Stock Reaction to the expiration of IPO lock-up period : Evidence in Thailand

Abstract

This paper examines the effects of the stock reaction surrounding the IPO lockup expiry as evidenced in Thailand. The sample used in the study is the IPO listed shares during 2001-2005, totaling 115 firms. The results prove that abnormal returns are statistically significantly negative surrounding the lockup expiry, while the abnormal volume is statistically insignificant negative. This implies that should the abnormal return exist, it will influence only minority investors in the market. In addition, this paper also investigates the statistically significant factors affecting the cumulative abnormal returns surrounding the lockup expiry period, consisting of stock price volatility, insider acquisition trading, and the percentage of shares lockup. The larger stock price volatility and the rising acquisition trading have a negative relation to the cumulative abnormal returns. Meanwhile, the rising percentage of shares lockup has a positive relation to the cumulative abnormal return.

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1. Introduction

One of the most popular IPO research topics is the study of "lockup period", or so called "silent period". The lockup period is the period of time that management and major shareholders of the listed company are prohibited from selling the securities, and the shares then would be released following the lockup expiry. The main reason that market obliges the lockup period is because there is usually asymmetric information between the existing shareholders and the public, thereby creating adverse selection and moral hazard problems. The lockup could signal the solution to the adverse selection problem, resulting from information asymmetries at the time of the stock issue, and also alleviate the moral hazard by alignment of the firm's insiders and new shareholders during the duration of the lock-in period. As 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 firm's stock price after the initial public offering date. In addition, lockups restrain the excessive supply in the market, and should also keep the insiders concentration on the execution of the company's strategy. Hence, the lockup agreement would increase the marketability of the IPO, thereby increasing its likelihood of success.

Even if the lock up contracts are designated by the market to diminish the effect of the IPO at the first trading day, many studies investigate the impacts to stock reaction around the expiration of the IPO lock up period. Most papers assert that there are significant abnormal negative returns on stock price and significant abnormal trading volume around the expiry of lock up period (For example, *Ofek and Richardson (2000), Brau, Carter, Christophe and Key (2004), Angenendt, Goergen and Renneboog (2005)*). In addition, *Bank (1999)* illustrates that one of the potential causes of the negative stock price reaction is the expectation of the sale of newly-released lockup shares in the open market. Consistent with this argument, *Browning (1999)* reports the investors concern on the overflow of sales and sell stocks in advance of lockup.

Contrast to the earlier studies in other markets, the effect of lockup period to the stock expiration does not exist in the case of Thai capital market. Evidenced by *Prasittirat (2001),* she examines the effect of stock return and trading volume during the silent period for IPO listed during 1993-1997. The results exhibit the insignificantly positive abnormal volume and high trading volume. Meanwhile, no explanatory variables correlates to the cumulative abnormal return.

Also dissimilar to the other countries, US and UK, which all existing lock up agreements are voluntary arrangements, The Stock Exchange of Thailand (SET) defines the lock up contracts as a mandatory towards Thai IPO companies. Previously, SET imposed the rule of lockup shares of 35 percent of paid-up after the IPO and the period of lockup over 6 months from the first day that the stocks were allowed to trade. Nevertheless, since 2005, SET has changed to severely impose the surge of the restricted shares to 65 percent of paid-up after the IPO (Figure 1) and extend the period of lockup to cover 1.5 years after the commencement date of the share trading. Upon completion of every 6-month period of trading, the prohibited shares could be gradually released at 25 percent of the number of locked shares (Figure 2). Under the SET rules during silent period, management and major shareholders have to deposit their shares with the Thailand Securities Depository Co., Ltd. (TSD) during the period specified by the SET. Subsequent to the lock up expiry, these shareholders would be allowed to sell their shares in regular in market trading. The details of lockup arrangements regulated by SET are shown in Table 1.

Figure 1: The minimum percentage of shares locked rose to 65 percent since 2005

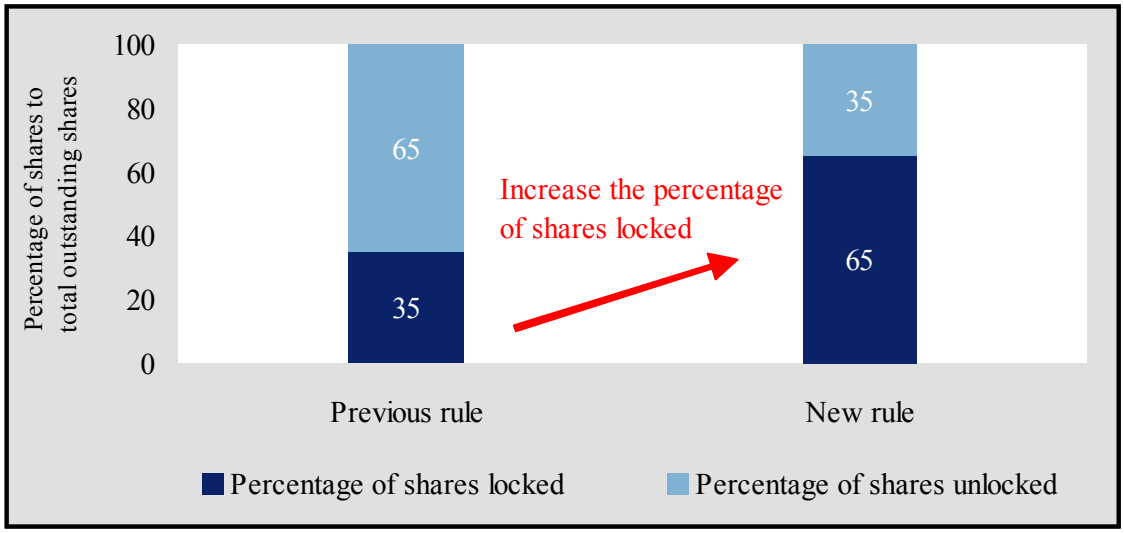
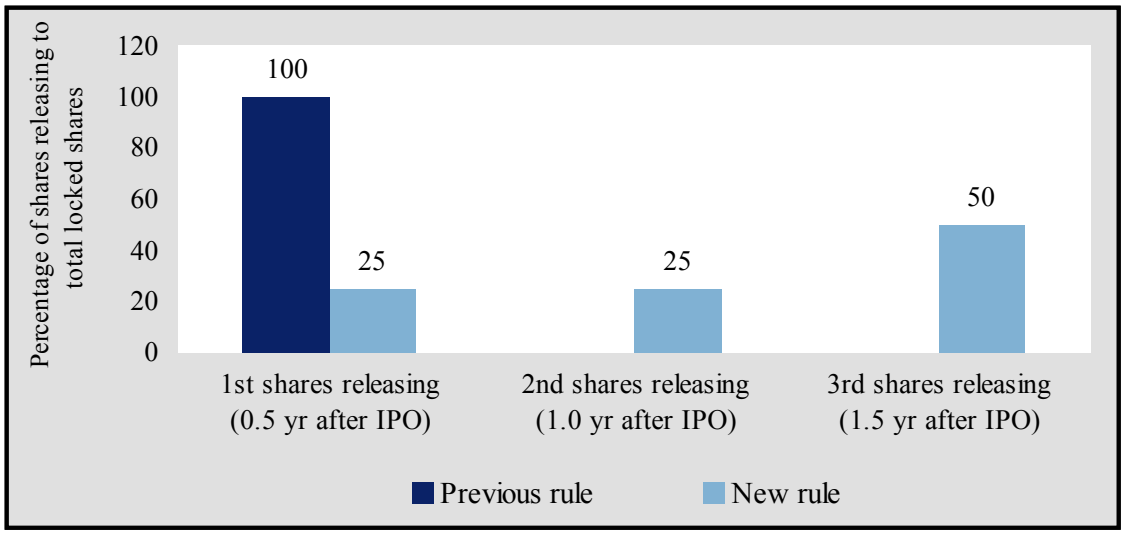


Figure 2: The percentage of locked shares gradually released in the lockup expiry

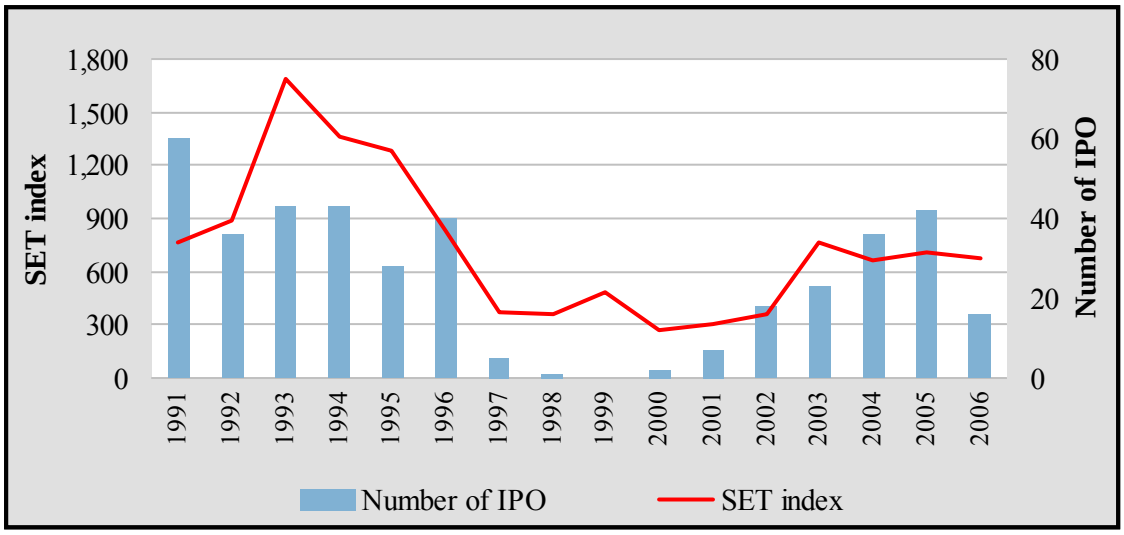


This paper intends to explore the effect of stock's reaction to the lockup expiry in Thai capital market, motivating by the noticeably following reasons. Firstly, insiders could dispose their shares initially in the lockup expiry subsequent to going public. Hence, the information asymmetries between the insiders and investors easing from IPO date might be critically reactive. It is appealing to clarify whether the effect of information asymmetries remains throughout the period. Secondly, many empirical evidences in other countries, especially in the US and UK, affirm that the stock effect at the expiration of IPO lock-up period exists, while the Thai capital market illustrates the insignificant results. Such diverse outcomes remain questionable, thereby inducing the further investigation in this paper. Finally, lockup regulations in Thailand inclined to be more stringent for new IPO listing, after SET has changed to escalate the amount of lockup shares and extend the lockup period since 2005. Such conduct indirectly implies the regulator's concerns on the lockup expiry issue in Thai capital market.

Aforementioned explanations lead to the examination in this paper, focusing on the impact of the stock surrounding the expiration of lock up period in Thailand. The period of study is identified during 2001-2005 as the number of IPO issuing activated throughout the period. Figure 3 illustrates after the impact of financial crisis in 1997 the number of IPO initially recovered in 2001. The main purpose is to acquire whether the effect of expiration of IPO lockup period exists in Thailand, whether the

results are similar to the results from other studies and which factors influence such outcomes.

Figure 3: The number of newly listed company and SET index during 1997-2006



Research Question

Surrounding lockup expiry, whether stock price tends to decline and stock trading volume tends to increase and what factors affect the stock price reaction in the case of Thailand.

Objectives

The main objectives of the study are as follows:

1. To investigate stock price behavior surrounding the lockup expiry. The study compares stock price before and after the event and examine whether they are differently significant.

2. To investigate stock trading volume behavior surrounding the lockup expiry. The study compares stock price before and after the event and examine whether they are differently significant.

3. To investigate the determinants affecting the different degree of stock reactions surrounding the lockup expiry. The study covers various factors, comprising of the firms' size and age, the first day return, the ownership

concentration of major shareholders, the underwriter reputation, the insider trading, the length of lockup period, the percentage of stocks locked up.

Scope of Study

The study concentrates on IPO lockup expiration in Thailand; therefore, SET is used to be the proxy of Thai capital market. The samples are composed of IPOs listed during 2001-2005, which the number of IPOs increased significantly during that period. The estimation period is the ninety days before the event period. Meanwhile, this paper analyzes three main event windows; surrounding five days before and after the lockup expiry, ten days before and after the lockup expiry, and fifteen before and after the lockup expiry.

In terms of gathering information, this paper incorporates the company's details as follows: issuing date, lockup released date, offering price, first day closing price, daily return, daily volume, the number of listed shares, the number of locked shares, the lockup period, the underwriter name, the firm's age, the stake holding of the major shareholders, and the insider trading of the firm.

Limitations of Study

The paper discards some IPO firms providing no lockup period, such as a property fund, or lacking of the lockup information. As such, the companies listed during 2001-2005 has been excluded from the study totaling 11 companies, consisting of TSTH, BKKCP, UOBAPF, PSAP, CPNRF, MIPF, MNIT, PTTCH, SIRIPF, TFUND, TIF1. The remaining samples, thus, declines to 115 IPO firms during the period of study.

In cases of some firms containing multiple lockup dates, the study primarily examines the first unlock date and omits further lockup dates. Since, in IPO process, management and major shareholders shares are locked up throughout the period, subsequently, should the information asymmetries between investors and major shareholders remain, either investors or major shareholders may dispose of their shares considerably as soon as possible. The initial period of such execution should be the first lockup expiry.

Finally, the insider trading information is assembled from The Securities and Exchange Commission, Thailand (SEC) through the Management's Securities Holding (Form 59-1) and Change of Management's Securities Holding (Form 59-2). SEC specifies the definition of insider holding as the firm's securities held by the director, manager, person who holds management position as specified in the notification of the Office, auditor of a company which issues securities, and the holding of securities by his spouse and minor children. Thus, this paper excludes the share trading of others associated to the company but outside the scope of insider definitions by SEC.

2. Literature Review

In this paper, groups of paper associated with lock up period studies can be classified to three groups as follows:

1. Studies the stock's abnormal return surrounding the lockup expiry
2. Studies the stock's abnormal trading volume surrounding the lockup expiry
3. Studies of factors affecting stock price and trading volume surrounding the lockup expiry

1. Studies the stock's abnormal return surrounding the lockup expiry

1.1 Significant stock price reaction surrounding the lockup expiry

Brau et al. (1999) find that cumulative abnormal returns are –1.9 per cent over the window covering the ten days preceding the expiry to the expiry day. The abnormal returns are interpreted by two possible explanations. First, lock-ins may be used to mitigate informational asymmetries that exist between insiders and outsiders. Second, they claim that at the lock-in expiry there is a possibility of misalignment of insider and outsider incentives. This misalignment can decrease investors' demand for the shares and, subsequently, increase the negative abnormal returns.

Ofek and Richardson (2000) evidence that even though the lock up event is totally anticipated, at the end of the lock-up period, U.S. capital market show a permanent drop in the stock price in the range of 1% - 3%. They also report that the decrease in

the share price is somewhat consistent with a downward sloping demand curve for the shares.

