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# Effect of Lockup Agreements on Buyout Backed Initial Public Offerings

Grant B. Heffernan
*Claremont McKenna College*

CLAREMONT MCKENNA COLLEGE

EFFECT OF LOCKUP AGREEMENTS ON BUYOUT BACKED INITIAL PUBLIC
OFFERINGS

SUBMITTED TO

PROFESSOR LISA K. MEULBROEK, Ph.D

AND

DEAN GREGORY HESS

BY GRANT HEFFERNAN

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Abstract

Using a sample of 279 buyout backed firms, I examined the effect of lockup agreements on the firm's stock returns. I found there to be a negative .8 percent cumulative abnormal return for the three-day period surrounding lockup expiration. Consistent with my hypothesis the CAR for the three-day period surrounding lockup expiration was less negative for buyout backed IPOs compared to venture capital backed IPOs. In addition, I found there to be an abnormal 24.24 percent increase in trading volume for the three days surrounding lockup expiration.

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## I.        Introduction

A company's initial public offering (IPO) represents the first opportunity for investors to reap the benefits of their investment. Investors such as private equity firms typically inject these companies with large amounts of debt and take these companies public to liquefy their time limited funds. Although investors hold a large amount of shares at the IPO, ultimately, these firms are unable to liquidate their entire investment at this time. This is typically due to use of lockup agreements, a tool used by underwriters to prevent inside shareholders from completely liquefying their stake in the firm before a certain date, typically 180 days post-IPO.[1] As much as two-thirds of a company's total shares are prevented from being sold before the lockup expiration.[2] When the lockup agreement expires, insiders usually flood the market with sell orders in order to liquidate the majority of their stake in the firm.[3]

Economists have conducted studies on the effect of lockup agreements, (Field and Hanka (2000), Brav and Gompers (2003), Bradley and Jordan (2000)), however, only a small amount of literature exists about the effects of lockup agreements on buyout backed IPOs. Instead, the vast majority of literature examines the effects of lockup agreements on either the entire IPO market or venture capital backed IPOs.

This paper aims to address this gap within the literature by assessing the effects of lockup agreements on buyout backed IPOs. Unlike prior literature that examines the effect of lockup

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[1] Field, Laura C., and Gordon Hanka. "The Expiration of IPO Share Lockups." *Journal of Finance* 56.2 (April 2001): 471. Print.
[2] Ibid
[3] SEC Rule 144 limits the sale of restricted securities by insiders. Rule 144 prevents insiders from selling restricted securities in quantities of greater than 1 percent of the shares outstanding for any three month period after lockup expiration. However, it should be noted that this rule only applies to affiliates of the issuer; otherwise, one can sell restricted securities with no limitation. (http://www.sec.gov/investor/pubs/rule144.htm)

agreements on venture capital IPOs or the entire IPO market, my study differs because I examine the effect of lockup agreement on a sample entirely composed of buyout backed IPOs. Additionally, while previous literature contained IPOs from the time range of 1980 to 2000, I will examine IPOs within the time span of 1990 to 2010.

To understand the importance of examining lockup agreements effect on buyout backed IPOs, it is important to discuss the differences between buyout and venture capital backed IPOs. Unlike venture capital firms which typically invest minority stakes in early-stage companies with proprietary technology, buyout firms invest majority stakes in mature companies that are already established competitive market participants.[4] Buyout firms differing investment strategy leads me to hypothesize that the stock return surrounding lockup expiration will be less negative for buyout backed IPOs compared to venture capital backed IPOs.

This paper will consist of the following sections. Section II describes my hypothesis, Section III provides background on lockup agreements and buyout backed IPOs. Section IV explains the sample construction process, Section V describes the sample the characteristics of the finalized sample, and Section VI displays my testing methodologies and results. Finally, Section VII concludes the paper and Section VIII is the appendix.

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[4] Katz, Sharon. "Earnings Quality and Ownership Structure: The Role of Private Equity Sponsors." *NBER Working Paper* NBER Working Paper No. 14085 (June 2008): 7. Print.

