Looking at these two variables, the insignificant influence of both FRACSELL and FRACBUY on abnormal returns following lockup expiration is also consistent with an efficient market argument. In an efficient market, insiders trading activities would influence returns surrounding the action dates.

The next variable is the fraction of insider sell after the lockup expiration (FRACSAFTER). In line with the earlier hypothesis, the cross sectional result indicates statistically significant negative relationship between insider sales after the expiration of lockup period and cumulative abnormal returns. The results are consistent with the studies of Angenendt *et al.* (2005), Field and Hanka (2001), and Chen *et al.* (2012). Angenendt *et al.* (2005) find that abnormal returns for insiders' sales are negative and strongly statistically significant at lockup expiration whereas Field and Hanka (2001) find that the abnormal return is significantly more negative when insiders disclose share sales on the unlock day. Moreover, Chen et al. (2012) indicate that senior executives' insider sales are largely motivated by private information whereas sales by other insiders tend to be driven by diversification. However, the results are inconsistent with Espenlaub *et al.* (2002) where they find that the negative abnormal returns at the expiration of the lockup are not caused by the directors' sales.

Insiders' sales can have a potential strong impact on the share price. This trading activity tends to convey bad news as it suggests a reduction in insiders' incentives, lack of insiders' confidence, and an increase in the supply of shares that may cause the decline in price (Field & Hanka, 2001; Brau *et al.*, 2005). Since this study captures the actual trading by insiders during post-lockup expiry, it shows that the impact of the negative abnormal return is entirely caused by the insiders' sales. A possible explanation for the significant negative result could be related to either portfolio diversification purpose or that the insiders have some negative private information regarding the company's future prospect.

Some insiders are wealthy in terms of the market value of their holdings. However, they can still be cash poor if the large chunk of their wealth is tied up in the shares of the company. If the cash is needed, these insiders may have to liquidate some of their holdings. In the same line, insiders in a company that has just gone public may find that they have too much of their wealth tied up on that company. Having weighed the desire for control of having a concentrated position against the peace of mind that arises from diversification, some of them may choose to cash out on at least a portion of their holdings for other investments. Thus, insiders may dispose their shares when they are allowed to do so after the lockup period expires without conveying material information by their action.

Alternatively, insiders have better information about companies' fundamentals and future growth than the public investors. This private information in connection to

insider sales following lockup expiration suggests that the insiders have negative information about their company's prospects or current valuation. Thus, it motivates them to sell the proportion of their shares in order to reduce their exposure to the company. Therefore, this study accepts the hypothesis $\mathbf{H_{4B}}$ of negative relationship between abnormal returns and the fraction of insiders' sales after lockup expiration.

Meanwhile, for the independent variable fraction of insiders buy after the lockup expiration (FRACBAFTER), the results show a positive relationship with the abnormal returns as expected and highly significant at the 1% level. This coefficient is expected to be positive as the buying trading activity by insiders conveys good news to the market and it is motivated by the commitment and signaling effects (Brav & Gompers, 2003; Brau *et* al., 2005). A possible reason is that rationally, insiders would take advantage of the fall on the company's share price after the lockup expiration. Given the attractive valuation, it is an opportunity for insiders to continue accumulating the shares, hence increasing their holdings. This insider buying reflects the willingness of the insiders to become less diversified, providing a signal about the company's good future performance over the long term. Thus, the proposed hypothesis $\mathbf{H_{4D}}$ of positive relationship between abnormal returns and the fraction of insiders buy after lockup expiration is accepted.

The first proxy for information asymmetry in the cross sectional study is the company size. Two variables are used, namely BOARD and LNSIZE which are expected to provide similar results. For variable BOARD, the result indicates a negative relationship with the abnormal returns which is statistically significant ($p = 0.025$). It is

not as expected since hypothetically, the level of information asymmetry is lower in larger companies, and thus less abnormal returns are expected at the expiration of the lockup period. The results are inconsistent with the studies of Bradley *et al.* (2001), Brav and Gompers (2003) and Brau *et al.* (2004). They find significant smaller price decline for larger companies where these companies are likely to have more information available in the market. In addition, more information available for larger companies would lead to less severe information asymmetry problem. Hence, the result of this study is not consistent with the information hypothesis. Accordingly, the hypothesis $\mathbf{H_5}$ of positive relationship between BOARD (Main Market) and the abnormal returns is rejected.

Meanwhile, for variable LNSIZE, in contrast to the developed hypothesis where positive relationship between company's size and abnormal returns is expected, the results show a statistically insignificant negative relationship. Thus, the result is also inconsistent with the information hypothesis. It is worth noting that at this stage, these two variables (BOARD and LNSIZE) provide similar negative relationship with the abnormal returns which contradict with the developed hypotheses. Furthermore, variable BOARD is found to be statistically significant as opposed to variable LNSIZE. Hence, the results suggest for further testing to be carried out for robustness analysis.