Field and Hanka (2001) report a statistically significant three-day abnormal return of –1.5 per cent and a permanent 40 percent increase in trading volume. Consistent with the downward-sloping demand curve hypothesis, they find that the abnormal return is more negative when the trading volume is abnormally high.

Dussold (2001) exhibits that a large number of IPOs actually contain multiple lockup period. First and second lockup expirations, as well as the largest lockup expiration, are shown to generate significantly negative stock return reactions. These decreases in prices tend to remain for several days after the release dates.

Gasper (2002) demonstrates that the abnormal return found by *Ofek and Richardson (2000), Field and Hanka (2002), Brav and Gompers (2000), Bradley, Jordan and Yi (2001)* remain significant even after the increased wide spread availability of information pertaining to the unlock day. Likewise, *Garfinkle, Malkiel and Bontas (2002)* found that the fall in prices before the end of the lockup period is highly significant. Moreover, after the end of the lock up period, excess return tended to be negative through the end of the 12 month period after the IPO.

Brav and Gompers (2003) find that from the day -1 to day 2, abnormal returns are large and negative. Prices drop by nearly 1.5% around lockup expiration. In addition, this paper proves that transaction costs are likely to eliminate the ability of investors to make money from the abnormal return. Also, it may simply hard to borrow shares to set up a short position given the small amount of shares that have been floated. Therefore, even if the market knows with a high degree of certainty the number of shares that will come to the market, costly arbitrage may imply that the price may still decline on average on the expiration of the lockup. Similarly, *Brau, Carter, Christophe and Key (2004)* indicate that there is significantly abnormal return around lockup expiration and market participants cannot earn abnormal returns using this information after incurring transaction costs associated with trading.

1.2 Insignificant stock price reaction around the lockup expiration day

If the efficient market hypothesis exists, the lockup agreement information in IPO prospectus should factor in the stock's price since the initial public offering date. *Mohan and Chen's (1999)* as well as *Espenlaub et al.'s (2001)* findings support these theoretical assertions. They find no abnormal returns around the expiration of the lock-in agreements.

Goergen, Renneboog and Khurshed (2004) also discover that using an event study methodology identical to that of *Espenlaub et al. (2001),* such paper reports the absence of significant abnormal returns at the expiry for France and Germany, regardless of the type of lockup contract and the category of shareholder locked up. The results are contrary to those from US studies, but confirm the results of *Espenlaub et al. (2001)* who do not find significantly negative abnormal returns at the expiry of UK lockup contracts.

Lastly, in the case of Thai capital market, *Prasittirat (2001)* find insignificant abnormal return surrounding the lockup expiry of IPO listed during 1993-1997, totaling 128 samples. Defining the lockup expiry as the day 0, the period before lockup expiry (-9,-6) provides the insignificantly negative abnormal return. As the investors probably doubt on the public information, and concern on the change of market situation after the end of lockup expiry, leading to the dispose of their shares. While the period surrounding the lockup expiry (-5, 20), the stock return shows the insignificantly positive abnormal return. As the firms are likely to create the good news prior to lockup expiry, or induce the investors to trade following the company's insider trading during the period. Besides, the lockup expiry has already informed to the investors, thereby implying the no stock trading effect at the end of lockup expiry.

To summarize, most researchers in USA, UK, Germany and Italy report that even if lockup periods are realized in advance, there are significantly negative abnormal returns around the lockup expiry date. On the other hand, only few researchers in France, Germany, and UK argue that there are negative abnormal returns around the lockup expiry date, but those results are insignificant. Combined with Thai capital market research, the results report that there are insignificantly positive abnormal

returns around the lockup expiry. In my opinion, a number of researches in the former group (significant results) dominate those in the latter group (insignificant results). This means most stocks in many countries face with significantly negative abnormal returns around the lockup expiry date; therefore, it is very attractive to study whether there is a significant abnormal return around the lockup expiry date in the case of Thailand.

2. Studies the stock's abnormal trading volume surrounding the lockup expiry

2.1 Significant stock trading volume reaction surrounding the lockup expiry

Ofek and Richardson (2000) find that there is a permanent shift in volume around 40%. The higher volume at the end of the lock-up period is consistent with shareholders selling their positions for diversification reasons. Interestingly, the permanent drop in stock price is consistent with a permanent increase in the volume of shares traded. The coincident event is the end of the lock-up period.

Mohan and Chen (2000) prove that for the thin-trading portfolio, average cumulative excess returns before the lock-up period expiration date follow the same pattern. Average cumulative excess returns after the expiration date, however, begin to increase approximately 30 days after day 0 and continue to increase through day 250.

Dussold (2001) examine that a large number of IPOs actually contain multiple lockup period. Volume is significantly and positively affected at the first three as well as the largest lockup release dates. These increases in volumes tend to remain for several days after the release dates, although volumes tend to level off quickly to amounts lower than experienced on their event days.

Gasper (2002) conclude that as was expected since there is a considerable increase in the available float of tradable shares post unlock, abnormal volume about the unlock day persists. Even in the days prior to the unlock abnormal trading activity is apparent. In the same way, *Garfinkle, Malkiel and Bontas (2002)* report that volume of trading was relatively flat during the six months after the initial public offering. The exception is the significant spike in volume traded on the unlock date. Moreover, there was a more permanent increase in volume 45% after unlock date.

Brav and Gompers (2003) indicate that nearly all event days prior to the lockup expiration have an insignificant abnormal volume, except for those on day -3 through day -1, which are marginally significant. Moreover, abnormal volume after day 1 onward is significantly positive and has permanent changed.

Angenendt, Goergen and Renneboog (2005) study that there is very high abnormal trading volume during the first ten days after the lock-in expiry. This suggests that substantial amounts of shares that were previously locked-in are sold soon after the lock-in expiry. This evidence corroborates the findings for the US by *Field and Hanka (2001), and Ofek and Richardson (2003).*

2.2 Insignificant stock trading volume reaction surrounding the lockup expiry

In the case of Thai capital market, *Prasittirat (2001)* finds statistically insignificant abnormal volume surrounding the lockup expiry of IPO listed during 1993-1997, totaling 128 samples. Stock trading volume demonstrates the insignificantly positive abnormal volume the period before and around lockup expiry, the subsequent period after lockup expiry, it shows the insignificantly negative abnormal volume. As the stream of information creating by the firm should be lower after the firm's insiders had already obtained the advantage at the lockup expiry. The trading information, therefore, should depend on the existing news in the public.

In conclusion, all researchers in USA, Germany and Italy report that there are significantly higher trading volumes around the lockup expiration date. Most of them state that, after the lockup expiry, trading volume changes in terms of permanent and temporary increases. This results support the belief that insiders desire to sell their shares at the end of lockup period. Moreover, the raise in trading volume complies with the results of a decrease in stock price around the lockup expiration date. Nevertheless, the research in Thai capital market proves that there are insignificant abnormal volumes surrounding the lockup expiry. Overall, these different results lead to the investigation of lockup expiry to the stock trading volume in this paper.

3. Studies factors affecting stock price and trading volume surrounding the lockup expiry

3.1 Firm's size

Brav and Gompers (2003) propose that as the lockup is an agreement between the lead underwriter and the IPO firm, insiders can sell equity if the lead underwriter chooses to break the lockup. The paper proves only firms greatly reducing potential for insiders to take advantage of shareholders would be released form the lockup restrictions. Large firms are likely to have more information available about the firms, and the paper found that larger firm size is a greater probability to early lockup release.

Brau, Carter, Christophe and Key (2004) investigate that there is significantly positive relationship between firm's size to the cumulative abnormal return. As more information is generally available to the market for the larger firms than for small firms, this result is consistent with investors reaching more negatively when there is less information, and hence more uncertainty.

Prasittirat (2001), contrast to other preceding researches, reports that the larger firms show the statistically insignificant negative relation to the cumulative abnormal return in Thai capital market. As the company's larger market capitalize means the greater likelihood of the share trading, typically share disposition, during the period of lockup expiry.

3.2 Firm's age

Chemmanur and Fulghieri (1995) state that the effect of information asymmetry is more serious for the younger listing companies, which have little track record and low visibility than for old companies.

In addition, *Goergen, Renneboog and Khurshed (2004)* show that the firm's shareholders subject to more uncertainty, evidenced by the younger and smaller firms, are locked up for longer periods.

3.3 IPO's first day return

Gasper (2002) indicate that the market conditions at the IPO and lockup expiry tend to result in different patterns of abnormal returns and abnormal volumes about the unlock. For both HOT/HOT market and the COLD/COLD market classifications, the

greatest proportion of price deterioration is experienced on the event day, then following with the partial price adjustments. However, for HOT/COLD market, consistent price deterioration is experienced in the month surrounding the unlock with no evident stabilization occurring in the post event windows. The results support the argument that in hot issue markets, a larger proportion of lower quality firms are able to come to market when market sentiment and conditions are most favorable. When the market prospects change, these firms are affected most severely and thus contribute to greater price adjustments when combined with the effects of insiders selling at the unlock date.

Tolia and Yip (2003) illustrate that the decline of stock prices for Cold IPOs starts around 30 days before the stocks are unlocked, while for Hot and Cool IPOs the decline begins around 20 days before the expiration of the lockup agreement. Moreover, the decline stabilizes immediately after the expiration of the lockup period except for the Extra Hot IPOs. Extra Hot IPOs, thus, substantially under perform the other groups (similar to Krigman et al (1999)). Furthermore, on the day when lockup agreement expires, the market reacts negatively to the event. However, except for Hot IPOs, the decline is not statistically significant at the 5% level.

Zheng (2003) conclude that underpricing is more substantially positively associated with higher trading volume for IPOs with lockup. It appears that investors will trade IPO shares more actively given the same degree of underpricing if IPO has lockup provision. Thus, preceding IPO owners will be more likely to exploit underpricing to improve liquidity when the IPO is unlocked.

Angenendt, Goergen and Renneboog (2005) find that firms with above-median underpricing in the IPO have larger negative abnormal returns at the expiry. They affirm that lock-in agreements and underpricing are substitute devices. Their findings are in line with the fact that shareholders of heavily underpriced firms do not sell many shares in the IPO, but rather wait until the lock-in expiry *(Aggarwal et al. 2002)*. Moreover, this paper state that firms that are only moderately underpriced show larger increases in trading volume at expiry.

Nordin W. and Hussin W. (2004), examining Malaysian IPOs, find the evidence that IPO underpricing is negatively related to owners' participation ratio and positively associated with the fraction of shares that are beneficially owned by directors which are subject to lock-up. The results show that the more the owners participate in the IPO, the lower is the underpricing, consistent with *Habib and Ljungqvist (2001)* and the greater the burden of IPO lock-up imposed on the directors, the higher is the underpricing. This is consistent with the notion that the burden of IPO lock-up imposed on the directors signals the ex-ante uncertainty facing the IPO company.

Prasittirat (2001) verifies that, for Thai capital market, the first day return could not clarify the relationship towards the lockup period as the lockup period of study is far away from the initial public offering date around 6 months. Such long period implies the change in market situation and company. Investors, thus, might not be convinced that the first day return should clarify the abnormal return at lockup expiry.

3.4 Stock Price Volatility

Ofek and Richardson (2000) indicate the evidence about the predictability of the price drop. Interestingly, the magnitude of the price drop is related to the two scenarios; a large increase in the share price prior to the lockup expiry, and a high volatility of the stock creating more desirable to diversify the initial shareholders' portfolio.

Brav and Gompers (2003) confirm that the price volatility proxies for information asymmetry, and the lower transparency is associated with larger negative abnormal returns.

3.5 Firm's news

Mohan and Chen (2000) conclude that thin-trading activity occurring shortly after the expiration of the lock-up period is perceived by the market as good news, while heavy trading is regarded as bad news.

Brav and Gompers (2003) investigate that as predicted by the commitment hypothesis, firms that have reduced information asymmetry problems are more likely to have early insider sales. Firms with higher returns are likely to have received a

series of good news events and investors would be less concerned about management cashing out.

Wiggenhorn and Madura (2005) find that the impact of public versus private information is statistically significant for both the lockup and the post lockup periods. Both periods exhibit significant overreactions for events that do not have public news associated with them, while events with public news exhibit insignificant reactions.

3.6 Underwriter Reputation

Carter and Manaster (1990) explore that lower risk offerings are associated with prestigious underwriters, and the choice of the underwriter can be interpreted as the signal of the quality of the firm. With lower asymmetries taking place, therefore, directors would sell less at the lock-in expiry because they will have less of an informational advantage that they can trade on.

Gasper (2002) demonstrates that although underwriter ranking is not found to be a driver of abnormal returns around the lockup expiry, it was found to be a significant factor acting on abnormal volume. Abnormal unlock volume was found to be a significant driver of abnormal returns.

Goergen, Renneboog and Khurshed (2004) state that high quality underwriters in Germany protect their reputation capital by imposing more stringent lockup contracts.

Angenendt, Goergen and Renneboog (2005) investigate that firms engaging a high quality underwriter have larger abnormal returns at the lock-in expiry. Moreover, they found that expiries for firms with a relatively low quality underwriter have significantly larger increases in trading volume at expiry than firms with a high quality underwriter.

3.7 Insider trading

Gregory et al. (1994) state that sell signals initially produce mostly insignificant negative abnormal returns followed by significantly negative abnormal returns a few months after the trade. Meanwhile, they find positive abnormal returns in the month of the directors' buys. This is supported by other UK studies, including *King and*

Röell (1988) and Pope et al. (1990). They also find that it takes time for the market to react to the directors' trades. Overall, the signals that directors send by selling or buying shares are a slow signal to the market so the cumulative abnormal return, given the short event windows, may not capture the market reaction to the directors' trades, and only capture the market reaction to the lock-in expiry.

Field and Hanka (2001) report that both firms with directors' sales and purchases have statistically significant negative abnormal returns surrounding the lockup expiry. While *Brau et al. (1999)* prove that directors' sales can have a potentially strong impact on the share price, because they tend to convey bad news. Also, agency costs of equity, caused by the lack of alignment of incentives between insiders and outsiders, are expected to decrease investor demand for the shares.

Espenlaub, Goergen, Khurshed, and Remenar (2002) find that there is a substantial increase in share sales by the directors in the weeks immediately after the lock-in expiry. Nevertheless, the directors' sales around the expiry date have statistically insignificant positive average cumulative abnormal returns. They also prove that companies with a good stock performance before the expiry are more likely to have directors' sales. Overall, they conclude that negative abnormal returns around the lock-in expiry are not caused by the directors' sales. The firms would signal their quality by the means of other devices, such as the duration of the lock-in agreement, the percentage of the shares locked-in and the level of IPO underpricing.

3.8 Venture Capital Backed

Bradley et al. (2001) illustrate that VC-backed US IPOs are associated with significantly more negative abnormal returns at the lock-in expiry. Similar results are found by *Field and Hanka (2001), Brav and Gompers (2003) and Brau et al. (2004)* for the US; *Espenlaub et al. (2003)* for the UK; *Bessler and Kurth (2003)* for Germany; and *Bertoni et al. (2002)* for Italy.