## II.     Hypothesis

My study of the stock return of buyout backed holds similar characteristics to Field and Hanka's (2001) study of the effect of lockup agreements on the entire IPO market. They tested the three day cumulative abnormal return (CAR)[5] surrounding the lockup date as well as the abnormal volume. For the three days surrounding lockup, they found a -1.5 percent return and permanent 40 percent in trading volume.[6] I will test for the surrounding three day abnormal return and abnormal volume surrounding the same time period as well.

Unlike Field and Hanka (2001) who test the effect of lockup agreements on the entire IPO market, I will exclusively test the effects of lockup agreements surrounding buyout backed IPOs. Field and Hanka's study only differentiates between venture capital backed and non-venture capital IPOs and does not study buyout backed IPOs. Unlike venture capital backed (a large portion of Field and Hanka's sample) which typically receive funding at early stages of a firm's existence, buyout firms typically invest in more mature companies in the later stages of the firm's life.[7] For example, although Field and Hanka find a CAR of negative 1.5 percent and a negative 2.3 percent return for venture capital firms, they found only a negative 0.8 percent return for non-venture capital backed firms.[8]

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[5] Cumulative Abnormal Return (CAR) represent s the difference between the expected and actual stock return ("Abnormal Return." *Abnormal Return*. Investopedia. Web. Apr. 2011.
<http://www.investopedia.com/terms/a/abnormalreturn.asp>.)
[6] Field, Laura C., and Gordon Hanka. "The Expiration of IPO Share Lockups." *Journal of Finance* 56.2 (April 2001): 471. Print.
[7] Katz, Sharon. "Earnings Quality and Ownership Structure: The Role of Private Equity Sponsors." *NBER Working Paper* NBER Working Paper No. 14085 (June 2008): 7. Print.
[8] Field, Laura C., and Gordon Hanka. "The Expiration of IPO Share Lockups." *Journal of Finance* 56.2 (April 2001): 471. Print

Examining Figure 1, historical evidence shows that venture capital backed IPOs have historically been more volatile than buyout backed IPOs. [9] [10] I argue this volatility stems from the fact that a large portion of venture capital sponsored IPOs involve proprietary technology that makes these firm's cash flows and net asset value more volatile. I further argue this volatility will have an effect on the stock returns of venture capital backed firms, and therefore, their stock returns surrounding lockup expiration. I hypothesize that since buyout backed IPOs are typically more mature firms with greater stability (i.e. more steady cash flows, strong financials), it will lead to less volatile stock returns (and therefore less volatile stock returns surrounding lockup expiration). Additionally, because buyout backed IPOs are more mature, they have already had the full effects of financial disclosure before IPO (this will result in less information asymmetries).[11] Consequently, this mitigates the risk of insiders taking advantage of asymmetrical information, and the market perceives these firms as less risky than their venture capital counterpart.[12] I hypothesize that these differentiating characteristics makes buyout backed IPOs stock returns less volatile. As a result, this will make the buyout backed firms stock returns surrounding lockup expiration less negative than previous literature has shown.

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[9] Annual volatility measures the annual volatility of the adjusted cash flows and total net asset value (%) of the sample. It is calculated as the standard deviation of the percentage change year to year

[10] Thomson ONE Banker. Thomson ONE. Claremont Colleges Library, Claremont, CA. April 2010
< http://banker.thomsonib.com/ta/?ExpressCode=claremontuniv>.