Meanwhile, the independent variable market-to-book value (MTBV) is used to act as a proxy to measure growth opportunities. In line with the anticipation, the cross sectional results show an insignificant negative coefficient ($p = 0.359$) relationship with

abnormal returns. Higher market-to-book ratio of a company is usually assumed to be associated with higher growth opportunity which leads to more uncertainty in terms of valuation of these high-growth companies. The insignificant result provides insufficient evidence in supporting the idea that growth opportunities have an influence in abnormal returns. The result coincides with the insignificant results of Brav and Gompers (2003), Brau *et al.* (2004) and Hakim *et al.* (2012). Thus, the proposed hypothesis H_7 of negative relationship between market-to-book value and the abnormal return is rejected.

The next variable is the offer price (OFFPRICE) issued by IPO companies for listing. In line with the previous hypothesis, the cross sectional result shows a positive relationship between OFFPRICE and cumulative abnormal returns but it is statistically insignificant. Additionally, similar results are observed when inverted offer price is used in the regression. As explain by Tinic (1988), low priced shares tend to be issued by more speculative companies, greater uncertainty at lockup expiration would lead to greater share price decline. The insignificant result coincides with the result of Brau *et al.* (2004) where they observe insignificant positive relation. Accordingly, the hypothesis H_8 of positive relationship between the offer price and the abnormal returns is rejected.

For the variable underwriter reputation (UNDER), presumably the underwriters provide a positive signal about the quality of the issuer. Therefore, a company issuing new shares can certify its true value by hiring a prestigious underwriter. As hypothesized, the results indicate a positive relationship between underwriter reputation and abnormal returns, although it is statistically insignificant which coincides with the

results of Brav and Gompers (2003). Such result however does not reaffirm the results of Goergen *et al.* (2006) and Angenendt *et al.* (2005), where they find that a company engaging with higher underwriter rank is associated with lower negative abnormal returns at the expiration of the lockup period. In contrast, the results of Bradley *et al.* (2001) indicate statistically significant while Brau *et al.* (2004) find statistically insignificant negative relationship between these two variables. Hence, hypothesis $\mathbf{H_9}$ that examines the positive relationship between the underwriter and the abnormal return is rejected.

There are two possible explanations for the insignificant effect of underwriters on abnormal returns. One is that the lockups for this study are set by regulators as opposed to being negotiated between companies and their underwriters. Hence, the effect of the underwriters and the abnormal returns at lockup expiry are not that significant. The other explanation could also be that high underwriter reputation reflects the lower information asymmetries towards the IPO companies. In order to protect their reputation, those prestigious underwriters would underwrite only the trustworthy IPO companies. This is done by certifying the true value or pricing the new issue as accurately as possible, Beatty and Ritter (1986). Therefore, IPO shares underwritten by reputable underwriters encounter with the lower negative abnormal returns.

Similar to underwriter reputation, the variable auditor reputation (AUDITOR) plays an important role in IPOs in reducing the information asymmetry between insiders and outsiders through their reporting on the reliability of the financial data in the prospectus. Michaely and Shaw (1995) indicate that the hiring of a reputable auditor can

reduce the uncertainty surrounding the value of the company. In line with the earlier anticipation, the cross sectional results show a positive relationship between auditor reputation and cumulative abnormal returns, but statistically insignificant.

Although Brau *et al.* (2005) show that lockups should be shorter when a company is more transparent in relation with the certification by a reputable auditor, the relatively strict regulations in Malaysian equity market do not allow IPO companies to have the choice of lockup length. Hence, the choice of reputable auditor for mandatory lockup is irrelevant as opposed to voluntary lockup. Accordingly, the proposed hypothesis $\mathbf{H_{10}}$ of positive relationship between the auditor and the abnormal return is rejected.

The next independent variable is the natural logarithm of company age (LNAGE) where it is anticipated that older companies would face lower negative abnormal returns at the expiration of the lockup period. In contrast to such prior anticipation, cross sectional result shows statistically insignificant negative relationship between the age and the abnormal returns at the lockup expiration date. Although Brau et al. (2005) and Goergen *et al.* (2006) find that younger companies have longer lockup periods or more stringent lockup contracts than their older counterparts; the results are not relevant to Malaysia as it is not voluntary where the companies are not allowed to shorten or extend the lockup length.

As such, a possible explanation for the insignificant effect of companies' age on abnormal return is that all companies must furnish detailed financial statements in the

prospectus regardless of their age. Hence, it is indifferent between the older and the younger companies in relations to a mandatory lockup regulation. Therefore, the hypothesis $\mathbf{H_{11}}$ which examines the positive relationship between the age of company and the abnormal return is rejected.

The last independent variable in this study is the technology company (TECH) which has been classified under the "Technology" sector on the listing date. In line with the prior expectation, the cross sectional result indicates a negative relationship between technology company and the cumulative abnormal returns, although it is statistically insignificant. The insignificant result provides insufficient evidence in supporting the idea that technology company has greater influence in abnormal returns. Likewise, the insignificant result does not reaffirm the studies by Field and Hanka (2001), Bradley *et al.* (2001), Chen *et al.* (2005), and Kryzanowski and Liang (2008) where they find that high-tech companies are associated with significant negative abnormal return.