Gasper (2002) conclude that unlock day abnormal return are significant only on the unlock date for the firms having venture capital backing. Non VC backed firms did not exhibit statistically abnormal returns on the event date or in short term windows

about the event date. In addition, VC backed firms experience nearly twice the level of abnormal volume on the unlock day than do non VC backed firms.

Brav and Gompers (2003) explain that insiders sell prior to lockup expiration in firms that are associated with less moral hazard, such as firms backed by venture capitalists. Investors are likely to be very concerned by insider selling activity at firms not backed by venture capitalists because of the higher level of asymmetry information. Therefore, the presence of VCs investors is associated with larger price declines.

Brau, Carter, Christophe and Key (2004) indicate that there is negative relationship between the cumulative abnormal return and venture capitalists. Because venture capitalists are more likely to sell the shares, this result suggests that market participants are concerned about the effect of the increased supply of shares.

Goergen, Renneboog and Khurshed (2004) state that Venture capitalists (VCs) have shorter lockup agreements, which suggests that they prefer to exit the firm at the earliest opportunity. This paper also examine whether the presence of a VC has a negative impact on the lockup duration given the possible certification role of VCs. While for France, the probability of being locked up is higher for firms with venture-capital backing (hence rejecting the certification role), they find no such effect for Germany.

In contrast, *Angenendt, Goergen and Renneboog (2005)* find that at the expiry of VC locks-up, the abnormal returns are insignificant negative whatever the window. Moreover, venture-capital reputation as such has no influence on abnormal returns at the expiry. Likewise, the nationality of the VC does not play any role in this finding. The abnormal returns around the expiry also do not differ between firms backed by one VC or by a VC syndicate. Moreover, the paper found that abnormal trading volume during the days immediately after the expiry is highly significant and that VC-backed firms show larger and more significant abnormal trading volume.

3.9 Percentage of shares locked up

Gasper (2002) explains that a greater proportion of shares locked should lead to a greater need for diversification and thus should be associated with greater unlock volume activity. *Brav and Gompers (2003)* also support that firms with greater fraction of their post-IPO insider shares locked up are less likely to have insiders selling shares prior to the lockup expiration, consistent with the greater need for insiders in these firms to commit to not selling equity. Therefore, the presence of having greater fraction of shares locked up is associated with larger price declines.

Brau, Carter, Christophe and Key (2004) state that there is a negative relationship between the percentage of shares in lockup and the cumulative abnormal returns. This result is consistent with the asymmetric information argument. When the proportion of shares in lockup approaches 100 percent, insiders have less ability to signal to the market the true value of the firm. Additionally, this result is consistent with investors reacting to the potential increase in the supply of traded shares; the greater the proportion of locked-up shares, the greater the shares available to enter the market, and thus the greater decline in price.

Angenendt, Goergen and Renneboog (2005) find that at the expiry of contracts which lock in more shares than the median firm, they find more strongly negative abnormal share price movements than for firms locking in stakes which are lower than the median.

Contrast to other countries, Prasittirat (2001) examines the statistically insignificant positive relations between the percentage of shares locked up and cumulative abnormal return surrounding the lockup expiry. The explanations are the effectiveness of dispersed information in the public. At the lockup expiry, thus, investors precisely anticipated the amount of shares sold in the marketplace. Should investors rely on the firm performance, they will not be panic to sell the shares surrounding the lockup expiry date.

3.10 Lockup length

Mohan and Chen (2000) demonstrate that the length of the lock-up serves as a reliable proxy of prior risk measure reveals credible information relevant to the IPO's

riskiness. Result suggests that departure from 180 days (a period that may be regarded as a norm) signals a more uncertain IPO. Both longer and shorter lock-up periods result in deeper underpricing and a larger underwriter spread. Moreover, the impact of lock-up periods on the initial returns could be nonlinear. This paper finds that the existence of a U-shaped relationship between initial returns and lock-up periods. In addition, the conclusions are the lock-up period is a reliable measurement of IPO risk, and is related to the initial underpricing of the IPOs.

Brav and Gompers (2003) show the evidence that firms that are potentially subject to greater information asymmetry problems utilize longer lockups. Moreover, while the signaling hypothesis predicts that lockup length should be positively related to the probability of SEO, this paper find that lockup length is significant negative relationship. Therefore, it is unlikely that the length of lockup is used by insiders to signal higher firm quality.

Angenendt, Goergen and Renneboog (2005) indicate that the expiries of lock-in contracts with a relatively short length have large abnormal returns at the expiry, while those with a relatively long length do not. This finding is in line with the fact that firms signal shareholder commitment and firm quality using lock-in length.

Unlike other countries, *Prasittirat (2001)* examines there is no relationship between the length of lock up and cumulative abnormal return surrounding the lockup expiry in Thai capital market. This might be supported that most Thai firms imposed the period of lockup at six months from the first trading day, thereby implying no explanations to the cumulative abnormal return at lockup expiry.

3.11 Ownership concentration

Even if the earlier research did not examine the ownership concentration, this variable is appealing for the study on the effect of stock reactions at the lockup expiry. According to *Berle and Means (1932),* they prove there is the inverse relation between ownership concentration and firm performance. As a firm with a large number of shareholders could not have enough power to monitor and control the management, thus the manager might exploit the firm's resources in activities that do not maximize shareholder value. Consequently, firms with more a concentrated

ownership structure should exhibit better performance owing to the robust relations between the interests of owners and managers.

According to *Clark and Wojcik (1997)*, there is a significant negative relationship between ownership concentration and the stock abnormal return. As the presence of efficient markets, the lower ownership concentration means high market monitoring which should discipline the managers.

Wiwattanakantang (2001) also proves that the ownership concentration is positively associated with performance measures based on Thai firms, primarily evidenced by their ROA and the sales–asset ratios.

Overall, most researchers examine a variety of variables that possibly affect the stock reactions around lockup expiry date. Thus, all variables should be specified into three groups as follows:

First, group of asymmetric information variables is composed of the first day return, firm's size, firm's age, underwriter reputation, stock price volatility, firm's news and insider trading. Firms with larger underpriced IPO, small firm size, younger age, and unknown underwriter reputation reflect more uncertainty of the firms, so abnormal return and abnormal volume are higher around lockup expiry date. Besides, stocks providing high volatility, bad news, and insider trading tend to have much larger price drops due to investors' concern about selling by management.

Second, venture capital involvement group derives from venture capital backed variable. Most researchers conclude that VC-backed IPOs are associated with significantly more negative abnormal returns and positive abnormal volume at the lock-in expiry.

Finally, group of lockup parameters is a combination from percentage of shares locked up and lockup length. From the results of many researchers, greater fraction of shares locked up and longer lockup length lead to larger share price decline.

This paper, similar to many researchers, mainly focuses on finding abnormal return and trading volume around lockup expiration date. Additionally, this paper studies on several factors possibly affecting stock reactions surrounding the lockup expiry. Nevertheless, from three groups of several factors discussed above, this paper concentrates only on examining both asymmetric information variables and lockup parameters. Venture capital involvement group is excluded from the investigation as there are only few samples of VC-backed IPOs during 2001-2005 which is not sufficient to be tested in this paper.

3. Theoretical Framework

3.1 Abnormal return and abnormal volume

Diversification Hypothesis

Leland and Pyle (1977) state that if managers are risk averse, they would desire to diversify their portfolios. Subsequent to IPO listed in the marketplace, insiders are required to release part of their shares as soon as possible, especially when the lockup period was terminated. Likewise, *Ofek and Richardson (2000)* suggest that diversification hypothesis is the main reason for insiders to sell part of their stakes at lock-up expiration date. Although they often use IPOs as a first path to diversify their shares, they frequently maintain the remaining of their holdings to sell at the end of lockup expiry date.

Demand curve hypothesis

Field and Hanka (2001) propose that only if the demand curves of shares are horizontal, different levels of supply will not affect the share price. However, similar to markets of common products, stocks have downward sloping demand curves, implying the demand curve hypothesis. Particularly, the firms facing high uncertainty and asymmetric information are likely to have downward sloping demand curves for their shares. A supply shocks shifts the equilibrium to a point where a higher quantity of shares is sold at a lower price.

Signaling effect hypothesis

Additionally, *Field and Hanka (2001)* study the signaling effect of insider sales. If insiders sell more shares at the lockup expiry than the market has anticipated, the

market accordingly interprets this situation as a lack of insider confidence in the firm. In this case, investors would also sell lots of shares after the lockup expiry date.

Anticipation hypothesis

Angenendt, Goergen and Renneboog (2005) propose that negative share price reactions usually occur before the lockup expiry date This is explained by the anticipation theory, stating that if abnormal returns are likely to occur after the lockup expiry date, investors should be motivated to de-escalate their shares prior to expiry. This behavior makes investors possible to prevent the price pressure created by insider's sales.

Efficient market hypothesis

In contrast to the above theories, *Ofek and Richardson (2000)* reject those suggestions. As lockup period has been declared in the prospectus, this effect should be incorporated since the first trading day. This argument is based on the semi-strong form of the efficient market hypothesis (EMH) which states that all public information about the firm have already included in its share price.

Apart from the efficient market hypothesis, the combinations of the above theories mostly hypothesize that the firm's insiders wish to diversify the firm's stake holding. In the meantime, investors have already predicted the firm insider's selling during lockup expiry date so investors should also prepare to sell the firm's shares during that period. Combined with the firm's insider selling, this implies the surge of selling trading volume and lead to lower its share price during that period. As such, the main hypotheses in this paper are as follows:

Hypothesis 1a: Surrounding the lock up expiry, abnormal returns are negative.

Hypothesis 1b: Surrounding the lock up expiry, trading volumes are higher.

3.2 Explanatory variables

Some explanatory variables probably impact the stock price and volume at the lockup expiry could be shown as follows:

1. Informational Asymmetries

At the lockup expiration date, there are strong informational asymmetries between inside and outside shareholders because insiders hold more of the firm's information than the outside investors. Thus, insiders have an opportunity to sell all their shares, but the actual number that will be sold is unknown. This will lead to greater negative market-price reaction and higher trading volume. The greater the information asymmetries of the firms, the greater impact of abnormal return and abnormal volume at the end of lockup date. In this paper, the firm's asymmetric information proxies are observed by its size, age, first day price, ownership concentration, stock price volatility, underwriter reputation and insider participations.

- ***Size***

According to *Leland and Pyle (1977) and Rock (1986)*, information asymmetry adversely affects the average quality of the companies seeking a new listing and thus the price at which their shares can be sold, and also determines the magnitude of the underpricing needed to sell them. Consequently, larger firms are anticipated to provide the greater information available to markets; hence, there is less uncertainty surrounding the pricing of these firms *(Barry and Brown, 1984)*. In this paper, the natural logarithm of the firm's market capitalization at the end of the first trading day is used as a proxy for firm's size.

Hypothesis 2a: Larger firms encounter less negative abnormal returns surrounding the lock up expiry.

Hypothesis 2b: Larger firms encounter lower trading volume surrounding the lock up expiry.

- ***Age***

Similar to size, *Chemmanur and Fulghieri (1995)* stated that the effect of information asymmetry is more serious for younger listed companies, which have little track record and low visibility than for old companies. Thus, to capture the effect of information asymmetries, this paper incorporates age as one of the variables for investigating the cross-sectional tests. The older firm's age should confront with the lower information asymmetry towards the public, thereby implying the lower

negative abnormal return and lower trading volume at the lockup expiry date. The proxy of firm's age is the year between the establishment and the first trading day

Hypothesis 3a: Elder firms face less negative abnormal returns surrounding the lock up expiry.
Hypothesis 3b: Elder firms face lower trading volume surrounding the lock up expiry.

- ***First day return***

In addition, first day return is used as a measure of uncertainty at the expiration of lockup period. To signal its quality, the firm should discount its share price more, lock up for a longer period, or lock up a larger percentage of the shares outstanding. If the firm imposes the lockup period for the short period, it will need to underprice more to signal the quality. These are consistent with *Beatty and Ritter (1986) and Tinic (1988).* They illustrate that the underpriced stock tends to be issued by more speculative firms. Therefore, the offer price is expected to contain information about the risks of the IPO. The prediction, therefore, is that there is a negative relation between the first day return and cumulative abnormal returns at the lockup expiration date. In this paper, the percentage after comparing the first day closing price to the IPO offering price is used as a proxy for the stock's first day return.

Hypothesis 4a: Firms with large underpricing on the first trading day are likely to face large negative abnormal returns surrounding the lock up expiry.
Hypothesis 4b: Firms with large underpricing on the first trading day are likely to face large trading volume surrounding the lock up expiry.

- ***Ownership concentration***

Many studies verify that the ownership concentration is positively associated with firm performance. As the firm is owned by the concentration of shareholder, its monitoring cost should be lower and the effective of controlling the manager should be improved. This is evidenced by other markets, indicated by *Berle and Means (1932),* and by Thai market, supported by *Wiwattanakantang (2001).* Thus, this paper expects the firm held by the concentration of owners should demonstrate the low

abnormal return and inactive abnormal volume surrounding the lockup expiry. The company's percentage of major shareholders (holding shares over five percent each) is used as the proxy of ownership concentration.

Hypothesis 5a: Firms held by the concentration of owners are likely to face the low negative abnormal returns surrounding the lock up expiry.
Hypothesis 5b: Firms held by the concentration of owners are likely to face the low trading volume surrounding the lock up expiry.

- ***Stock price volatility***

As indicated by *Ofek and Richardson (2000)*, the degree of the price deterioration at the lockup expiry relies on the stock underlying volatility. Consistently, *Brav and Gompers (2003)* reveal that the lower transparency firm, observed from the stock price volatility, is associated with larger negative abnormal returns surrounding the end of lockup period. As such, the high volatility stocks tend to have much larger price drops and larger trading volume at the lockup expiry. In this paper, the volatility of stock price during the first trading day until the ninety trading day is used as a proxy for the stock price volatility.

Hypothesis 6a: Large stock price volatility is likely to face large negative abnormal returns surrounding the lock up expiry.
Hypothesis 6b: Large stock price volatility is likely to face large trading volume surrounding the lock up expiry.

- ***Underwriter reputation***

Based on *Carter and Manaster (1990),* they provide the prediction that underwriting reputation is correlated to the less uncertainty of the IPO. The reputable underwriter may not risk selecting a low quality firm to the market. Accordingly, firms listed by reputable underwriters are less likely to show negative abnormal returns and improved trading volume surrounding the lockup expiry. Consequently, this paper expects IPO brought by the reputable underwriter ranking to confront with the lower abnormal return and trading volume around lockup expiry. Then, the underwriter variable is proxies by the binary dummy variable of underwriter reputation: 1 if underwriter rank is top five ranked by the size of all IPO market capitalizations

during 2001-2005, 0 otherwise. The classification for the sample period bringing IPOs to market is chosen because it is assumed that the companies would choose the underwriters based on the information that is already available on the market.

Hypothesis 7a: Firms with reputable underwriter encounter less negative abnormal returns surrounding the lock up expiry.
Hypothesis 7b: Firms with reputable underwriter encounter lower trading volume surrounding the lock up expiry.