[11] Katz, Sharon. "Earnings Quality and Ownership Structure: The Role of Private Equity Sponsors." *NBER Working Paper* NBER Working Paper No. 14085 (June 2008): 7. Print.
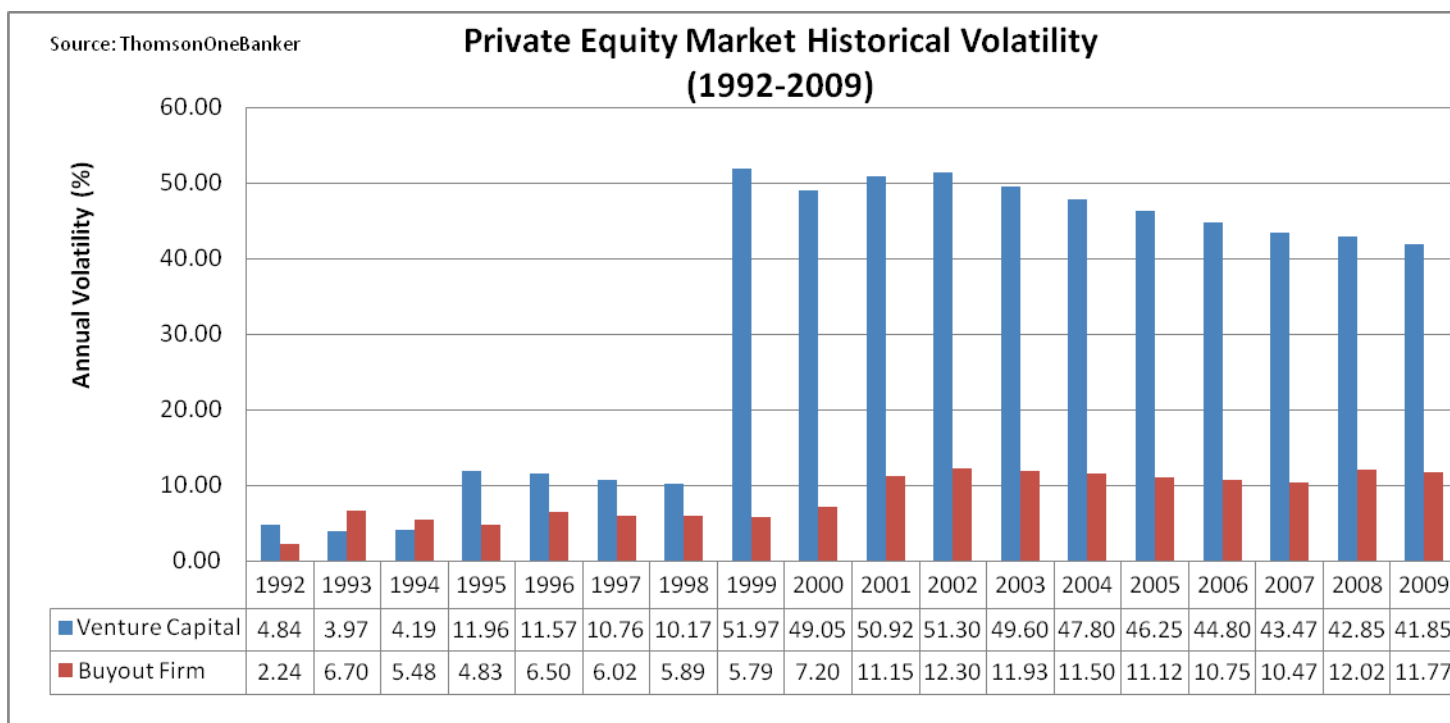
[12] Ibid

**Private Equity Market Historical Volatility (1992-2009)**

| | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Venture Capital | 4.84 | 3.97 | 4.19 | 11.96 | 11.57 | 10.76 | 10.17 | 51.97 | 49.05 | 50.92 | 51.30 | 49.60 | 47.80 | 46.25 | 44.80 | 43.47 | 42.85 | 41.85 |
| Buyout Firm | 2.24 | 6.70 | 5.48 | 4.83 | 6.50 | 6.02 | 5.89 | 5.79 | 7.20 | 11.15 | 12.30 | 11.93 | 11.50 | 11.12 | 10.75 | 10.47 | 12.02 | 11.77 |

**Figure 1**

## III.    Background

Over the last decade, economists have published a plethora of literature on lockup agreements. Lockup agreement literature is broken into two main categories, the motives behind lockup agreement usage (Brav and Gompers (2003), Yung and Zender (2009)) and the effect of lockup agreements affect on firm's share price (Field and Hanka (2001), Brau et. Al. (2007). In addition, I examined literature discussing the characteristics of buyout backed firms (Levis (2010), Katz (2009)).