A possible explanation is that even though these companies fall under "Technology" sector of Bursa Malaysia, they are not really as high-tech as those that have been discussed in previous studies. Also, technology companies are concentrated in ACE Market; hence incorporating the second and third multi-staged lockup expirations would provide conclusive results. As such, the technology company could not fully explain negative relationship with the abnormal return. Accordingly, the proposed hypothesis $\mathbf{H_{12}}$ of negative relationship between the technology company and the abnormal return is rejected.

Since the correlations for some of the variables are quite high, this study tries to reassess the significant results by employing more regressions with the excluding of the least significant variable one at a time. Finally, only three significant variables are left, namely FRACSAFTER, FRACBAFTER and LNSIZE. Table 4.9 shows the results of the regression for the three variables (final model) as well as their coefficients and p-values as they have appeared in the full model. From the table, it is noted that the variable LNSIZE has become significant at 1% level in the final model replacing the variable BOARD, while the other two variables remain at the same significant level.

Following the regression of the final model, the ten insignificant variables namely REGIME, FRACSELL, FRACBUY, BOARD, MTBV, OFFERPRICE, UNDER, AUDIT, LNAGE and TECH are tested to seek if jointly, all of them are equal to zero. F-test is carried out to test for this hypothesis and the results indicate the F-statistic and the p-values of 0.7200 and 0.7058, respectively. This finding confirms that these variables give no impact on the dependent variable and therefore can be excluded.

Table 4.9
Multiple regressions for full and final model

	Full Model		**Final Model**	
Variable	Coefficient	p-value	Coefficient	p-value
INTERCEPT	0.1183	*0.095	0.0774	**0.013
FRACSAFTER	-0.3905	**0.033	-0.4810	**0.041
FRACBAFTER	3.3651	***0.002	3.7257	***0.001
LNSIZE	-0.0062	0.144	-0.0045	***0.005
Number of observations		290		290
R-squared		0.0561		0.0232
Adjusted R-squared		0.0116		0.0130
F-statistics		1.77		7.17
Significance of F-statistics		0.0469		0.0001

***Significant at 1% level, **Significant at 5% level, *Significant at 10% level

Looking at the variable

LNSIZE, in contrast to the developed hypothesis where positive relationship between company's size and abnormal returns is expected, the results show a statistically significant negative relationship. The results are inconsistent with the results of Brau *et al.* (2004) and Bradley *et al.* (2001) who find statistically significant positive relationship between size and the abnormal returns. Generally, as more information is available to the market for larger companies than for smaller companies, investors would react more positively when there is more information. Thus, lower uncertainty implies smaller negative abnormal returns at lockup expiration. However, Field and Hanka (2001) and Hakim *et al.* (2012) find insignificant positive relationship between these two variables.

A possible explanation for the negative impact of size on abnormal return can be observed in relation to the lockup provisions. As mentioned earlier, this study focuses only on the first stage expiration of lockup period. Hence, at lockup expiration, larger companies can dispose all the shares that are locked-up. On the other hand, smaller companies are subjected to staggered lockup whereby these companies can only dispose 1/3 of the shares during this first stage. The remaining of the shareholdings under the lockup period can be disposed of up to 1/3 per year. Thus, for larger company, it is more likely larger amount of shares being disposed at lockup expiration. As a result, larger company would react more negatively at the expiration of the lockup. Therefore, the proposed hypothesis $\mathbf{H_{5B}}$ of positive relationship between the size and the abnormal return is rejected.

To further assess the robustness of the results, similar regressions are carried out using the market adjusted returns model for EMAS and KLCI Index as well as the market model using the EMAS Index. Results of the final models are shown in Table 4.10 where all the three variables remained significant. These findings reaffirm the results that have been reported earlier in the market model using the KLCI Index.

Table 4.10
Multiple regressions for final models

	Market Model Emas Index		Market Adjusted Returns KLCI Index		Market Adjusted Returns Emas Index	
Variable	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
INTERCEPT	0.0717	**0.023	0.0582	*0.076	0.0571	*0.084
FRACSAFTER	-0.4680	**0.047	-0.5145	**0.032	-0.4979	**0.038
FRACBAFTER	3.6503	***0.002	4.7621	***0.001	4.7032	***0.001
LNSIZE	-0.0042	***0.009	-0.0036	**0.034	-0.0035	**0.039
Number of observations		290		290		290
R-squared		0.0219		0.0315		0.0306
Adjusted R-squared		0.0116		0.0213		0.0204
F-statistics		6.4600		5.7000		5.5200
Significance of F-statistics		0.0003		0.0008		0.0011

***Significant at 1% level, **Significant at 5% level, *Significant at 10% level
Notes: The dependent variable is the 3-day cumulative abnormal returns (-1, +1). The t-statistics and p-values are based on robust standard errors.

Finally, this study aims to reassess the three significant factors that influencing the abnormal returns between the two regimes. By creating sub-samples of Regime #1 and Regime #2 in relation to abnormal returns, regressions are carried out by excluding the least significant variable one at a time. For Regime #1, results of the full model indicates the F-value of 1.73, which is statistically significant (p-value = 0.0631). Consequently, the final model confirms the evidence in supporting the three factors (FRACSAFTER, FRACBAFTER and LNSIZE) that have provided significant impact on the abnormal returns. Results of the sub-sample Regime #1's full and final models are presented in Tables 4.11 and 4.12, respectively.