- ***Insider participation***

According to *Angenendt, Goergen and Renneboog (2005)*, the executives are most likely to have superior information about the firm quality, as they are in charge of the firm's daily operations. Insider trading may increase agency problems, following unaligned information between investors and insiders, which may have a negative impact on firm value.

In this paper, the definition of insider is similar to the definition of insider by Securities and Exchange Commission, Thailand (SEC) as the firm's securities holding by the director, manager, person who holds management position as specified in the notification of the Office, auditor of a company which issues securities, and the holding of securities by his spouse and minor children. In the meantime, the insider trading information is collected from the Management's Securities Holding (Form 59-1) and Change of Management's Securities Holding (Form 59-2), provided by SEC.

To capture all effects of insider trading, this paper conducts the two explanatory variables, consisting of insider acquisition and insider disposition. Insider acquisition is the binary dummy variable of insider acquiring the stock: 1 if the insider's cumulative volume trading during the event period is positive, 0 otherwise. Insider disposition is the binary dummy variable of insider acquiring the stock: 1 if the insider's cumulative volume trading during the event period is positive, 0 otherwise.

Hypothesis 8a: Firms with accelerating insider trading (acquisition) encounter large negative abnormal returns surrounding the lockup expiry.

Hypothesis 8b: Firms with accelerating insider trading (acquisition) encounter large trading volume surrounding the lockup expiry.

Hypothesis 9a: Firms with accelerating insider trading (disposition) encounter large negative abnormal returns surrounding the lockup expiry.
Hypothesis 9b: Firms with accelerating insider trading (disposition) encounter large trading volume surrounding the lockup expiry.

2. Lockup characteristics

This paper studies whether some lockup characteristics possibly affect the stock price and trading volume at the lockup expiry date. According to *Courteau (1995)*, he argues that insiders can signal their firm's superior quality from the percentage of shares in lockup and the number of days in the lockup period. Hence, as independent variables in cross-sectional regressions, the percentage of shares in lockup and the number of days in the lockup period are used as proxies for lockup characteristics.

- ***The length of the lockup period***

Many papers indicate that the firms imposing the longer locked up period should reduce the information asymmetries at the IPO date. Nevertheless, the longer the time between the IPO and the expiration date, the more information that is likely to be available to investors. As such, share price may possibly drop to its true value when more information of the firm becomes available. For this reason, the predicted relation between the numbers of days and abnormal returns is negative. To proxy the length of locked up, the length of lock up is the binary dummy variable of lockup length: 1 if the period between IPO and the first locked up expiry date is higher than 0.5 year, 0 otherwise.

Hypothesis 10a: The locked up length has negative relation to the abnormal returns surrounding the lockup expiry.
Hypothesis 10b: The locked up length has negative relation to the abnormal volumes surrounding the lockup expiry.

- ***The percentage of shares locked-up***

Similar to the length of lockup, many papers also report that the firm imposed the greater shares locked up to reduce the information asymmetries at the IPO date. Nevertheless, such information asymmetries would be rather expected to rigorously occur at the lockup expiry, thereby affecting the high possibility of insiders to dispose the share during the period. This paper, thus, predicts the percentage of shares in lockup to be negatively related to the cumulative abnormal returns. To proxy the percentage of shares locked up, two explanatory variables are applied in the study, comprising of the percentage of all shares lockup, and the percentage of shares lockup for the first expiry. The percentage of all shares lockup is the binary dummy variable of lockup shares: 1 if the percentage of shares locked up to the total number of shares outstanding after the offer is equal to or higher than 35 percent, 0 otherwise. The percentage of shares lockup for the first expiry is the binary dummy variable of lockup shares: 1 if the percentage of shares locked up at the first lockup date to the total number of shares outstanding after the offer is equal to or higher than 35 percent, 0 otherwise.

Hypothesis 11a: The percentage of shares locked-up has negative relation to the cumulative abnormal return surrounding the lockup expiry.
Hypothesis 11b: The percentage of shares locked-up has negative relation to the cumulative abnormal volume surrounding the lockup expiry.

Note that the proxies for explanatory variables are summarized in table 8.

4. Data and Methodology

Data Sources

This paper contains IPO data listed during 2001-2005 from www.setsmart.com, IPO prospectuses of the firms and The Securities and Exchange Commission, Thailand (SEC).

The first source, www.setsmart.com, provides the firm's information and daily trading information. The details are as follows:

- *Daily stock return and volume* Daily stock trading volume can be observed directly from the stock trading volume at the end of the day. Daily stock return can be calculated from the percentage difference between stock closing price of the previous day and that of the following day.
- *Market return and volume* For market return, SET is used to be the proxy of Thai stock market and, therefore, daily market return can be calculated from the percentage difference between closing SET index of the previous day and that of the following day. Meanwhile, the SET volume traded is used as the proxy of market volume.
- *Firm's size* is the firm's market capitalization on the first trading day.
- *Firm's age* is the period between the date of incorporation as a private limited company and the date of the IPO.
- *The firm's IPO price* is the firm's IPO offering price.
- *The firm's first day price* is observed from the closing price of the first trading day.
- *Underwriter* is the underwriter name issuing the IPO
- *Ownership concentration* is the firm's cumulative percentage of major shareholders holding over five percent of the firm's total shares each.

The second source, IPO prospectuses, provides data on the characteristics of lockup contracts as follows:

- *Length of lockup period* is calculated from the period between the offer and IPO lockup expiry day.
- *The number of locked-up shares* is calculated from firm's percentage locked-up shares to total outstanding shares.

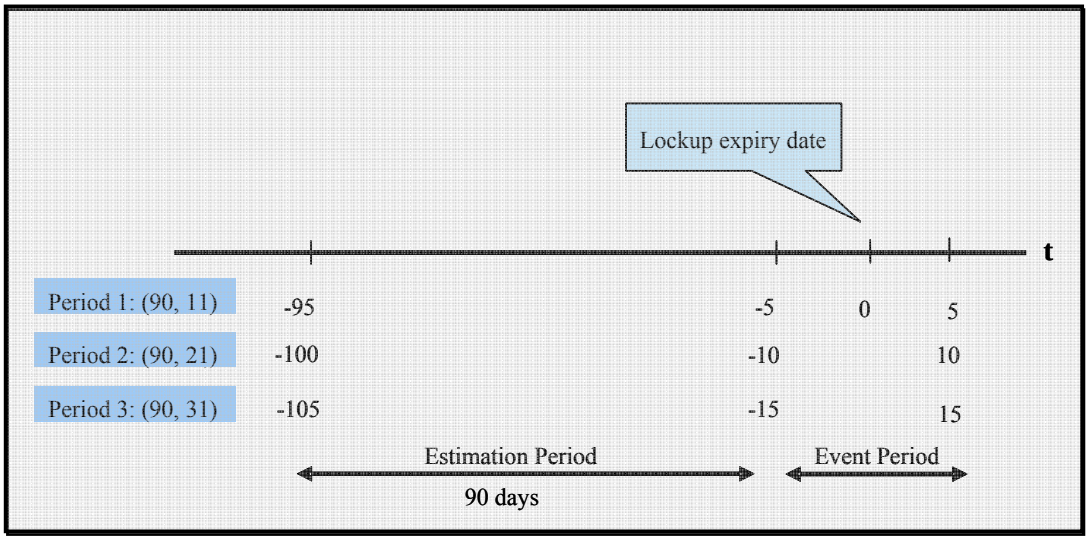
The last source, The Securities and Exchange Commission, Thailand (SEC) provides data of firm's insider trading through the Management's Securities Holding (Form 59-1) and Change of Management's Securities Holding (Form 59-2). Meanwhile, SEC specifies the definition of insider holding as the firm's securities holding by the director, manager, person who holds management position as specified in the notification of the Office, auditor of a company which issues securities, and the holding of securities by his spouse and minor children.

- *Insider participation* is the number of shares that firm's insider acquisition or disposition from the form of 59-1 and 59-2.

Methodology

To study IPO's return and trading volume, this paper uses event study as a methodology. The lockup expiry date is identified as day 0. The beta estimation period lies within the period of 90 days before the event window period. The event window will be classified into three main periods: (-5, 5) the period of five days before the expiry date and five days after the expiry date, (-10, 10) the period of ten days before the expiry date and ten days after the expiry date, (-15, 15) the period of fifteen days before the expiry date and fifteen days after the expiry date. The period of studies around lockup expiration date could be demonstrated by Figure 4.

Figure 4: Period of studies around lockup expiration date



1. Test for abnormal returns: Market model

This paper estimates abnormal returns surrounding the expiration of the lockup period using standard event-study methodology discussed in *Brown and Warner (1980, 1985).* The abnormal returns are examined from the estimated market model as follows

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$$

Where

R_{it} = Return of stock i during period t

= $((stock_t - stock_{t-1}) / stock_{t-1})$

R_{mt} = Return of market portfolio during period t

= $((SET_t - SET_{t-1}) / SET_{t-1})$

α_i, β_i = Coefficient of the relevant variables of stock i

ε_{it} = Stochastic error term of stock i during period t

To ensure that reported results are not affected by time variation, beta estimation obtained from regressing company daily stock returns within the period of 90 days prior to the event window period. Then, abnormal returns (AR) and cumulative abnormal returns (CARs), for each firm, during the event period surrounding the lockup expiration date are calculated, respectively as follows:

$$AR_{it} = R_{it} - \hat{\alpha}_i - \hat{\beta}_i R_{mt}$$

$$CAR_i = \sum_{t=t_1}^{t_2} AR_{it}$$

Cumulative average abnormal returns (CAAR) is calculated as follow

$$CAAR = \frac{1}{N} \sum_{i=1}^{N} CAR_i$$

To test the null hypothesis that the CAAR is equal to zero for a sample of N securities, the hypothesis and t-test statistic are as follows:

Ho: CAAR = 0

Ha: CAAR ≠ 0

$$t_{CAAR} = \frac{\frac{1}{N} \sum_{i=1}^{N} CAR_i}{s(CAR_i) / \sqrt{N}}$$

Where the numerator is the CAAR and $s(CAR_i)$ is the standard deviation of the sample's CARs. The t_{CAAR} test statistic is based on *Barber and Lyon (1997).* It is Student-t distributed with N-1 degrees of freedom, which approaches the normal distribution as N increases.

2. Test for abnormal trading volume

2.1 Test for abnormal trading volume: Mean adjusted model

Daily abnormal trading volume is calculated as in *Field and Hanka (2001)*, applying the mean adjusted model. The firm's mean daily trading volume is calculated from its average trading volume during 90 days before the event window. For each firm, abnormal trading volume (AV) during the event day is computed as the percentage difference between the trading volume on the event day and the mean.

$$AV_{it} = \frac{V_{it}}{\frac{1}{90}\sum_{t=t_1}^{t_2} V_{it}} - 1$$

Cumulative abnormal trading volume (CAV) is then estimated by the summation of the daily average abnormal trading volume over a window covering the lockup expiry date. The cumulative average abnormal trading volume (CAAV) is the sample average abnormal trading volume as follows:

$$CAV_i = \sum_{t=t_1}^{t_2} AV_{it}$$

$$CAAV = \frac{1}{N}\sum_{i=1}^{N} CAV_i$$

To test the null hypothesis that the CAAV is equal to zero for a sample of N securities, the hypothesis and t-test statistic are as follows:

Ho: CAAV = 0

Ha: CAAV ≠ 0

$$t_{CAAV} = \frac{\frac{1}{N}\sum_{i=1}^{N} CAV_i}{s(CAV_i)/\sqrt{N}}$$

2.2 Test for abnormal trading volume: Market model

Apart from Market model, this paper also applies the market model to test the abnormal trading volume. The abnormal volume is computed as follows:

$$Vol_{it} = \alpha_i + \beta_i Vol_{mt} + \varepsilon_{it}$$

Where

Vol_{it} = The percentage of volume change of stock i during period t

= $((Vol_t - Vol_{t-1}) / Vol_{t-1})$

Vol_{mt} =The percentage of volume change of market portfolio during period t

= ((Vol SET_t – Vol SET_{t-1}) / Vol SET_{t-1})

α_i, β_i = Coefficient of the relevant variables of stock i

ε_{it} = Stochastic error term of stock i during period t

Subsequently, the firm's abnormal volume (AV) during the event period surrounding the lockup expiration date is measured as follows:

$$AV_{it} = Vol_{it} - \hat{\alpha}_i - \hat{\beta}_i Vol_{mt}$$

The cumulative abnormal trading volume (CAV) and the cumulative average abnormal trading volume (CAAV) are estimated as follows:

$$CAV_i = \sum_{t=t_1}^{t_2} AV_{it}$$

$$CAAV = \frac{1}{N} \sum_{i=1}^{N} CAV_i$$

To test the null hypothesis that the CAAV is equal to zero for a sample of N securities, the hypothesis and t-test statistic are as follows:

Ho: CAAV = 0

Ha: CAAV ≠ 0

$$t_{CAAV} = \frac{\frac{1}{N} \sum_{i=1}^{N} CAV_i}{s(CAV_i) / \sqrt{N}}$$

3. Cross-sectional tests

This paper investigates cross-sectional differences in cumulative abnormal returns (CAR) by regressing CAR for each firm against a variety of explanatory variables. Similarly, this method is employed to explore cross-sectional differences in cumulative abnormal volume (CAV). The model for the determination of cumulative abnormal returns (CAR) and cumulative abnormal volume (CAV) could be shown as follows:

$$CAR_i = \beta_0 + \beta_1 Logsize_i + \beta_2 Age_i + \beta_3 Price_i + \beta_4 Ownership_i + B_5 SD + B_6 Dumunderwriter_i + B_7 Duminsidera_i + \beta_8 Duminsiderd_i + \beta_9 Dumlength_i + B_{10} Dumshares_i + B_{11} Dumfirstshares_i + \varepsilon_{CAR,i}$$

$$CAV_i = \beta_0 + \beta_1 Logsize_i + \beta_2 Age_i + \beta_3 Price_i + \beta_4 Ownership_i + B_5 SD + B_6 Dumunderwriter_i + B_7 Duminsidera_i + \beta_8 Duminsiderd_i + \beta_9 Dumlength_i + B_{10} Dumshares_i + B_{11} Dumfirstshares_i + \varepsilon_{CAV,i}$$

Where

CAR_i = Cumulative abnormal return for stock i

CAV_i = Cumulative abnormal volume for stock i

$Logsize_i$ = The natural logarithm of the firm's market capitalization at the end of the first trading day

Age_i = The year between the establishment and the first trading day

$Price_i$ = The percentage of first day return by comparing the first day closing price to the IPO offering price

$Ownership_i$ = The company's percentage of major shareholders (holding shares over five percent each)

SD = The volatility of stock price during the first trading day until the ninety trading day

$Dumunderwriter_i$ = Binary dummy variable of underwriter reputation: 1 if underwriter rank is top five ranked by the size of all IPO market capitalizations during 2001-2005, 0 otherwise

$Duminsidera_i$ = Binary dummy variable of insider acquiring the stock: 1 if the insider's cumulative volume trading during the event period is positive, 0 otherwise.

$Duminsidernd_i$ = Binary dummy variable of insider disposing the stock: 1 if the insider's cumulative volume trading during the event period is negative, 0 otherwise.