Lockup agreements serve a variety of purposes. Underwriters use lockup agreements in a majority of IPOs, even though they are not required by the SEC.[13] The use of lockup agreements is widespread because they serve a variety of purposes that help support the share price of the stock as well as instill market confidence. These agreements reassure the market that:  key

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[13] Brav, Alan, and Paul A. Gompers. "The Role of Lockups in Initial Public Offerings." *The Review of Financial Studies* 16.1 (Spring 2003): 3. Print.

company employees will perform their job at the best of their abilities until the lockup period expires, it signals the market that insiders will not liquidating their shares due to bad news at IPO.[14] Finally, lockup agreements serve as a means for underwriters to temporarily sustain a high stock price by temporarily restricting the supply of shares.[15]

Lockup agreements mitigate the threat of insiders capitalizing on asymmetric information. Insiders hold high levels of asymmetric information, which could be exploited for personal gain. Leading into the 21st century, the market encountered a wave of IPOs stemming largely from the technology sector. These companies have a competitive advantage stemming from their knowledge of proprietary technology that could be the next major product in the ever-evolving technology sector. For example, if insiders held inside information that could damage the firm's reputation, they would be inclined to sell their shares immediately at IPO to hedge their losses. Thus, it is evident that lockup agreements are powerful tools that mitigate the risks posed to firms at IPO. By limiting these risk factors, a firm appears more appealing for potential investors.

Economists have studied the rationale behind companies implementing these restricting agreements. Brav and Gompers (2003) studied the role of lockups in IPOs by testing three possible explanations for lockups: (i) signaling of the quality of the firm, (ii) a commitment device to fix the moral hazard problem, or (iii) a method for underwriters to increase their compensation, their results support the commitment hypothesis.[16][17] They argue prior to lockup

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[14] Katz, Sharon. "Earnings Quality and Ownership Structure: The Role of Private Equity Sponsors." *NBER Working Paper* NBER Working Paper No. 14085 (June 2008): 7. Print.
[15] Ibid
[16] Brav, Alan, and Paul A. Gompers. "The Role of Lockups in Initial Public Offerings." *The Review of Financial Studies* 16.1 (Spring 2003): 1. Print.
[17] Unlike the signaling hypothesis which predicts firm's lockup their shares to show the market that insiders have confidence in the firm, the commitment hypothesis says that a firm's insiders (who have high moral hazard

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expiration, firm related news is massively produced (i.e. analyst reports, SEC filings, etc.).[18]

Consequently, individuals are more willing to invest in the firm knowing that insiders' ability to

capitalize on insider information is reduced. Brav and Gompers (2003) also find that while

holding the quality of the firm constant, firms where insiders have higher moral hazard

incentives tend to have longer lockup periods to convince the market to invest in the firm.

Extended lockup periods are prominent amount younger firms, firms with proprietary

technology, or firms with other information not disclosed to the public. Brav and Gompers find

that lockups act as a commitment hypothesis to alleviate the moral hazard problem and are not

used as a signaling method or a means for the underwriter to extract additional fees.[19]

Prior literature ((Brav and Gompers (2003), Brau et al. (2005)) has typically treated the

theorized motives lockup agreements as mutually exclusive. Yung and Zender (2009) conversely

hypothesize that the motives are interrelated motives.[20] Yung and Zender (2009) argue that all

firms experience both moral hazard and asymmetric information risk at IPO, however, one risk

will be more dominant and will be the principal reason behind implementing a lockup

agreement.[21]  They found a positive correlation between lockup length and IPO underpricing for

firms where asymmetric information plays a more dominant role than the issue of moral hazard.

Conversely, Yung and Zender (2009) find that there is no correlation between lockup length and

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incentives in the aftermarket) would be forced to accept a longer lockup in order to convince the market to buy at IPO.

[18] Brav, Alan, and Paul A. Gompers. "The Role of Lockups in Initial Public Offerings." *The Review of Financial Studies* 16.1 (Spring 2003): 1. Print.

[19] Brav, Alan, and Paul A. Gompers. "The Role of Lockups in Initial Public Offerings." *The Review of Financial Studies* 16.1 (Spring 2003): 5. Print.

[20] Yung, Chris, and Jaime F. Zender. "Moral Hazard, Asymmetric Information and IPO Lockups." *Journal of Corporate Finance* 16 (2009): 320. Print.

[21] To understand Young and Zender (2009) hypothesis, it is helpful to understand how moral hazard and asymmetric information complement each other. Moral hazard is the risk that firm insiders will take advantage of asymmetric information (insiders knowledge of firm's overall health, techonology, etc.), which results in negative consequences for shareholders. As asymmetric information held by insiders increases, so will the risk of moral hazard. These two factors will determine lockup length based on the cumulative risk of both.