Table 4.11
Multivariate regression sub-sample full model for Regime #1

Variable	Coefficient	t-statistics	p-value
INTERCEPT	0.1998	1.79	*0.076
FRACSELL	0.0380	0.41	0.686
FRACBUY	0.0098	0.08	0.936
FRACSAFTER	-0.3048	-1.43	0.155
FRACBAFTER	3.3417	3.33	***0.001
BOARD	-0.0382	-2.11	**0.036
LNSIZE	-0.0103	-1.56	0.121
MTBV	-0.0105	-1.34	0.180
OFFPRICE	0.0119	0.96	0.336
UNDER	0.0172	0.71	0.477
AUDITOR	0.0163	1.19	0.235
LNAGE	0.0432	0.77	0.442
TECH	-0.0357	-1.47	0.144

Number of observations	220
R-squared	0.0910
Adjusted R-squared	0.0383
F-statistics	1.7300
Significance of F-statistics	0.0631

***Significant at 1% level, **Significant at 5% level, *Significant at 10% level

Table 4.12
Multivariate regression sub-sample final model for Regime #1

Variable	Coefficient	p-value
INTERCEPT	0.1518	**0.025
FRACSAFTER	-0.4923	**0.035
FRACBAFTER	4.1469	***0.000
LNSIZE	-0.0086	**0.024

Number of observations	220
R-squared	0.0273
F-statistics	5.6200
Significance of F-statistics	0.0010

***Significant at 1% level, **Significant at 5% level, *Significant at 10% level

Alternately, regressions for sub-sample Regime #2 are carried out. It is observed that for Regime #2, none of the variables is significant. This further show that the overall sample results is driven by Regime #1. The full model of sub-sample Regime #2 is shown in Table 4.13 where the F-value of 0.40 which is statistically insignificant (p-value = 0.9569).

Table 4.13

Multivariate regression sub-sample full model for Regime #2

Variable	Coefficient	t-statistics	p-value
INTERCEPT	0.1035	0.80	0.425
FRACSELL	0.1036	0.13	0.899
FRACBUY	-0.0621	-0.10	0.917
FRACSAFTER	-0.4209	-0.36	0.718
FRACBAFTER	-3.5035	-0.89	0.376
BOARD	-0.0012	-0.07	0.946
LNSIZE	-0.0052	-0.70	0.487
MTBV	0.0005	0.28	0.781
OFFPRICE	0.0071	0.62	0.536
UNDER	-0.0217	-1.53	0.132
AUDITOR	0.0091	0.61	0.543
LNAGE	-0.0055	-1.07	0.290
TECH	0.0006	0.03	0.974

Number of observations	70
R-squared	0.0781
Adjusted R-squared	- 0.1160
F-statistics	0.4000
Significance of F-statistics	0.9569

***Significant at 1% level, **Significant at 5% level, *Significant at 10% level

In essence, the results of the cross-sectional regression have shed some light on the characteristics that affect the abnormal returns around the lockup expiration period. Due to lack of information content in mandatory lockup provision, this study provides insufficient evidence particularly in connection with the existence of the relationship between the lockup agreements and the degree of the information asymmetry variables.

4.9 Chapter Summary

In summary, this chapter reassesses the statistical explanatory power in providing evidence regarding the impact of the expiration of lockup period. In addition, findings from the cross sectional for the 290 IPO sample between the year 2003 and 2012 are observed. At lockup expiry, this study indicates the existence of statistically significant

negative abnormal returns which is in line with the US studies. Hence, it is against the semi-strong form of the efficient market hypothesis. Furthermore, it is observed that the drop in cumulative abnormal returns of Main Market is insignificantly different from that of the ACE Market. Meanwhile, for the two lockup regimes under the period of study, Regime #1 and Regime #2 exhibit insignificant difference of negative abnormal returns at the lockup expiration. As such, the result proves that the change in lockup regulation does not have an impact in reducing the abnormal returns following the lockup expirations.

As for the trading volume, the result shows the existence of abnormal trading volume at lockup expiration which corresponds to the previous studies such as Field and Hanka (2001), Garfinkle *et al.* (2002), Brav and Gompers (2003) in the US, Boreiko and Lombardo (2013) in Italy, and Goergen *et al.* (2010) in Hong Kong. In terms of testing the cross sectional results, this study explores the factors that explain the degree of cumulative abnormal returns. The 3-day event window (-1,+1) is the dependent variable while lockup regime, insider trading of buying and selling surrounding the lockup expiration, board, size, market-to-book ratio, offer price, underwriter, auditor, age and technology company are the independent variables.

The statistically significant factors that could explain the relationships with the abnormal returns are both the fraction of insider selling and buying after the lockup expiration, and the size of the IPO companies which are observed to be associated with Regime #1. The factor containing the positive relation to cumulative abnormal returns is

the fraction of insider buy after lockup expiration, while factors that providing the negative relation are fractions of insider sell after the lockup expiry and the company size.