$Dumlength_i$ = Binary dummy variable of lockup length: 1 if the period between IPO and the first locked up expiry date is higher than 0.5 year, 0 otherwise.

$Dumshares_i$ = Binary dummy variable of lockup shares: 1 if the percentage of shares locked up to the total number of shares outstanding

after the offer is equal to or higher than 35 percent, 0 otherwise.

$Dumfirstshares_i$ = Binary dummy variable of lockup shares: 1 if the percentage of shares locked up at the first lockup date to the total number of shares outstanding after the offer is equal to or higher than 35 percent, 0 otherwise.

α_i, β_i = Coefficient of the relevant variables of stock i

ε_i = Stochastic error term of stock i

5. Empirical Results

Summary statistics

Excluding the 11 firms, lacking lockup information, there are 115 IPO firms during the period during 2001-2005.

Event study results

1. Abnormal return

From the event study, the results from market model in Table 5 demonstrate that there are abnormal returns during the lockup period. Evidenced by main three event periods, the results illustrate the statistically significant cumulative average abnormal return approximately -0.17% at 90 percent confidence level for (-5, 5) period, -0.15% at 95 percent confidence level for (-10, 10) period and -0.15% at 95 percent confidence level for (-15, 15) level respectively. The results are consistent with the negative abnormal return found by most researchers in USA, UK, Germany and Italy. The studies are composed of *Brau et al. (1999), Ofek and Richardson (2000), Brav and Gompers (2000), Bradley, Jordan and Yi (2001) Field and Hanka (2001) Gasper (2002) Brau, Carter, Christophe and Key (2004).* They claim that abnormal return is large and significantly negative surrounding the lock up expiry date, explained by the possibility of misalignment of insider and outsider during that period. Such misalignment can decrease investors' demand for the shares and also increase the negative abnormal returns.

In terms of theoretical explanations, though all lockup information has already provided in the prospectus since the IPO date, the negative abnormal return results

exist surrounding the lockup expiry against to the efficient market hypothesis proposed by *Ofek and Richardson (2000)*. The explanations are partly attributable to the anticipation hypothesis, supported by *Angenendt, Goergen and Renneboog (2005)*. As the public expects the insider to intend to release their shares at the lockup expiry following their diversification purposes, explained by *Leland and Pyle (1977)*; thus, the investors should avoid such situations by selling the stock surrounding the period, supported by the anticipation hypothesis. As such, hypothesis 1a is accepted.

2. Abnormal volume

In contrast to abnormal return results, the event studies using mean adjusted model in table 6 illustrate the statistically insignificant cumulative average abnormal volume. Meanwhile, the sign of abnormal volume show the contradict results, evidenced by the positive cumulative average abnormal volume of 4.5% for (-5, 5) period, but the negative cumulative average abnormal volume of -12.0% for (-10, 10) period and -17.53% for (-15, 15) period. These results contrast to our expectation and previous studies stating that the cumulative average abnormal volume should be significantly positive during the lockup expiry date. The studies in USA, Germany and Italy, proposed by *Ofek and Richardson (2000), Dussold (2001), Field and Hanka (2001), Gasper (2002), Garfinkle, Malkiel and Bontas (2002) Brav and Gompers (2003), Ofek and Richardson (2003,* and *Angenendt, Goergen and Renneboog (2005),* prove that the higher volume at the end of the lock-up period is consistent with the increase in the available tradable shares, coupled with the shareholders selling for diversification after the end of lockup date. Meanwhile, the increase in the volume of shares traded conforms to the drop in stock price.

Thus, this paper expands the event study of the abnormal volume to the market model. Similar to the mean adjusted model, the market model applies the ninety days before event period as the estimation period and the main three event periods as the event study. The results in table 7 demonstrate the statistically insignificant cumulative average abnormal volume and the contradict sign of results. As it exhibits the negatively cumulative average abnormal volume of -0.4% during (-5, 5) period, but the positive cumulative average abnormal volume of 0.1% during (-10, 10) period and 1.1% during (-15, 15) period. Note that, in terms of abnormal volume for both mean adjusted model and market model, various days during the event period

show the statistically significant negative abnormal volume during the event period. Hence, the hypothesis 1b is rejected as the results argue to the previous expectation that the cumulative average abnormal volume should be significantly positive during the lockup expiry date.

In terms of theoretical explanations, the demand curve hypothesis states that owing to the downward sloping demand curves, the huge supply of shares trading surrounding the lockup expiry should imply lower demand in the marketplace, thereby affecting the stock price erosion. In spite of the significantly negative abnormal return, in this paper, the results show that there would not be positively abnormal volume as expected. Thus, the results affirm the opposition to the demand curve hypothesis. The dissimilar results might be explained that the abnormal return occurs by the lower-than-average trading volume in the market, concerning on the lockup expiry date. Hence, even if a normal return exists, it influences only on the minority investors in the market.

Cross sectional results

The event studies support only negative abnormal returns during the lockup expiry date. For cross sectional study, this paper tests only the factors to explain the degree of abnormal return.

1. Size

In contrast to the previous expectation, positive relation between firm's size and abnormal return, the cross sectional results evidence the statistically insignificant positive relation between the firm's size and cumulative abnormal return. The results are also different from *Brav and Gompers (2003),and Brau, Carter, Christophe and Key (2004),* investigating that large firms are likely to have more information available in the market; thus the lower uncertainties imply less abnormal returns surrounding lockup expiry.

Nevertheless, the results are similar to Prasittirat (2001) as she also verifies the identical results in Thai capital market. Her interpretation is the larger the firm market capitalization, the more likely the larger amount of shares being disposed at the end of lockup expiry date. In this paper, the possible explanations should also be

the large firm size, proxies by firm's market capitalization, implies such business entering into the mature stage. The firm's performance, therefore, should be stable rather than providing for material growth. All of these indicate the investor's concerns on the lockup expiry, by avoiding the expected material price deterioration and eliminating inconsiderable growth stock. Accordingly, I reject the hypothesis 2a.

2. Age

This paper expects older firms to face less negative abnormal returns surrounding the lock up expiry. In contradictory to such prior expectation, the results exhibit no relationship between the age and the abnormal return at the end of lockup expiry date is statistically insignificant and approaching zero. The results are also dissimilar to *Chemmanur and Fulghieri (1995)*, and *Goergen, Renneboog and Khurshed (2004)*, clarifying that the younger firms provide the slight track record in the public so those firms should counter with the high abnormal return at the end of lockup expiry.

The possible explanations might due to the fact that some investors view the elder firm credible from lots of information available in the market. Meanwhile, in turn, others might observe the elder firm as the obstacle for its expansion since the enduring of operating business indicates the inflexibility to accommodate to the new technology or investment. As such, the firm's age could not explain the cumulative abnormal return at the lockup expiry. Thus, hypothesis 3a is rejected.

3. First day return

Dissimilar to aforementioned expectation that large first day return affects the large negative abnormal returns, the cross sectional results demonstrate no relationship between the first day return and cumulative abnormal return surrounding the lockup expiry. As the coefficient number approaches zero, and the results are statistically insignificant. The results are inconsistent with *Aggarwal et al. (2002)*, *Zheng (2003) Angenendt, Goergen and Renneboog (2005)* stating that large underpricd IPO tends to have larger negative abnormal returns at the expiry. As the shareholders of heavily underpriced firms could not sell the stock after IPO so they wait until the lock-in expiry to dispose their shares initially.

Nevertheless, the results might be supported by Prasittirat (2001) examining the statistically insignificant no relations. Her possible explanations state that the period during the first trading day and the lockup expiry date may be too long to apply the effects of first day return to evaluate the abnormal return at lockup expiry date. Identical to Parsittirat (2001)'s study, the period between the first trading day and lockup expiry day in this paper is around a half year. Accordingly, the change in the market condition and more widespread information to the public should lead the investors to react differently between initial public offering and lockup expiry date. Thus, the hypothesis4a is rejected.

4. Ownership concentration

Opposite to the preceding expectation of positive correlation between concentration of owners and abnormal return, the cross sectional results reveal no relationship between the ownership concentration and cumulative abnormal return. As the coefficient number approaches zero, albeit not statistically significant. This is contrast to *Berle and Means (1932), and Wiwattanakantang (2001)* stating that the presence of large controlling shareholders is associated with higher performance of the firm due to the improvement of monitoring and controlling the management.

In this paper, the different results are likely to be explained by the dissimilarity in the nature of ownership structure in Thai capital market and other markets, such as in US and UK. In other countries, the company's ownership concentration could be observed directly through the percentage of stake holding in the firm. Meanwhile, in Thailand, using the same method might not reflect the accurate results due to the problem of nominee holding shares as a representative of the real shareholders in Thai capital market. Thus, the investors in Thailand might not believe in the ownership information provided by firms and concern on other factors impacting the stock reaction surrounding the lockup expiry. This might be observed through the insider trading and stock price volatility, rather than focusing on the ownership concentration of the firm. Thus, the investors ignore the ownership concentration, leading to no correlation with the cumulative abnormal return. The hypothesis5a is rejected.

5. Stock price volatility

Aligned with the earlier hypothesis, the cross sectional results prove the statistically significant negative relationship between the first day return and cumulative abnormal return. The results are similar to the previous studies from *Ofek and Richardson (2000) and Brav and Gompers (2003).* They indicate that a high volatility of the stock should create more desirable to diversify the shareholders' portfolio, and also induce investors to dispose low transparency stock at the end of lockup expiry.

In the meantime, this paper views that high stock price volatility as a result of high information asymmetries in the firm. Surrounding the lock up expiry, the effect of the information asymmetries should be more influenced as the public concerns on whether the insiders might release a large amount of shares. As such, the high stock price volatility shows the large price drop during the period. The hypothesis 6a, thus, should be accepted.

6. Underwriter reputation

As hypothesized, the cross sectional result shows a positive relationship between underwriter reputation and cumulative abnormal returns, even it is statistically insignificant. Such result coincides with *Carter and Manaster (1990), Goergen, Renneboog and Khurshed (2004), Angenendt, Goergen and Renneboog (2005).* They explore that firms engaging a high quality underwriter have less negative abnormal returns at the lock-in expiry. The high underwriter reputation implies the low information favorable to the insiders; therefore, the stock would be sold less at the lock-in expiry.

In this paper, the possible clarification could also be the high underwriter reputation reflects the lower information asymmetries towards the firm. To protect its reputation, the credible underwriter would issue only the trustworthy firms and apparently declare the IPO information in the public. This implies the lower information asymmetries for insiders to exploit from the investors. Hence, the stocks listed by the reputable underwriter counter with the lower abnormal return. The hypothesis 7a is accepted.

7. Insider trading

This paper anticipates the negative relationship between the insider trading, composing of insider acquisition and disposition, and cumulative abnormal return. Rather similar to the expectations, the results exhibit the statistically significant negative relation between the insider acquisition and cumulative abnormal return. On the other hand, the insider disposition and cumulative abnormal return have no relations, albeit statistically insignificant.

In terms of insider acquisition, the results are in line with *Field and Hanka (2001)* stating that both firms with directors' sales and purchases have statistically significant negative abnormal returns surrounding the lockup expiry. The possible explanations might be clarified as the investors observe the insider acquisition to be the signal of information asymmetries towards the firm. The superior knowledge of the insiders might influence the investors to avoid investing in the stock. In addition, investors may be sensitive to the larger amount of shares owned by the insiders as the shares might be sold going forward. All of these might lead to the negative relations between the insider acquisition and cumulative abnormal return around lockup expiry. Thus, the hypothesis 8a is accepted.

Contrast to the results of insider acquisition, this paper could not find the relation between the insider disposition and cumulative abnormal return. The results are dissimilar to *Gregory et al. (1994) and Brau et al. (1999).* They prove that directors' sales could have a potentially strong impact on the share price, because they tend to convey bad news, thereby leading to the decline of abnormal return. Nevertheless, the results in this paper are supported by *King and Röell (1988) and Pope et al. (1990)*. They find that it takes time for the market to react to the directors' trades. Given the short event windows, the study might not capture the market reaction to the directors' trades, and only capture the market reaction to the lock-in expiry. Thus, the hypothesis 9a is rejected.

Interestingly, the lack of relation between the insider disposition and cumulative abnormal return implies the appealing conclusion. Firstly, the abnormal return does not influence by the insider selling surrounding the lockup expiry. The results are consistent with *Espenlaub, Goergen, Khurshed, and Remenar (2002).* They explain

that the negative abnormal returns around the lock-in expiry do not cause by the directors' sales. The firms would signal their qualities by the means of other devices instead, such as the duration of the lock-in agreement, the percentage of the shares locked-in and the level of IPO underpricing. Secondly, the results disprove the diversification and signaling hypothesis. In the diversification hypothesis, the insiders do not sell large amount of shares surrounding lockup expiry to the diversification purpose as expected; therefore, such theory should be opposed. Also, in the signaling hypothesis, the amount of insider sale is insignificant, but the abnormal return remains negative. This implies abnormal return should occur from investor selling without noticing the insiders' trading in advance. As the public anticipation absolutely impacts the abnormal return, this should be concluded that the abnormal return is likely to be explained by the anticipation hypothesis.

8. Lockup length

In line with our expectation, the results prove that there is the statistically insignificant negative relation between the lockup length and cumulative abnormal return. As supported by the previous studies, *Brav and Gompers (2003), and Angenendt, Goergen and Renneboog (2005)* verify low quality firms utilize longer lockups to ease the alignment between the insiders and investors at IPO date, and the lockup length is significant negative relationship to the abnormal return surrounding the lockup expiry date. This implies low quality firms are unlikely to use the length of lockup to signal the improved firm quality.

Apart from the previous studies, firm imposing strict lockup length contains the information asymmetries at the IPO date. In this paper, the results of the deterioration in the share price are due to the fact that investors remain concern on the information asymmetries of the firm surrounding the lockup expiry. As the company's information should be gradually revealed after IPO until the end of lockup expiry date, its share price might drop in response to the true value reflecting from such information. Thus, it is costly to the low quality firm imposing the rigid lockup length since the negative relationship between lockup length and the abnormal return from this paper show that such conductivity is not convincing. Thus, this paper accepts hypothesis 10a.

9. The percentage of lockup shares

This paper predicts a negative relation between the abnormal return and the percentage of shares locked up. Unlike the prior expectation, the cross sectional result exhibit a statistically significant positive relationship between ownership concentration and cumulative abnormal return. The results are also different from the previous studies, proposed by *Gasper (2002) Brav and Gompers (2003) Brau, Carter, Christophe and Key (2004) Angenendt, Goergen and Renneboog (2005)*. They claim that the larger proportion of shares in lockup, the lesser ability insiders have to signal the true value of the firm. In addition, the greater proportion of shares locked should lead to a greater need for diversification and the investors should react to the larger number of shares expected to be released at the lockup expiry. Nevertheless, our results are similar to Prasittirat (2001). As the lockup information has been provided in the IPO prospectus since the IPO date, investors should predict the amount of shares sold in advance. Thus, in case of high investor confidence in the firm performance, this might lead to the positive relations to the cumulative abnormal return.