IPO underpricing.[22] This conjecture stems from their evidence that underpricing drives asymmetric information and not from the moral hazard issue. Yung and Zender (2009) conclude that firms where asymmetric information is the dominant reason for lockup suffer from both underpricing and lockup length. If moral hazard is the dominant motive for lockup, only underpricing will be affected. Yung and Zender (2009) also find that firms using a reputable underwrite suffer from less asymmetric information and therefore will have more moral hazard risk, whereas firms who hire a less reputable underwriter will suffer the opposite.[23]

In addition to studying the motives behind lockup agreements, other economists focus on lockup agreements affect on firm's stock returns. Economists have consistently found abnormal return for the three days surrounding a IPOs lockup agreement. For example, Field and Hanka (2001) studied the effects of lockup agreements on IPO market. Using a sample of 1,948 IPOs, Field and Hanka showed that lockup expiration, on average, led to a three-day abnormal stock return of negative 1.5 percent, as well as a permanent 40 percent increase in average trading volume. Although Field and Hanka (2001) sample included all types of IPOs, their regression used a dummy variable for venture capital IPOs. Their evidence shows a more negative return as well as higher trading volume for firms that are venture capital sponsored.[24]

Economists such as Brau et.al (2007) explore whether secondary shares (i.e. post-lockup share issuance) have a negative effect on aftermarket performance. Brau tests whether secondary share sales represent a negative signal through aftermarket performance. They find that

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[22] Yung, Chris, and Jaime F. Zender. "Moral Hazard, Asymmetric Information and IPO Lockups." *Journal of Corporate Finance* 16 (2009): 331. Print.

[23] Yung, Chris, and Jaime F. Zender. "Moral Hazard, Asymmetric Information and IPO Lockups." *Journal of Corporate Finance* 16 (2009): 331. Print.

[24] Field, Laura C., and Gordon Hanka. "The Expiration of IPO Share Lockups." *Journal of Finance* 56.2 (April 2001): 471. Print.

secondary share sales are in general not correlated with poorer initial or long-run performance.[25]

However, selling by officers and directors is associated with poorer long-run returns. Four major

points summarize their conclusion. First, the aftermarket performance is not affected by the

offering type (primary or secondary). This shows that secondary share sales are due to

shareholder portfolio diversification, not market sentiment that the firm's stock is overpriced.

Second, secondary offerings, such as the expiration of the lockup period, do not lead to poorer

market performance. Third, market conditions directly affect secondary share revisions. Fourth,

IPO secondary shares sales and IPO secondary share revisions do not convey negative

information that is captured in aftermarket price performance.[26]

There is very limited literature on the effect of lockup agreements on buyout backed

IPOs. Levis (2010), examined buyout backed offerings[27] and the returns relative to venture

capital groups post lockup agreements for firms listed on the London Stock Exchange. Using a

sample period spanning from January 1992 to September 2005, he found that relative to venture

capital backed and non-backed IPOs, private-equity backed IPOs are more profitable, larger, and

less underpriced.[28]

Katz (2008) investigated the effect of ownership structure buyout backed firms. Although

Katz's paper provides no insight on buyout backed IPO lockup agreements, he did provide vital

information on the difference between private-equity driven IPOs compared to those backed by

venture capital firms. Katz explains, "unlike [venture capital firms], which invest in early-stage

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[25] Brau, James C., Mingsheng Li, and Jing Shi. "Do Secondary Shares in the IPO Process Have a Negative Effect on Aftermarket Performance?" *Journal of Banking & Finance* 31 (2007): 2612-2631. Print.

[26] Brau, James C., Mingsheng Li, and Jing Shi. "Do Secondary Shares in the IPO Process Have a Negative Effect on Aftermarket Performance?" *Journal of Banking & Finance* 31 (2007): 2629. Print.