Of additional note, a mandatory lockup provision in IPO is lacking of information content because the regulator does not allow an IPO company to choose both the optimal length of the lockup period and the percentage of shares to be locked-up. In contrast, under a voluntary lockup, IPO companies can negotiate with their underwriters in choosing the length of lockup period as well as the proportion of the shares to be retained during the restricted period. Hence, the voluntary lockup agreements provide information about the different characteristics associated with the risk of the IPO.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter begins with the recapitulation of the study by describing the overview of the study in Section 5.2. This is followed by Section 5.3 which summarizes the main findings and it is divided into two subsections; Section 5.3.1 and Section 5.3.2. Section 5.4 outlines the contribution of this study. Research limitations are discussed in Section 5.5, and finally Section 5.6 offers some suggestions for future research.

5.2 Overview of the Study

Chapter 1 begins with the introduction of the background of the study, problem statement, research questions and objectives, and its significance. Lockup is an important component of IPOs where its provision, terms and expiration date are disclosed in the IPO prospectus. The study of IPO lockup starts with a curiosity to investigate the market reaction at the expiration of the lockup period in terms of the abnormal returns and the abnormal trading volume. This study is motivated by the lack of research done in Malaysian market as compared to the voluminous research in the US, coupled with the mixed evidence as reported in the US (e.g., Field & Hanka, 2001; Brav & Gompers, 2000 & 2003; Garfinkle *et al.*, 2002; Brau *et al.*, 2004) and other countries like the UK (e.g.,

Espenlaub *et al.*, 2001; Hoque & Lasfer, 2009; Hoque, 2011), Europe (e.g., Novak (2004); Goergen *et al.*, 2006; Boreiko & Lombardo, 2013), and Asia such as in Hong Kong (Goergen *et al.*, 2010), Taiwan (Chen *et al.*, 2005), and India (Mahajan & Singh, 2011).

Furthermore, a unique characteristic of the Malaysian IPO lockup is that it is regulated by the SC and is mandatory in terms of percentage of shareholding and the length of the lockup period. Both of these parameters are clearly stipulated in the IPO prospectus. Hence, the exact date and the exact number of shares to be released by insiders are possible for common investors to anticipate at the expiration of the lockup. As opposed to other countries like the US and the UK, the IPO lockups are voluntary where the lockup agreements are undertaken between the issuing companies and the underwriters. Hence, there is information content of lockup provisions about the risk of the issuing company where such risk is incorporated into the IPOs. Given the dissimilar regulations and variation on lockup provisions observed in the international markets, this study is conducted to fill the gap by investigating the trading behavior by insiders who are under lockup provisions, the price and trading volume reaction at the lockup expiration, and factors that significantly explain the behavior of share prices at the expiration of the lockup. In addition, the effect of regulatory changes in lockup provisions towards the abnormal returns is explored.

Chapter 2 begins with the introduction of the two regulatory entities in the Malaysian Capital Market, namely Securities Commission and Bursa Malaysia. It then

illustrates the lockup provisions in Malaysia where its existence is observed to have begun commencing on 3 May 1999, followed by several regulatory changes on 1 May 2003 and 3 August 2009, respectively. The major part of this chapter is where it critically reviews previous works related to IPO lockups. It is noted that the related prominent hypothesis that can be applied to explain the expiration of the lockup in the Malaysian market is the efficient market hypothesis. In general, both the framework and methods of this study are designed based on prior studies of market reaction to lockup expiration and its determinants. The reviews begin with the pioneering work on lockup expirations as found in well-known studies in the US, followed by the findings in the UK studies, and finally the search expanded to other international equity markets. As such, related literatures are reviewed to identify the existence of both the abnormal returns and abnormal trading, and to verify the correlation between the abnormal returns and certain factors.

Chapter 3 develops the research framework and testable hypotheses as well as engages in the methods used. There are thirteen variables included as potential determinants for the abnormal returns. These variables are grouped according to lockup parameters, trading by insiders, informational asymmetric and technology company. The present study uses sample of listed IPOs from 1 May 2003 to 31 December 2012 which covers the latest two mandatory lockup regimes as imposed by the Securities Commission. The final sample consists of 292 IPOs which is derived after the final exclusion of Infrastructure Project Company and Special Purpose Acquisition Company. Meanwhile, event study method is employed to examine the abnormal performance

changes in response to IPO issuance using the market model, together with the market adjusted returns model which serves as a robustness check. In addition, this study adopts the estimation of the ordinary least squares (OLS) multiple regression model to examine the determinants of market reaction to lockup expiration. It is noted that only 290 IPO companies are engaged in the regressions analyses due to missing data.

5.3 Summary of Main Findings

This section summarizes the findings as elaborated in Chapter 4 and is arranged according to the four research objectives that corresponds to the research questions. It begins with a summary of findings based on market reaction at lockup expiration in Section 5.3.1. This is followed by Section 5.3.2 which provides a summary of findings based on multiple regression analysis. These findings are also discussed in comparison to those of previous studies.