The contradictory results lead us to extend the test to cover another explanatory variable, the percentage of lockup shares released at the first lockup expiry. In this paper, the dependent variable is the cumulative abnormal return at the first lockup expiry; thus, using the percentage of lockup shares releasing at the first lockup expiry as the independent variable, it is possible to explain their relationship in the results. As hypothesized, the results show that there is a negative relationship between the percentage of lockup shares released around the first lockup expiry and cumulative abnormal return, albeit it is still not statistically significant.

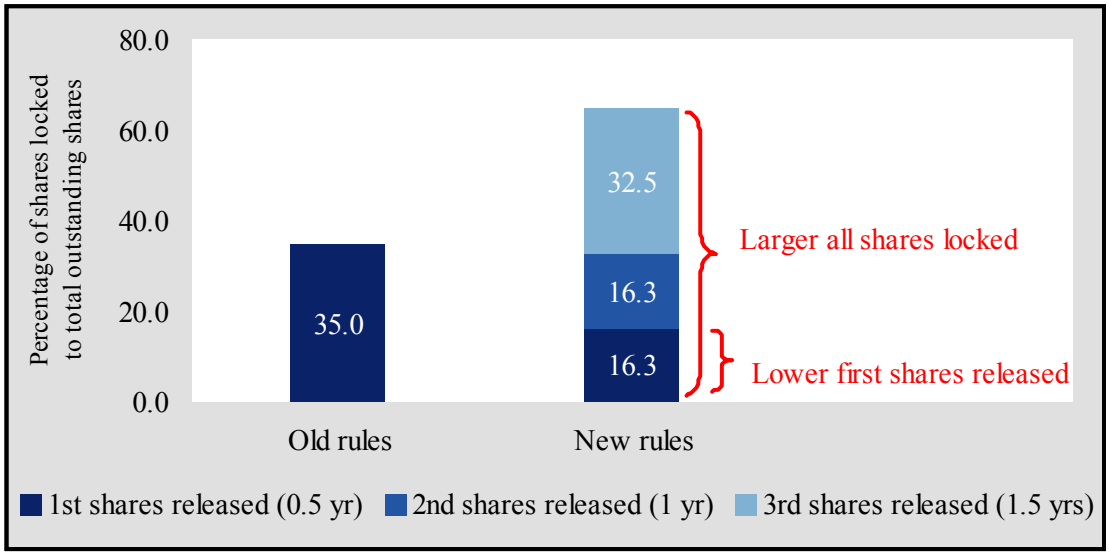
Overall, the results could be summarized in the table below and the percentage of all lockup shares has a positive relation to the cumulative abnormal return, the percentage of shares locked in the first lockup expiration while the cumulative abnormal return has a negative relation. This is similar to the other previous studies.

Table 9: The relation between the percentage of shares lockup and the cumulative abnormal return (CAR)

	Variables	Observed relation to CAR
1	The percentage of all shares locked	Positive
2	The percentage of shares locked in the first lockup expiry	Negative

The possible explanations might be the different SET regulations during the period of study, as shown in Figure 8. During period of study, in 2001-2004, the IPO shares restrictions imposed locked out at least 35% of total outstanding shares within 0.5 year after IPO. Nevertheless, after 2005, the shares must locked out were at least 65% of total shares, and the minimum period of locked out shares is 1.5 years after IPO. In addition, 25% of the total locked shares (implying 16% of total outstanding shares) are freed the first lockup expiry (0.5 year after IPO). Thus, compared to the previous rule, the new rule denotes the higher percentage of all locked shares, but the lower percentage of shares freed in the first lockup expiry. This supports our results that the larger portion of all shares locked up, implying the lower shares released in first expiry, should affect the lower negative abnormal return surrounding the first lockup expiry. In other words, the new lockup regulation reduces the large impact of negative abnormal return surrounding the first lockup expiry.

Figure 8: The comparison between the previous and new lockup regulations



Overall, in terms of testing the cross sectional results, this paper explores the factors explaining the degree of cumulative abnormal return, consisting of size, age, first day

return, ownership concentration, stock price volatility, underwriter reputation, insider trading, lockup length and the percentage of lockup shares. The statistically significant factors could explain the relations with the abnormal return are stock price volatility, the insider acquisition trading, and the percentage of shares lockup. The factors providing the negative relation to cumulative abnormal return are stock price volatility and insider acquisition trading, while the factors containing the positive relation to abnormal volume are the percentage of all shares lockup.

6. Conclusion

Subsequent to the various preceding studies, this paper examines the stock response after the share lockup expiration period. The study focuses on examining the shares abnormal return, abnormal volume, combined with the factors explaining the irregular situations in Thailand

As in many countries, such as the US, UK, France, Italy and Germany justify the a stock's negative abnormal return and positive abnormal volume surrounding the lockup expiry period. This paper also discovers the supporting evidence as a result of negative abnormal return surrounding the lockup expiry. However, surprisingly, the positive abnormal volume surrounding the lockup expiry could not be further explained which is different from earlier studies. The results might be explained by the anticipation hypothesis. As the market predicts that insiders sell the stocks at the lockup expiry period, the investors should react by creating a large stock disposition during the period. Meanwhile, further investigation proves that insiders do not significantly dispose lots of shares surrounding lock up expiry so the diversification and the signaling effect theory, observed by insider selling, should be discarded. In addition, the lack of positive abnormal volume at the lockup expiry, despite the negative abnormal return, rejects the demand curve hypothesis. The lower-than-average trading volume in the market is likely to indicate that the negative abnormal return exists by the concerns of the minority investors in the market.

In terms of factors affecting the attitude of abnormal return, this paper considers the factors of firm's size, age, first day return, ownership concentration, stock price volatility, underwriter reputation, insider trading, lockup length, and the percentage

of share locked-up. The factors providing the statistically significant relations to the cumulative abnormal return are the stock price volatility, the insider acquisition trading, and the percentage of shares lockup. The larger stock price volatility and the rising acquisition trading have the negative relation to the cumulative abnormal return. Meanwhile, the rising percentage of all shares lockup has the positive relation to the cumulative abnormal return.

Interestingly, the abovementioned empirical results demonstrate the similarity and difference between Thai and other markets, particularly in US. Although Thai market reveals similar results to US market with a negative abnormal return surrounding the lockup expiry, there are different reasons for the explanation In US market, the negative abnormal return is created by the insider and investor dispositions whereas, in Thai market, it is solely generated by investor dispositions. This might be explain that US firms' shareholders are likely to release their shares at lockup expiry as their businesses are operated only in the short term before listing in the market. In such cases, the lockup contracts are appropriate to prevent the existing shareholders to take the benefit from the investors. On the other hand, Thai listed companies operated in the longer period before going public, and most firms are state-owned or family-owned businesses. This implies the previous shareholders' purpose to further run the business after listing so the insider disposition does not significantly exist at lockup expiry. Besides, Thai insider acquisition surrounding lockup expiry is supposed to signal their qualities through the confidence in investing in the firms. All of these indicate that the investors, reacting by selling the stock at lockup expiry, and regulators, imposing the stricter lockup regulations since 2005, are overly concerned on the lockup effects in the case of Thailand.

In my point of view, this implies the remarkable implications to investors and regulators in Thai capital market. In terms of investors, they should foresee that there is a negative abnormal return to the stock's response after lockup expiry. Thus, investors should deliberate whether they justify investing in IPO until the lockup expiry or trading the stock surrounding lockup expiry. If they are still interested in investing in the stock, they should lessen the lockup effect by investing in the stocks providing inverse relations to the abnormal return, such as stocks with low price volatility. In terms of regulators, they should weigh the rigidity of regulations to the

impact in the market. Should the lockup regulations be strict, insiders might take advantage from better inside information by accumulating the lower stock price, created by investor anticipation, surrounding lockup expiry. In turn, should the lockup regulations be entirely freed, this might create incentives for newly listed firms to exploit better information and sell the stock soon after IPO. As such, the appropriate level of lockup regulations should be reconsidered to comply with the nature of Thai capital market. In addition, the regulators should be aware of the impacts of lockup expiry in the case of Thai market to public to improve the accurate understanding to the investors, and also help to limit the stock reaction impacts, create by investors selling, at lockup expiry.

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Table 1: Lockup regulated by The stock Exchange of Thailand

Definitions	Explanations
Silent Period	Pre-specified period of time required by the stock Exchange of Thailand (SET) to prohibit a company's executives and major shareholders from selling their shares after the company is listed on the Exchange. The restricted persons have to deposit their shares with the Thailand Securities Depository Co., Ltd (TSD) during the period specified by the SET.
The restricted persons in the silent period	Strategic shareholders who are prohibited from selling their shares consist of ▪ Government, State-owned Enterprises or public sector agencies ▪ Directors, manager, and executive management, including related persons and associated persons ▪ Shareholders who have a holding of above 5% including related persons ▪ Controlling shareholders ▪ Shareholders who enter into agreements not to sell their stocks within a specific period These restricted persons have to decide by themselves whose shares will be placed in the silent period. The SET will consider only the qualifications of restricted persons and the total amount of restricted shares. In a case where the total shares of restricted persons are less than the number of shares required by the SET, the applicant has to call in shares from other shareholders to meet the requirement.
The amount of restricted shares	The restricted shares are the amount of 65 percent of paid-up capital after the IPO.
The time of the silent period	▪ 1 year and a half after its listing. After six months, it will be permitted to sell only a maximum of 25 % of the locked-up shares every six months thereafter. ▪ 3 years in cases where the applicant is engaged in an infrastructure project, the share sale restrictions will apply for a period of one year from the trading date. After one year, 20 per cent of the total of restricted shares shall be returned to shareholders once every six months.

Sources: The stock Exchange of Thailand (SET)

Table 2: Summary Statistics of samples

The table represents the details of all IPO samples listed during 2001-2005 from Stock Exchange of Thailand (SET). The limitations of samples are excluding some IPOs with lack of lock up information. Size is the firm's market capitalization on the first trading day. Age is the number of year between establishment day and the first trading day. First day return is the first closing day price compared to the IPO price. Lockup length is the length of years between the first trading day and the first locked up expiry. Lockup shares is the amount of shares locked compared to total outstanding shares. Ownership concentration is the percentage of stake holding of major shareholders (holding over five percent) in the company.

Panel A: Summary Statistics of All samples

Year	Observations (Firms)		Size (Mn Bt)	Age (Year)	First day return (Percent)	Lockup length (Year)	Lockup shares (Percent)	Ownership concentration (Percent)
2001-2005	115	Mean	6,109	13.62	22.82	1.28	65.33	58.13
		Median	2,042	11.56	12.11	1.50	72.75	60.65
		Max	100,002	52.73	166.67	1.50	82.38	82.13
		Min	480	0.35	-36.40	0.50	35.00	5.33
		S.D.	14,351	9.82	38.38	0.41	16.83	14.35

Panel B: Summary Statistics of samples classified by year of IPO

Year	Observations (Firms)		Size (Mn Bt)	Age (Year)	First day return (Percent)	Lockup length (Year)	Lockup shares (Percent)	Ownership concentration (Percent)
2001	7	Mean	16,370	10.4	36.8	0.5	35.0	59.7
		Median	1,425	9.0	21.7	0.5	35.0	66.5
		Max	100,002	30.0	166.7	0.5	35.0	79.8
		Min	487	1.0	(17.5)	0.5	35.0	30.6
		S.D.	36,956	9.3	61.5	-	0.0	18.6
2002	17	Mean	2,705	10.6	17.3	0.5	35.0	58.1
		Median	1,710	12.0	4.2	0.5	35.0	60.0
		Max	8,101	22.0	106.7	0.5	35.3	79.5
		Min	618	1.0	(12.4)	0.5	35.0	5.3
		S.D.	2,375	5.6	31.9	-	0.1	16.7
2003	21	Mean	7,419	15.8	49.6	1.5	70.8	57.1
		Median	2,820	11.0	39.3	1.5	73.3	58.9
		Max	38,023	49.0	151.7	1.5	81.3	77.0
		Min	636	6.0	(36.4)	0.5	35.0	29.4
		S.D.	9,471	11.2	43.5	0.2	9.9	13.5
2004	35	Mean	7,727	14.9	18.9	1.5	75.1	56.6
		Median	2,562	11.0	10.7	1.5	75.9	60.9
		Max	89,167	52.0	137.1	1.5	82.4	79.8
		Min	518	1.0	(23.2)	1.5	57.7	27.7
		S.D.	18,010	11.6	37.9	-	5.3	14.3
2005	35	Mean	3,304	15.6	10.6	1.5	73.0	60.0
		Median	1,840	13.0	2.6	1.5	75.0	62.8
		Max	32,914	53.0	90.9	1.5	81.6	82.1
		Min	480	5.0	(23.1)	1.5	61.5	24.0
		S.D.	5,513	10.3	24.0	-	6.1	13.4

Table 3: Summary statistics of underwriter raking measurement

The underwriters were ranked by the market share of IPOs listed during 2001-2005. The IPO market capitalization is the amount of IPO listed by the underwriter during 2001-2005. The percentage of market share is the percentage of underwriter's market share to total IPO listed during 2001-2005.

Rank	Name of underwriter	IPO market capitalization (Mn Bt)	Market share (Percent)
1	PHATRA SECURITIES PUBLIC CO., LTD.	232,799	33.14
2	SCB SECURITIES CO., LTD.	75,026	10.68
3	TISCO SECURITIES CO., LTD.	58,106	8.27
4	FINANSA SECURITIES LTD.	44,294	6.31
5	ASSET PLUS SECURITIES PUBLIC CO.,LTD.	42,490	6.05
6	TRINITY ADVISORY 2001 CO., LTD.	35,431	5.04
7	IFCT ADVISORY CO., LTD.	34,724	4.94
8	KIM ENG SECURITIES (THAILAND) PUBLIC CO., LTD.	30,630	4.36
9	SEAMICO SECURITIES PUBLIC CO., LTD.	25,162	3.58
10	THANACHART SECURITIES PUBLIC CO., LTD.	23,466	3.34
11	ASIA PLUS SECURITIES PUBLIC CO., LTD.	20,742	2.95
12	UNITED ADVISORY SERVICES CO., LTD.	14,552	2.07
13	GLOBLEX ADVISORY CO., LTD.	6,947	0.99
14	INTEL VISION SECURITIES PUBLIC CO., LTD.	6,298	0.90
15	DBS VICKERS SECURITIES (THAILAND) CO., LTD.	6,250	0.89
16	KGI SECURITIES (THAILAND) PUBLIC CO., LTD.	5,609	0.80
17	SIAM CITY SECURITIES CO., LTD.	5,383	0.77
18	ADVISORY PLUS CO., LTD.	5,080	0.72
19	BUALUANG SECURITIES PUBLIC CO., LTD.	4,910	0.70
20	PLOENCHIT ADVISORY CO., LTD.	4,041	0.58
21	BT SECURITES COMPANY LIMITED	3,740	0.53
22	CAPITAL NOMURA SECURITIES PCL.	3,175	0.45
23	SICCO ADVISORY CO., LTD.	2,485	0.35
24	SYRUS SECURITIES PUBLIC CO., LTD.	2,441	0.35
25	SAGE CAPITAL CO., LTD	1,881	0.27
26	DS PRUDENTIAL MANAGEMENT CO., LTD.	1,780	0.25
27	PHILLIP SECURITIES (THAILAND) PUBLIC CO., LTD.	1,328	0.19
28	YUANTA SECURITIES (THAILAND) CO., LTD.	965	0.14
29	TURNAROUND CO., LTD	960	0.14
30	UNITED SECURITIES PUBLIC CO., LTD	760	0.11
31	PRICEWATERHOUSECOOPERS FAS LTD.	533	0.08
32	ADVISORY SERVICES CO., LTD	500	0.07
	Total	702,489	100

Table 4: Summary statistics of insider trading during the lockup period

The table represents the number of shares trading during the five days before lock up expiry date and five days after lock up expiry date (-5,5). The lockup expiry date is the day 0. The insider trading information is collected from the report 59-2 from The Stock Exchange of Commission (SEC). The definition of insider is the management (managing director or management position within four levels subordinated from managing director or auditors). The positive number implies the number of shares acquired by the insider. The negative number implies the number of shares sold by the insider.