[27] Some literature such as Levis (2010) and Katz (2008) use private equity IPO to describe buyout backed IPOs. Consistent with my definition of buyout backed IPO, Levis and Katz define private equity backed IPOs as a firm who buys a majority stake in the acquiring firm, which is typically a mature established company. (Levis pg 7) (Katz pg 7)

[28] Levis, Mario, "The Performance Private Equity Backed IPOs." (2010): 1-37. Print.

and mostly not yet profitable companies, [buyout firms] generally buy mature, profitable businesses that had been subject to full financial disclosure before the IPO."[29] This consequently lessens the risk of asymmetric information from existing, which will lead to less underpricing at the IPO. In addition, Katz explains that buyout backed sponsors typically seek to acquire a majority stake using high levels of debt whereas venture capital sponsors generally invest only a minority stake in young firms that are developing or applying new technology.[30]

Thus, the majority of the lockup agreement literature produced has used the entire IPO market or venture capital firms as the data sample. The lack of literature regarding the effect of lockup agreements on private-equity driven IPOs has provided me with the opportunity to fill an existing gap in the literature.

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[29] Katz, Sharon. "Earnings Quality and Ownership Structure: The Role of Private Equity Sponsors." *NBER Working Paper* NBER Working Paper No. 14085 (June 2008): 7. Print.
[30] Ibid

## IV.    Sample Construction

Using Thomson ONE Banker, I was able to acquire my initial sample of buyout backed IPOs. The sample was compiled using a variety of search criteria. This included a time span ranging from January 1, 1990 to January 1, 2011. The first search criteria in the sample construction was the exclusion of all venture capital backed IPOs. This resulted in a base sample of private equity firms, private equity advisors, and private equity fund of funds.[31] Next, I excluded all startup stage, early stage, expansion, or late stage because these selections typically include younger firms (characteristics of venture-capital sponsored IPOs).

To better refine my sample to consist solely of buyout backed IPOs (mature and established firms in their respective industry); I solely included buyout/acquisition firms.[32] The buyout/acquisition selection included leveraged buyouts, recap/turnaround, management buyout (MBO), and management buy-in (MBI), secondary buyout, pending acquisition, and other acquisition. By limiting the sample to buyout/acquisition firms, it will require the buyout firm to have a majority stake in the firm. As a result, firm's with a minority stake in the firm (such as venture capital firms), will be excluded from the sample.

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[31] Thomson ONE Banker defines private equity sponsors as firms that invest solely in private equity investments and provide equity financing to companies engaged in a variety of industries. In addition, they focus on management buyouts, industry consolidations, re-capitalization of existing business and other private equity opportunities. Conversely, venture capital sponsors specialize in providing money to startup firms and small businesses with high growth potential. (Thomson ONE Banker). An example of a private equity/buyout backed IPO is Caribou Coffee. In 1998 Arcapita, a private equity firm specializing in buyouts of American companies obtained a controlling interest in the firm. (http://www.arcapita.com/private_equity/strategy.html). Caribou Coffee was founded in 1992 and taken public in 2005 (http://moneycentral.hoovers.com/global/msn/factsheet.xhtml?COID=106161). A venture capital sponsored IPO would be characterized as an IPO where the sponsor if providing the initial funding to get the firm started. Therefore, buyout firms invest in mature firms already established within the market whereas venture capital are typically invested in the firm at is earliest of stages.

[32] Thomson ONE Banker defines buyout/acquisition as a firm who makes a leveraged buyout, management buyout or acquisition investments. These funds use debt in addition to equity to leverage the size of their investments and increase the potential return on investment.

The third and final IPO search criteria selected was the fund investment focus selection; I excluded all venture capital and real estate IPOs. More specifically this excluded seed stage, early stage, balanced stage, later stage IPOs as well as core, opportunistic, and value real estate IPOs. This better refined my search to only include buyout backed IPOs.

The initial sample from Thomson ONE Banker comprised of 855 buyout backed IPOs. The sample included information on the IPO price, IPO shares, IPO initial value, and the post offer value. However, the sample did not provide me with information related to the lockup date, time span of lockup, and percentage of shares subject to lockup, etc.[33] To obtain the information on the actual lockup date, I searched in the Thomson ONE Banker Equity database for the lockup information. These search variables included each IPOs macro description, main SIC code, public status date, IPO flag (Y/N), lockup flag (Y/N), lockup expiration date, percent of shares outstanding subject to lockup agreement, lockup days, and lockup shares.