5.3.1 Findings of Market Reaction at Lockup Expiration

In general, the results of this study are consistent with earlier prediction regarding existence of the abnormal returns and abnormal trading volume at the expiration of the lockup period. Firstly, in connection to the first objective, this study finds statistically significant negative abnormal returns at the expiration of the lockup period. Significant cumulative average abnormal returns are observed at windows surrounding the event date for windows (-3, +3), (-2, +2) and (-1, +3). The statistically significant negative

abnormal returns are in line with the US studies (e.g. Field & Hanka, 2001; Brav & Gompers, 2003; Brau *et al.* 2004) although the lockup provision in this study is mandatory as opposed to voluntary lockup agreements in the US.

In addition, the reported abnormal returns as well as the significant level are slightly lower in comparison to the US. The evidence is consistence with Nowak (2004) who reports significant larger drop in share prices for the expiration of voluntary lockup agreements than for mandatory lockup provisions. The presence of significant negative abnormal returns in this study, therefore contradicts the semi-strong form of the efficient market hypothesis.

Secondly, in line with the second objective, the behavior of trading volume at lockup expiration is investigated following the work of Field and Hanka (2001). The abnormal volume is detected from day -10 towards the unlock day and starts to increase and remains positive. Furthermore, the abnormal trading volume does not revert back to zero which indicates that the trading volume has permanently changed after the expiration of the lockup period. The increasing in abnormal trading volume corresponds with the studies such as in the US (e.g. Field & Hanka, 2001; Brav & Gompers, 2003), Goergen *et al.* (2010) in Hong Kong, Chen *et al.* (2005) in Taiwan, and Boreiko and Lombardo (2013) in Italy. Accordingly, the present study confirms the existence of abnormal trading volume at the expiration of lockup period.

The third objective is examined in relations to the impact of lockup regulation changes on abnormal returns. In line with the new structure arising from the new framework for listings and equity fund-raisings, there is a significant shift in the regulatory approach with regards to lockup provision by the Securities Commission. Regime #1 represents the previous lockup provision which takes effect on 1 May 2003, prohibits the promoters and major shareholders from selling their shareholdings amounting to 45% of the enlarged issued and paid up capital of the company for one year from the listing date. Thereafter, all the shares under the moratorium are allowed for disposal at the lockup expiration. Meanwhile, with effect 3 August 2009, SC's guidelines have been revised which represents Regime #2. Accordingly, the present lockup period is imposed to all new listings, reduces the lockup length to six months as well as revises the number of shareholdings under the lockup from 45% to the entire shareholdings of the promoters and major shareholders.

Since this study involves the two lockup regimes, two-sample t test with unequal variances is carried out. In contrast to the expectation, the results indicate a statically insignificant p-value of 0.2612. Hence, the evidence shows that the change in lockup regulation does not have an impact in reducing the negative abnormal returns at the expiration of the lockup period.

5.3.2 Findings Based on Multiple Regression Analysis

In line with the fourth objective, this study adopts multiple regressions in order to determine the factors that significantly explain the behavior of share prices at the expiration of the lockup period. The analysis begins with the descriptive statistics on relevant independent variables, and then it continues to test for the existence of multicollinearity by using the variance inflation factor (VIF).

To assess the robustness of the results, more regressions are carried out by excluding the least significant variable one at a time. Apart from employing market model using both KLCI Index and EMAS Index as representative of the market returns, similar regressions are undertaken using market adjusted returns model for KLCI and EMAS Indices as the market returns. Results of the four final models confirm the three factors that could explain the abnormal returns at lockup expiration. The factors identified are the fraction of insider sell after lockup expiry (FRACSAFTER), the fraction of insider buy after lockup expiry (FRACBAFTER) and the company size (LNSIZE). It is noted that factors containing the negative relationship to cumulative abnormal returns are fraction of insider sell after the expiration of lockup and company size while the factor that provides positive relationship is the fraction of insider buy after the expiration of lockup. In addition, using sub-samples between the two regimes, these three significant factors are observed to be associated with Regime #1.

First, the evidence on the fraction of insider sell after the lockup expiry is as expected and appears to be consistent with the studies of Field and Hanka (2001), Angenendt *et al.* (2005) and Chen *et al.* (2012). They indicate that the directors and insiders selling have statistically significant negative abnormal returns. Since the present study captures the actual selling by insiders during post-lockup expiration, a plausible explanation for the significant negative result could be related to insiders having some negative private information regarding the company's prospect and diversification which is consistence with the findings of Chen *et al.* (2012). They indicate that the insider sales by senior executives are mostly motivated by private information while the sales by other insiders are more driven by diversification.

Second, on the company size, the result is in contrast with prior expectation and appears inconsistent with the theory that larger companies are associated with lower degree of information asymmetry. In general, larger companies are closely followed by analysts and easily evaluated and interpreted. The result of the present study that finds companies with larger capitalization suffer larger value declines at lockup expiration is inconsistent with the studies of Bradley *et al.* (2001), Brav and Gompers (2003) and Brau *et al.* (2004). A possible explanation for this study is that the larger market capitalization companies are not engaging in staggered lockup. Hence, all the lockup-up shares are allowed for disposal at unlock date.