		Days										
No.	**Company**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
1	HMPRO										600,000	
2	CI								(1,000)			
3	TOC							(37,500)				
4	BLISS						(2,500)					
5	CSL						(128,000)	(792,000)		(88,500)		
6	DCON							10,000		84,800	11,000	4,000
7	DE							125,000				
8	ECL						(7,500)					
9	GBX						63,750,000					
10	KH	100,000		4,000	10,000		40,000	200,000				
11	NCH					(70,100)	(33,000)					
12	OISHI								(68,000)			(34,800)
13	PAP											78,000
14	PRO		50,000	90,000					10,015,000	(2,285,000)	(660,000)	
15	S-PAC						15,000					
16	SYRUS							150,000				
17	DRT	30,000		(20,000)								
18	MCS											3,600,000
19	PHATRA							(495,909)		(222,000)	(278,180)	
20	PREB										200,000	
21	SMIT						(1,894,000)	(351,500)				

Table 5: Event study of abnormal return from the market model

The lockup expiry date is the day 0. Abnormal return is calculated from the market model, applying the company's beta from the estimation period to find the abnormal return during the event period. Estimation period is the period of ninety days before event window. Event window will be classified into three main event window with trading day relative to lockup expiry date of (-5,5), (-10,10) and (-15,15), respectively.

Panel A: Average abnormal return (AAR) from the market model									
Event window		(-5,5)			(-10,10)			(-15,15)	
Days	AAR	t-test	p-value	AAR	t-test	p-value	AAR	t-test	p-value
-15							0.000	0.190	0.850
-14							0.002	0.612	0.542
-13							0.001	0.307	0.760
-12							-0.002	-1.039	0.301
-11							-0.001	-0.275	0.784
-10				-0.001	-0.009	0.993	0.000	0.003	0.998
-9				-0.001	-0.562	0.575	-0.001	-0.573	0.568
-8				-0.003	-1.306	0.194	-0.003	-1.280	0.203
-7				0.001	0.263	0.793	0.001	0.248	0.805
-6				-0.002	-0.492	0.623	-0.002	-0.534	0.595
-5	-0.002	-0.691	0.491	-0.001	-0.645	0.520	-0.002	-0.669	0.505
-4	-0.002	-0.565	0.573	-0.002	-0.575	0.567	-0.001	-0.507	0.613
-3	-0.006	-1.840	*0.068	-0.006	-1.739	*0.085	-0.006	-1.748	*0.083
-2	-0.004	-1.171	0.244	-0.004	-1.147	0.254	-0.004	-1.133	0.259
-1	0.001	0.244	0.807	0.001	0.269	0.789	0.001	0.224	0.823
0	-0.006	-2.191	**0.031	-0.006	-2.192	**0.030	-0.006	-2.204	**0.030
1	-0.007	-1.031	0.305	-0.007	-1.036	0.303	-0.007	-1.014	0.313
2	-0.001	-0.130	0.897	-0.001	-0.005	0.996	-0.001	-0.089	0.929
3	0.003	1.393	0.166	0.003	1.402	0.164	0.003	1.340	0.183
4	0.004	1.266	0.208	0.004	1.292	0.199	0.005	1.347	0.181
5	-0.001	-0.335	0.739	-0.001	-0.243	0.808	-0.001	-0.253	0.801
6				0.002	0.925	0.357	0.002	0.974	0.332
7				-0.006	-2.632	***0.010	-0.006	-2.658	***0.009
8				0.001	0.289	0.773	0.001	0.289	0.773
9				-0.004	-1.771	*0.079	-0.004	-1.829	*0.070
10				-0.002	-1.229	0.222	-0.002	-1.212	0.228
11							0.000	0.083	0.934
12							0.002	0.769	0.443
13							-0.016	-1.097	0.275
14							0.001	0.465	0.643
15							-0.002	-0.911	0.364

Panel B: Cumulative average abnormal return (CAAR) from the market model									
Event window		(-5,5)			(-10,10)			(-15,15)	
	CAAR	t-test	p-value	CAAR	t-test	p-value	CAAR	t-test	p-value
Results	-0.002	-1.833	*0.070	-0.002	-2.154	**0.033	-0.002	-2.356	**0.020

*Significant at 90% confidence level

**Significant at 95% confidence level

***Significant at 99% confidence level

Table 6: Event study of abnormal volume from the mean adjusted model

The lockup expiry date is the day 0. Abnormal volume is calculated from the mean adjusted model, applying the company's mean volume traded during the estimation period to find the abnormal volume during the event period. Estimation period is the period of ninety days before event window. Event window will be classified into three main event window with trading day relative to lockup expiry date of (-5, 5), (-10, 10) and (-15, 15), respectively.

Panel A: Average abnormal volume (AAV) from the mean adjusted model									
Event window		(-5,5)			(-10,10)			(-15,15)	
Days	AAV	t-test	p-value	AAV	t-test	p-value	AAV	t-test	p-value
-15							-0.492	-6.935	***0.000
-14							-0.399	-4.484	***0.001
-13							-0.390	-5.070	***0.002
-12							-0.151	-0.950	0.344
-11							-0.249	-1.625	0.107
-10				-0.053	-0.249	0.804	-0.069	-0.312	0.756
-9				-0.269	-1.670	*0.098	-0.247	-1.128	0.262
-8				-0.454	-5.285	***0.000	-0.458	-4.146	***0.000
-7				-0.288	-2.543	**0.012	-0.304	-2.468	**0.015
-6				-0.306	-2.811	***0.006	-0.339	-3.050	***0.003
-5	-0.381	-4.768	***0.000	-0.392	-4.467	***0.000	-0.395	-4.002	***0.000
-4	1.245	0.763	0.447	1.206	0.742	0.459	1.507	0.771	0.442
-3	-0.079	-0.264	0.793	-0.106	-0.355	0.724	-0.078	-0.219	0.827
-2	-0.231	-1.095	0.276	-0.246	-1.160	0.248	-0.218	-0.853	0.395
-1	0.172	0.413	0.680	0.155	0.374	0.709	0.216	0.438	0.662
0	-0.183	-1.334	0.185	-0.202	-1.465	0.146	-0.227	-1.610	0.110
1	-0.158	-0.804	0.423	-0.181	-0.972	0.333	-0.196	-1.037	0.302
2	-0.185	-0.923	0.358	-0.230	-1.239	0.218	-0.281	-1.739	*0.085
3	-0.241	-1.716	*0.089	-0.276	-2.071	**0.041	-0.301	-2.279	**0.025
4	0.405	0.708	0.480	0.335	0.592	0.555	0.405	0.602	0.549
5	0.136	0.318	0.751	0.078	0.184	0.855	0.129	0.257	0.798
6				0.098	0.184	0.854	0.173	0.273	0.786
7				-0.338	-2.439	**0.016	-0.366	-2.464	**0.015
8				-0.378	-3.713	***0.000	-0.400	-3.836	***0.000
9				-0.192	-0.909	0.365	-0.195	-0.883	0.379
10				-0.472	-5.156	***0.000	-0.505	-5.885	***0.000
11							-0.071	-0.209	0.835
12							-0.377	-3.513	***0.001
13							-0.228	-1.052	0.295
14							-0.401	-3.254	***0.002
15							-0.525	-5.569	***0.000

Panel B: Cumulative average abnormal volume (CAAV) from the mean adjusted model									
Event window		(-5,5)			(-10,10)			(-15,15)	
	CAAV	t-test	p-value	CAAV	t-test	p-value	CAAV	t-test	p-value
Results	0.046	0.136	0.892	-0.120	-0.539	0.591	-0.175	-0.902	0.369

*Significant at 90% confidence level

**Significant at 95% confidence level

***Significant at 99% confidence level

Table 7: Event study of abnormal volume from the market model

The lockup expiry date is the day 0. Abnormal volume is calculated from the market model, applying the company's beta from the estimation period to find the abnormal volume during the event period. Estimation period is the period of ninety days before event window. Event window will be classified into three main event window with trading day relative to lockup expiry date of (-5, 5), (-10, 10) and (-15, 15), respectively.

Panel A: Average abnormal volume (AAV) from the market model									
Event window		(-5,5)			(-10,10)			(-15,15)	
Days	AAV	t-test	p-value	AAV	t-test	p-value	AAV	t-test	p-value
-15							0.041	0.357	0.721
-14							0.062	0.563	0.574
-13							0.071	0.627	0.532
-12							0.248	2.367	**0.020
-11							-0.183	-1.798	*0.075
-10				0.183	1.550	0.124	0.190	1.628	0.106
-9				-0.119	-1.041	0.300	-0.116	-1.013	0.313
-8				-0.094	-0.838	0.404	-0.098	-0.873	0.385
-7				0.077	0.738	0.462	0.082	0.789	0.432
-6				0.036	0.329	0.743	0.042	0.380	0.705
-5	-0.018	-0.179	0.858	-0.012	-0.119	0.905	-0.011	-0.106	0.916
-4	0.001	0.006	0.995	-0.001	-0.011	0.991	-0.003	-0.029	0.977
-3	0.016	0.142	0.887	0.013	0.117	0.907	0.016	0.141	0.888
-2	0.081	0.821	0.413	0.087	0.878	0.382	0.088	0.900	0.370
-1	0.014	0.140	0.889	0.019	0.188	0.851	0.025	0.250	0.803
0	0.043	0.398	0.691	0.045	0.415	0.679	0.059	0.537	0.592
1	-0.129	-1.197	0.234	-0.123	-1.141	0.256	-0.115	-1.072	0.286
2	0.021	0.215	0.830	0.022	0.225	0.822	0.019	0.193	0.847
3	-0.069	-0.583	0.561	-0.071	-0.599	0.550	-0.070	-0.588	0.558
4	0.222	1.681	*0.096	0.222	1.682	*0.095	0.228	1.717	*0.089
5	-0.228	-2.322	**0.022	-0.226	-2.307	**0.023	-0.226	-2.305	**0.023
6				0.002	0.014	0.989	0.007	0.059	0.953
7				0.093	0.985	0.327	0.099	1.050	0.296
8				-0.099	-0.937	0.351	-0.098	-0.917	0.361
9				0.104	1.000	0.319	0.110	1.053	0.294
10				-0.136	-1.405	0.163	-0.133	-1.371	0.173
11							0.132	1.299	0.197
12							-0.144	-1.445	0.151
13							0.198	1.649	0.102
14							-0.043	-0.383	0.702
15							-0.136	-1.263	0.209

Panel B: Cumulative average abnormal volume (CAAV) from the market model									
Event window		(-5,5)			(-10,10)			(-15,15)	
	CAAV	t-test	p-value	CAAV	t-test	p-value	CAAV	t-test	p-value
Results	-0.004	-0.262	0.793	0.001	0.112	0.911	0.011	1.360	0.177

*Significant at 90% confidence level

**Significant at 95% confidence level

***Significant at 99% confidence level

Table 8: Definitions of variables for cross-sectional model

Variables	Definitions
Size	The natural logarithm of the firm's market capitalization at the end of the first trading day
Age	The year between the establishment and the first trading day
Price	The percentage of first day return by comparing the first day closing price to the IPO offering price
Ownership	The company's percentage of major shareholders (holding shares over five percent each)
SD	The volatility of stock price during the first trading day until the ninety trading day
Dumunderwriter	Binary dummy variable of underwriter reputation: 1 if underwriter rank is top five ranked by the size of all IPO market capitalizations during 2001-2005, 0 otherwise
Duminsidera	Binary dummy variable of insider acquiring the stock: 1 if the insider's cumulative volume trading during the event period is positive, 0 otherwise.
Duminsiderd	Binary dummy variable of insider disposing the stock: 1 if the insider's cumulative volume trading during the event period is negative, 0 otherwise.
Dumlength	Binary dummy variable of lockup length: 1 if the period between IPO and the first locked up expiry date is higher than 0.5 year, 0 otherwise.
Dumshares	Binary dummy variable of lockup shares: 1 if the percentage of shares locked up to the total number of shares outstanding after the offer is equal to or higher than 35 percent, 0 otherwise.
Dumfirstshares	Binary dummy variable of lockup shares: 1 if the percentage of shares locked up at the first lockup date to the total number of shares outstanding after the offer is equal to or higher than 35 percent, 0 otherwise.

Table 9: Cross-sectional model to verify the factors of abnormal return

To examine the factors affecting the abnormal return at the lockup expiry date, the regression model is as follows:

$$CAR_i = \beta_0 + \beta_1 Logsize_i + \beta_2 Age_i + \beta_3 Price_i + \beta_4 Ownership_i + B_5 SD + B_6 Dumunderwriter_i +$$

$$B_7 Duminsidera_i + \beta_8 Duminsiderd_i + \beta_9 Dumlength_i + B_{10} Dumshares_i + B_{11} Dumfirstshares_i + \varepsilon_{CAR,i}$$

CAR is the cumulative abnormal return for the IPO of 115 firms listed during 2001-2005. Using the market model, the estimation period is the ninety days before the event period, the event period is the five days before until five days after lockup expiry date (-5,5). Size is the natural logarithm of the firm's market capitalization at the end of the first trading day. Age is the year between the establishment and the first trading day. Price is the first closing day price compared to the IPO price. Ownership is the company's percentage of major shareholders (holding shares over five percent each). SD is the volatility of stock price during the first trading day until the ninety trading day. Dumunderwriter is the binary dummy variable of underwriter reputation: 1 if underwriter rank is top five ranked by the size of all IPO market capitalizations during 2001-2005, 0 otherwise. Duminsidera is the binary dummy variable of insider acquiring the stock: 1 if the insider's cumulative volume trading during the event period is positive, 0 otherwise. Duminsiderd is the binary dummy variable of insider disposing the stock: 1 if the insider's cumulative volume trading during the event period is negative, 0 otherwise. Dumlength is the binary dummy variable of lockup length: 1 if the period between IPO and the first locked up expiry date is higher than 0.5 year, 0 otherwise. Dumshares is the binary dummy variable of lockup shares: 1 if the percentage of shares locked up to the total number of shares outstanding after the offer is equal to or higher than 35 percent, 0 otherwise. Dumfirstshares is the Binary dummy variable of lockup shares: 1 if the percentage of shares locked up at the first lockup date to the total number of shares outstanding after the offer is equal to or higher than 35 percent, 0 otherwise.