Unfortunately, Thomson ONE Banker did not provide lockup information for all 855 firms. As a result, firms with missing data were excluded from the sample set. This significantly decreased the sample from 855 to 543 firms. Typical reasons for sample exclusion included: that the IPO was not buyout backed, the IPO did not have a lockup agreement, or an overall lack of lockup agreement data.

Several firms in the sample contained information related to the lockup, however, lacked other information, such as stock ticker. I used EdgarOnline to fill these holes in the data sample. If missing information could not be found using Thomson ONE Banker or Edgar Online, those IPOs were excluded from the sample. The main reason surrounding exclusion from the sample

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[33] This information is necessary to calculate the stock price around the lockup date and calculate the cumulative abnormal return.

stemmed primarily from IPOs where a stock ticker was not given in the initial search. These firms were typically unlisted from an exchange.

Another problem encountered was the lack of information provided by Thomson ONE Banker regarding the shares subject to lockup. For missing samples, I searched for each firm's individual S-1 SEC filing form (SEC form to register securities) to find the amount of shares locked up. If no data could be found, those samples were excluded as well. The finalized sample is organized in excel format with each firms IPO and lockup information inputted on a single row.

With this initial set of IPOs, daily stock price data was collected using the Center for Research in Security Prices (CRSP) through the Wharton Research Data Services (WRDS) database. The search criteria provided daily stock price information for 50 days before and 50 days after the lockup agreement date. Other firm information gained included the daily Standard & Poor 500 return, daily trading volume, each firm's respective exchange, and the shares outstanding. The percentage of shares locked proved to be the largest gap in the data sample and resulted in the exclusion of a 71 firms from the sample. For several firms no trading data could be found; those firms were excluded from the final sample. The final data set includes 279 buyout backed IPOs.

## V. Sample Characteristics

Stock return data was collected using the Center for Research in Security Prices (CRSP) through the Wharton Research Data Services (WRDS). Table 1 describes the sample's index distribution. The sample includes 152 (54%) NASDAQ stocks, 124 (44%) NYSE stocks, and 3 (1%) AMEX stocks. Table 2 describes that 45 (16.1%) of the companies lockups occurred between 1990 and 1999 and 234 stocks (83.9%) were from 2000-2010.

Table 6 details on the percentage of shares subject to lockup, which is defined as the amount of shares locked up at IPO. The sample had an average of 58.4 percent of the shares locked up with a median of 62.83 percent. Also, the $25^{th}$ percentile is 47.40 percent, and the $99^{th}$ percentile is 90.56 percent. This differs from Field and Hanka (2001) sample where the sample average of shares amounted to 63 percent. Other studies such as Bradley et. al (2001) find an average of 60.47 percent of shares locked up for venture capital firms. Therefore, buyout backed IPOs tend to lockup fewer shares compared to venture capital backed IPOs/the entire IPO market.

The standard length of 180 days dominates the sample's lockup length, 93 percent of the sample has a lockup equal to 180 days. Lockups greater than 180 days and lockups less than 180 days each represent approximately 3.5 percent of the sample.

| Index | N | % |
|---|---|---|
| NASDAQ | 152 | 54% |
| NYSE | 124 | 44% |
| AMEX | 3 | 1% |
| Total | 279 | |

**Table 1**

| Time Period | N | % |
|---|---|---|
| 1990-1999 | 45 | 16.1% |
| 2000-2010 | 234 | 83.9% |
| Total | 279 | |

**Table 2**

| Percentage of Shares Subject to Lockup (N=279) | |
|---|---|
| Percentile | Amount (%) |
| 25% | 47.40% |
| 50% | 62.83% |
| 75% | 74.58% |
| 99% | 90.56% |

**Table 3**

Table 4 shows the sample distribution among business sector. Data on the business sector was collected using Thomson ONE Banker.   Thomson ONE Banker separates the business sector by TF macrocodes, which is their methodology for sorting based on SIC codes, NAIC codes, and overall business description. This results in 14 different industry sector classes. Although Thomson ONE Banker uses 14 different macro level classifications, the final sample is broken down into 12 different macro industry classifications: consumer products & services (15.41%), consumer staples (3.58%), energy & power (9.32%), financials (10.39%), healthcare (7.53%), high-technology (15.05%), industrials (11.47%), materials (7.53%), media &

entertainment (5.02%), real estate (1.08%), retail (9.32%), and telecommunications (4.30%).