Lastly, the statistically significant positive results of the independent variable, fraction of insider buy after lockup expiration could indicate that the insiders are

conveying good news to the market. The acquisition could be driven by insiders exploiting the price depression at lockup expiration as repurchase opportunities. Hence, insiders would engage in buying to take advantage of the falling on the company's share price after the lockup period expires. At the same time, they would continue accumulating shares given the attractive valuation, thus increasing their holdings especially for high quality companies and becoming less diversified.

Meanwhile, it is noted that the findings of this study indicate no relationships between the other ten independent variables (lockup regime, fraction of insider sell before lockup expiry, fraction of insider buy before lockup expiry, board listed, market-to-book value, IPO offer price, underwriter, auditor, company age, and company listed under technology sector) and the abnormal returns. Following the regression of the final model as mentioned earlier, these insignificant variables are tested to seek if jointly, all of them are equal to zero by performing the F-test. The findings reaffirm that these variables give no impact on the dependent variable and hence can be excluded.

5.4 Contribution of the Study

The contribution of this study can be associated with the practical and theoretical aspects in terms of its findings. On the practical contribution, this study helps to benefit the regulators, particularly the Securities Commission and Bursa Malaysia by improving the existing regulations in protecting the investors. The existence of a significant negative abnormal return at lockup expiration together with the lack of impact from the

regulation change on abnormal returns should capture the attention of the regulators. Hence, the SC should focus closely on lockup parameters in terms of formulating the lockup provisions. For example, the SC could improve the present regulation by imposing the minimum mandatory lockup period of six months. However, the actual lockup period could be longer and be determined between the underwriter and the issuer in protecting the best interests of IPO investors. In this case, the information content of lockup provisions can be associated with a commitment device or as a signaling tool. Meanwhile, it is noted that there is insignificant difference in the abnormal returns between the Main Market and ACE Market. Hence, staggered lockup provisions could also be imposed to certain Main Market companies as opposed to all ACE Market companies. Besides working closely with the SC in improving the listing requirements and formulation of the lockup provisions, Bursa Malaysia can add its involvement in the process by posting the upcoming lockup expiration dates on their websites for investors' awareness, particularly the retail investors.

Apart from regulators, the present study also aims to contribute beneficial and useful insights to research houses and should be of interest to public investors. Research houses could play a major role around the lockup expirations by starting their coverage such as earnings forecasts of the companies and issue recommendations in terms of "buy", "hold" or "sell" of the company's share. In the same line, public investors can be alerted of the event date and be more attentive to the market trading activity surrounding the expiration period. Retail investors especially, must depend heavily and be guided to the information available in the prospectus since no news coverage of these companies

for some years before the IPO. These investors could avoid from suffering losses by making appropriate investment decisions around the event date and at the same time be informed of investing in an IPO company with lockup provisions is not the same as investing in the shares of established companies.

As far as the theoretical is concerned, the related theory in this study is the efficient market hypothesis. The observation of market reaction at lockup expiry contradicts with the market efficiency. Particularly, the semi-strong form suggests that the expiration of the lockup period, which is public knowledge, should not be accompanied with significant abnormal returns. The present study examines the impact of share price at lockup expiration that has not been investigated in previous studies on Malaysian IPOs. Prior studies on lockup expirations have shown mixed results in connection to the market efficiency. However, the findings of the present study have yielded significant negative abnormal returns at lockup expiration, hence contradicting the semi-strong form of the efficient market hypothesis.

5.5 Limitations of the Study

There are two main limitations identified in this study. First, IPO lockup started in Malaysian market with effect on 3 May 1999. Since then, there have been regulation changes pertaining to lockup on 1 May 2003 and 3 August 2009, respectively. This study only captures the last two regimes while ignoring the earliest regime. It is observed that the latest revision in 2009 which is the present lockup provision is obviously the most

restricting and vigilant where all IPO companies are subjected to mandatory lockup compared to certain previously known Main Board companies with multi-staged lockup starting on 3 May 1999.

Second, the present study only examines the lockup expiration for the first stage while ignoring the second and third stages of lockup expirations, in the case of MESDAQ Market and later the currently named ACE Market IPOs. It is worth noting that the actual lockup length imposed on the promoters for disposal of their entire locked-up shares for these two markets is three years. As for this sample study, the total multi-staged effect can only be captured at the end of 2015. In addition, the sample for present lockup period (Regime #2) is slightly smaller, where it only covers the period from 3 August 2009 to 31 December 2012 compared to earlier lockup regime which includes the period between 1 May 2003 and 2 August 2009.

5.6 Recommendations for Future Study

This study presents some issues that can be taken as a basis for exploring future research on the existence and effects of IPO lockup in Malaysia. It focuses merely on the effect of lockup expiration in terms of share price and trading volume, impact of lockup regulation change and the determinant factors that influence the abnormal returns. Future studies could look into other variables as proxies for information asymmetry such as venture backing capital (VCs) and underpricing. Venture capitalists not only provide the necessary capital but their presence also signals the company's quality through

monitoring and involving in the company's major investment decisions. Similarly, initial returns are used as a measure of uncertainty at the lockup expiration period. Companies can also underprice to signal their quality; hence a high quality company will underprice more.