Variable	Expected sign	Coefficient	t-Statistic	Prob.
Intercept		0.0000	0.0002	0.9999
LOGSIZE	+	-0.0174	-0.6506	0.5167
AGE	+	-0.0009	-0.8743	0.3840
PRICE	-	0.0004	1.2295	0.2217
OWNERSHIP	+	0.0008	1.0530	0.2948
SD	-	-0.0045	-2.1015	0.0380
DUMUNDERWRITER	+	0.0345	1.2982	0.1971
DUMINSIDERA	-	-0.0858	-2.5778	0.0114
DUMINSIDERD	-	-0.0009	-0.0232	0.9816
DUMLENGTH	-	-0.0651	-1.1518	0.2521
DUMSHARES	-	0.1034	1.6713	0.0977
DUMFIRSTSHARE	-	-0.0347	-1.3253	0.1880

R-squared	0.1704
Adjusted R-squared	0.0818
F-statistic	1.9227
Prob(F-statistic)	0.0446

*Significant at 90% confidence level

**Significant at 95% confidence level

***Significant at 99% confidence level

Figure 5: Event study of abnormal return from the market model

Abnormal return is calculated from the market model, applying the company's beta from the estimation period to find the abnormal return during the event period. The lockup expiry date is the day 0. Estimation period is the period of ninety days before event window. Event window will be classified into three main event window with trading day relative to lockup expiry date of (-5, 5), (-10, 10) and (-15, 15), respectively.

Figure 5.1: Average abnormal return (AAR) and cumulative abnormal return (CAR) during (-5, 5)

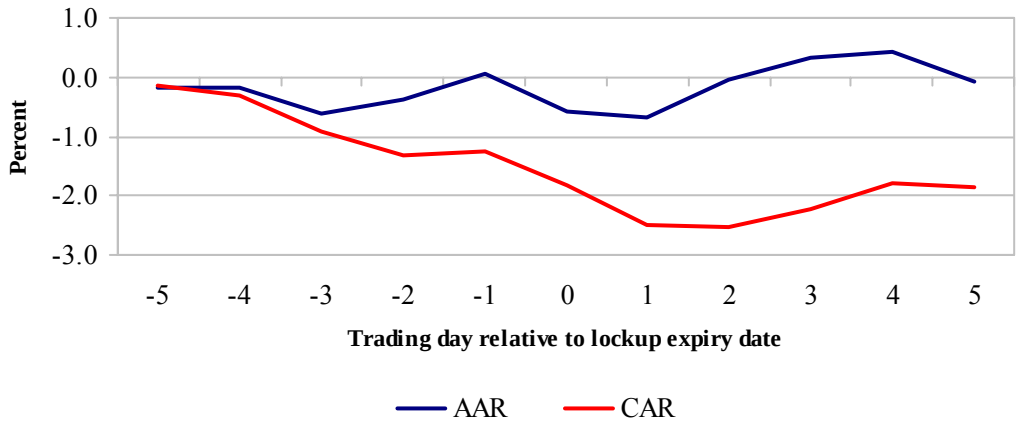

Figure 5.2: Average abnormal return (AAR) and cumulative abnormal return (CAR) during (-10, 10)

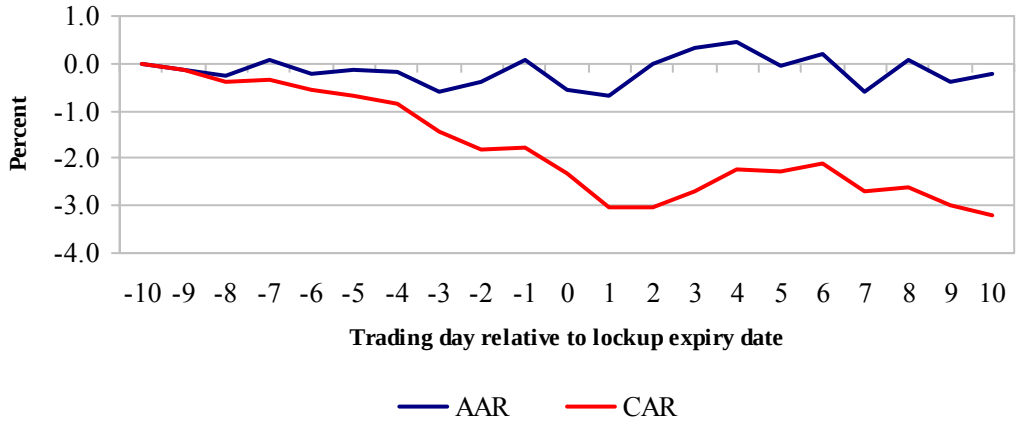

Figure 5.3: Average abnormal return (AAR) and cumulative abnormal return (CAR) during (-15, 15)

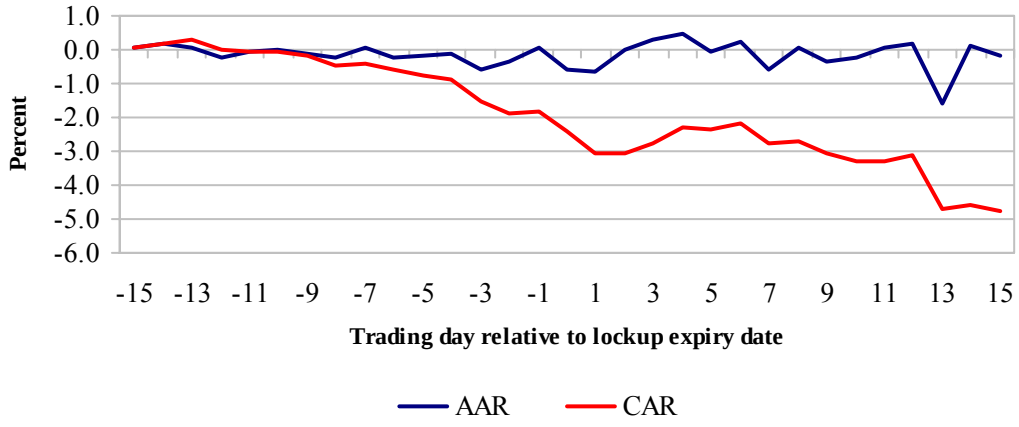

Figure 6: Event study of abnormal volume from the mean adjusted model

Abnormal volume is calculated from the mean adjusted model, applying the company's mean volume traded from the estimation period to find the abnormal volume during the event period. The lockup expiry date is the day 0. Estimation period is the period of ninety days before event window. Event window will be classified into three main event window with trading day relative to lockup expiry date of (-5, 5), (-10, 10) and (-15, 15), respectively.

Figure 6.1: Average abnormal volume (AAV) and cumulative abnormal volume (CAV) during (-5, 5)

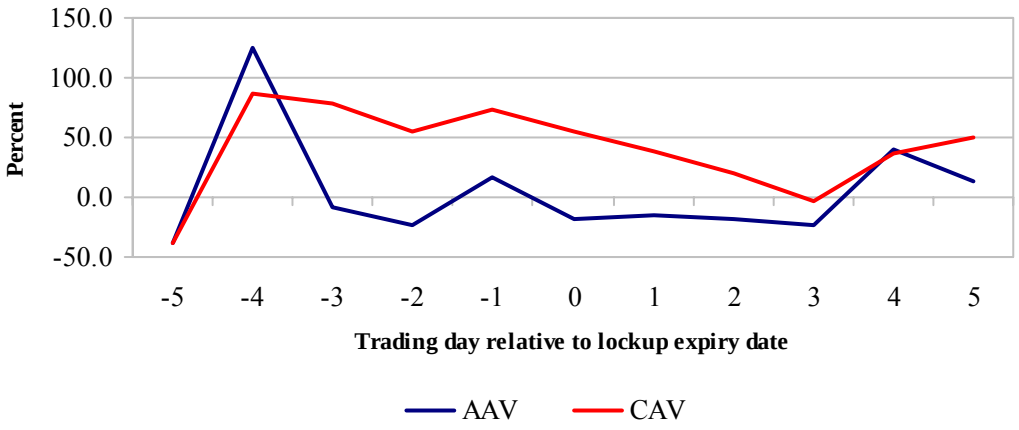

Figure 6.2: Average abnormal volume (AAV) and cumulative abnormal volume (CAV) during (-10, 10)

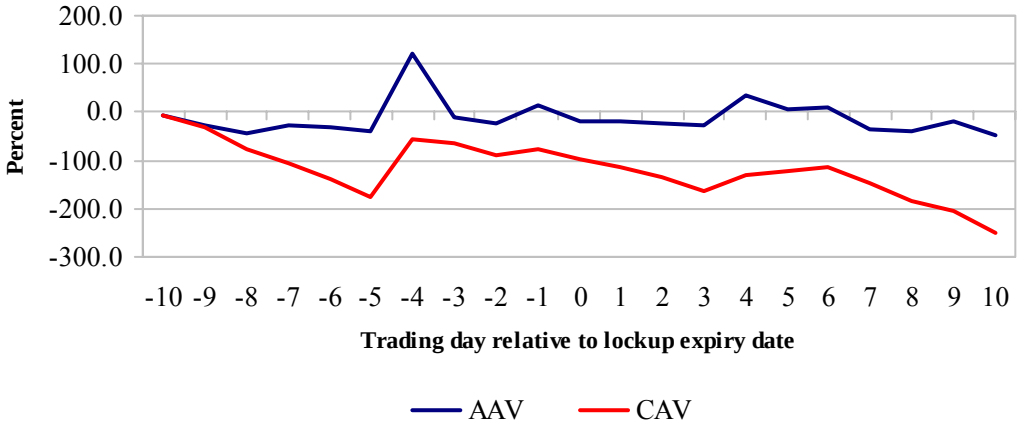

Figure 6.3: Average abnormal volume (AAV) and cumulative abnormal volume (CAV) during (-15, 15)

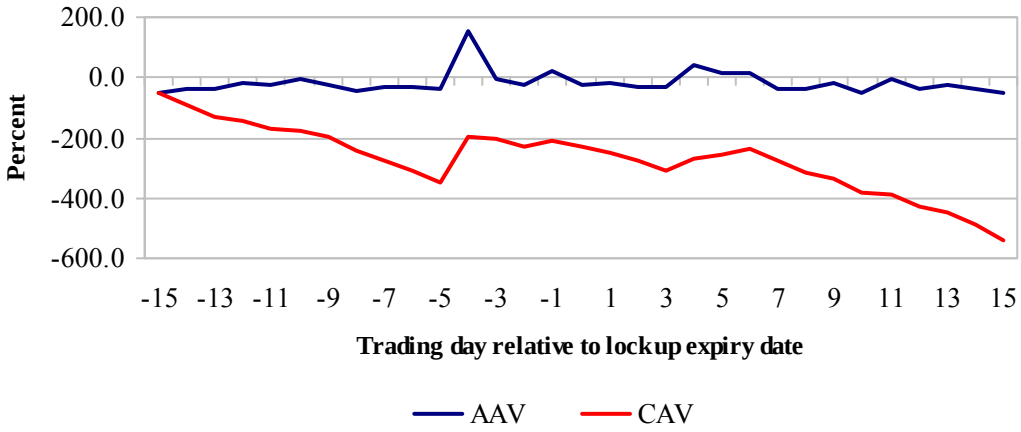

Figure 7: Event study of abnormal volume from the market model

Abnormal volume is calculated from the market model, applying the company's beta from the estimation period to find the abnormal volume during the event period. The lockup expiry date is the day 0. Estimation period is the period of ninety days before event window. Event window will be classified into three main event window with trading day relative to lockup expiry date of (-5, 5), (-10, 10) and (-15, 15), respectively.

Figure 7.1: Average abnormal volume (AAV) and cumulative abnormal volume (CAV) during (-5, 5)

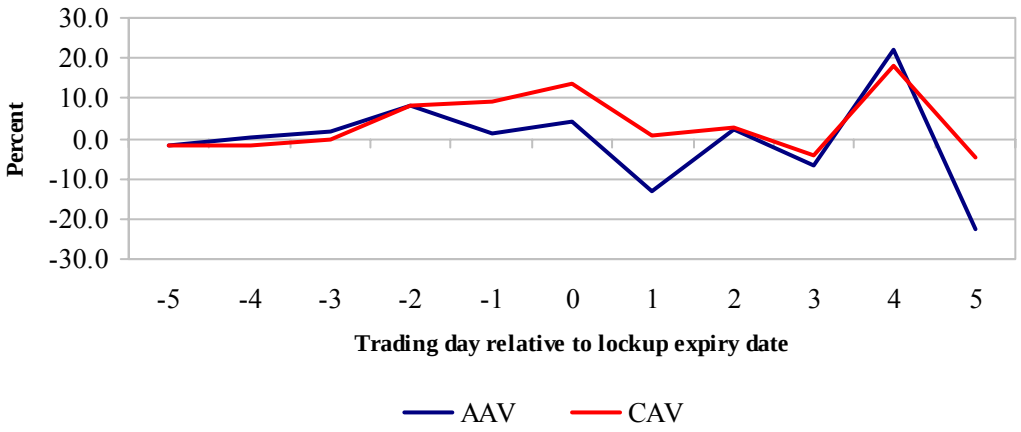

Figure 7.2: Average abnormal volume (AAV) and cumulative abnormal volume (CAV) during (-10, 10)

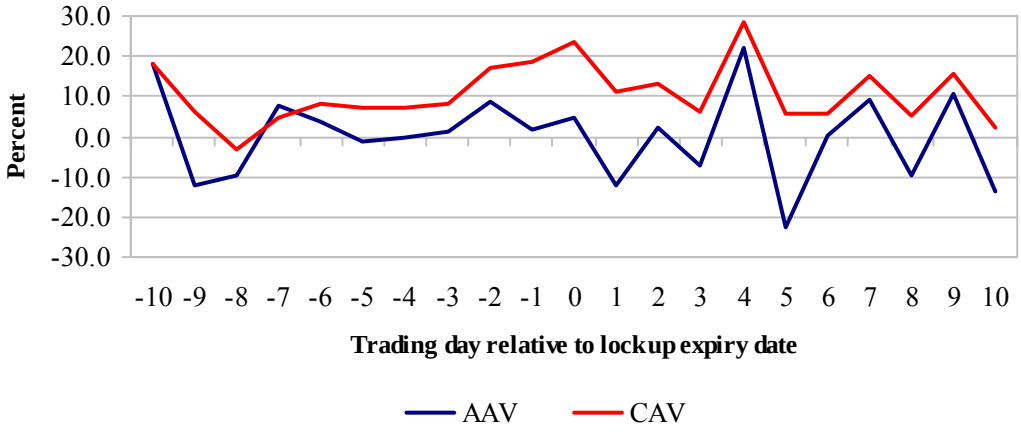

Figure 7.3: Average abnormal volume (AAV) and cumulative abnormal volume (CAV) during (-15, 15)