Other variables that can be included are Shariah-compliant IPOs and ownership structure as determinant factors of market reaction to lockup expiration. Shariah law forbids investment in companies that derive more than 5% of their revenue from activities considered unethical, including charging interest rates, gambling and alcohol. Bursa Malaysia has 673 Shariah-compliant stocks, or 74% of all listed securities, according to a statement from the Securities Commission dated 27 November 2014. The regulator dropped 30 companies from the list, including SapuraKencana Petroleum Bhd, Puncak Niaga Holdings Bhd, Scomi Group Bhd, CLIQ Energy Bhd, Perdana Petroleum Bhd and Chemical Company Malaysia Bhd. SapuraKencana and Puncak Niaga shares dropped as much as 32 sen or 10% each after the Securities Comission removed both companies from its Shariah-compliant list on 28 November 2014.

Meanwhile, ownership structure among others can be examined by looking at the bumiputera ownership, family ownership, managerial ownership and ownership concentration in the Malaysian context. For instance, bumiputera ownership looks at the prevalent effect of etnicity where it has been argued from previous literature that it has a different risk taking behavior from non-bumiputera owners. Particularly, the focus of the study should be concentrating in the area of another regulatory change with respect to

listing requirements. It is noted that the SC has made revision to the Bumiputera equity requirement by reducing its proportion from 30% to 12.5% in July 2009. Hence, some effect could be observed in association with this regulation change at lockup expiration. Meanwhile, family ownership can be associated with moral hazard problem where it can be controlled due to easy communication within a family. Also, a long-term commitment to the company and undiversified portfolios of founding families reduces the agency conflicts between founders and outsiders.

In connection to insider trading activity, the significant result of fraction of insider selling after lockup expiration that are possibly be driven by diversification purpose or that insiders having some negative private information regarding the company's prospect appears to be inconclusive. These two possible reasons could not be distinguished with the methods conducted in this study. Therefore, it is suggested that future research should look into these possibilities by exploring further of this matter. Alternately, given the similar significant result for fraction of insider buying after the lockup expiration, stronger evidence is required before a solid conclusion can be made. Thus, further examination could be focused on this issue and it is left for further study.

Moreover, future studies could incorporate the three lockup regimes that have taken place in the Malaysian market by focusing on the multi-staged lockups with the inclusion of latest IPO company sample. As mentioned earlier, IPO lockup period has been made compulsory for promoters / major shareholders for certain IPO companies starting on 3 May 1999. Since then, the regulator (SC) has made some changes on 1 May

2003 while the latest amendment takes place on 3 August 2009. It is observed that the latest regulation change is obviously the most restrictive where all IPO companies are subjected to lockup. Apart from that, it is also suggested that research on IPO lockup in Malaysia could be extended to other related issues such as lockup provisions and survival of the IPO companies, lockup expiration in REIT IPOs, IPOs' long-run performance with lockup provisions, and impact of share price performance to recommendations by research houses surrounding the lockup expiration.

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APPENDICES

APPENDIX A:

AARs and CAARs using Market Model and Market Adjusted Returns Model based on EMAS Index

	Market Model (MM)			Market Adjusted Returns (MAR)		
Event Day	AAR (%)	p-value	CAAR (%)	AAR (%)	p-value	CAAR (%)
-10	-0.21	0.3182	-0.21	-0.32	0.1039	-0.32
-9	0.40	*0.0509	0.20	0.36	0.2511	0.04
-8	-0.05	0.7936	0.14	-0.13	0.4909	-0.09
-7	-0.62	***0.0027	-0.48	-0.65	**0.0367	-0.74
-6	0.23	0.2653	-0.25	0.15	0.3942	-0.59
-5	0.12	0.5570	-0.13	0.08	0.6454	-0.51
-4	-0.24	0.2505	-0.36	-0.31	0.1434	-0.82
-3	-0.15	0.4576	-0.52	-0.23	0.3109	-1.05
-2	-0.12	0.5493	-0.64	-0.22	0.2105	-1.27
-1	-0.29	0.1586	-0.93	-0.40	*0.0737	-1.66
0	0.43	**0.0374	-0.50	0.40	0.1872	-1.25
1	-0.56	***0.0066	-1.06	-0.67	**0.0417	-1.92
2	-0.18	0.3802	-1.24	-0.30	0.2483	-2.22
3	-0.16	0.4440	-1.40	-0.22	0.4157	-2.44
4	0.19	0.3613	-1.21	0.13	0.6284	-2.30
5	-0.03	0.8750	-1.25	-0.17	0.4917	-2.47
6	0.24	0.2380	-1.00	0.10	0.6302	-2.37
7	-0.32	0.1215	-1.32	-0.37	*0.0903	-2.74
8	-0.03	0.8737	-1.35	-0.11	0.6372	-2.85
9	0.21	0.3140	-1.15	0.07	0.7321	-2.79
10	0.00	0.9942	-1.15	-0.17	0.4504	-2.96

***Significant at 1% level, **Significant at 5% level, *Significant at 10% level

APPENDIX B:

CAARS over 21 event days for market model and market adjusted return model using KLCI & EMAS Index