Table 4 explains the sector breakdown of the final sample.

| Sector | N | % |
|---|---|---|
| Consumer Products & Services | 43.00 | 15.41% |
| Consumer Staples | 10.00 | 3.58% |
| Energy & Power | 26.00 | 9.32% |
| Financials | 29.00 | 10.39% |
| Healthcare | 21.00 | 7.53% |
| High-Technology | 42.00 | 15.05% |
| Industrials | 32.00 | 11.47% |
| Materials | 21.00 | 7.53% |
| Media & Entertainment | 14.00 | 5.02% |
| Real estate | 3.00 | 1.08% |
| Retail | 26.00 | 9.32% |
| Telecommunications | 12.00 | 4.30% |
| Total | 279.00 | |

**Table 4**

## VI. Methodology and Results

### *Calculation of Cumulative Abnormal Return*

I used the daily returns of each stock to calculate the return surrounding the lockup date. The cumulative abnormal return (CAR) was calculated using the formula:

$$R_{i,t} = \beta_i - R_{m,t} + \gamma_j \left( X_{i,u} \right)$$

$$CAR = u \left( \gamma_j \right)$$

*where*

> $R_{i,t}$ = *Return of firm i (i=1,…, 279) at time t (t=1,…, 89)*
> $R_{m,t}$ = *S&P 500's return at time t*
> $\beta_1$ = *S&P Return Coefficient*
> $\gamma_1$ = *Dummy Variable Coefficient*
> $u$  = *CAR testing period (measured in days)*
> $X_i$ = *Firm i dummy for u days surrounding lockup*
> *CAR* = *Cumulative Abnormal for 3 days surrounding lockup*

The term $R_{i,t}$ represents the return of firm *i* at time *t*, *i* representing the 279 data sample and *t* spanning the 88 days surrounding lockup, $R_{m,t}$ is the return of the Standard & Poor's 500 index on day t, and $X_{i,u}$ is the dummy variable for days *u*. The variable *u*, is the CAR testing period measured in days. For example, to test for the three day CAR, *u* would equal three. The 88 day span includes 42 days before the lockup, the three day surrounding lockup, and the 44 days post lockup. The coefficient $\gamma_j$ represents of the cumulative abnormal return (CAR) for the three days surrounding lockup. However, because $\gamma_j$ is only representative of the dummy

variable, only $\frac{1}{u}$ of the return is reflected, as a result, $\gamma_j$ is multiplied by $u$, testing to find the

actual CAR.

*Calculation for CAR Significance using Z-Statistic*

$$Z = \frac{\sum_{i=1}^{N} \frac{\widehat{\gamma_i}}{S_i}}{\sqrt{N}}$$

Using the same methodology as Meulbroek (1992), I used a z-statistic to test for whether

the CAR is significantly different from zero.[34] The z-statistic is equal to the sum of the t-statistics

($\gamma_i$) for the dummy variable coefficient for the three days surrounding the lockup date divided by

the square root of the total number of regressions. The Z-statistic calculated from the equation

will provide me with statistical evidence of whether the CAR surrounding for CAR is in fact

significant.

Therefore, by calculating the Z-statistic I will calculate whether the buyout backed IPOs

CAR is statistically significant surrounding the time period.

*Calculation of Abnormal Volume*

$$Abnormal\ Volume\ \omega_{i,t} = \frac{\frac{1}{3}\sum_{t=-1}^{+1} V_{i,t}}{\frac{1}{40}\sum_{t=-45}^{-6} V_{i,t}}$$

To calculate the abnormal trading volume, I used the same methodology as Field and

Hanka (2001).[35] The abnormal daily trading volume, $\omega_{i,t}$, is the daily trading volume for firm $i$

on day $t$. The abnormal volume is calculated by dividing the average volume surrounding the

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[34] Meulbroek, Lisa K. "An Empirical Analysis of Illegal Insider Trading." *The Journal of Finance.* 47.5 (1992): 1674. Print.
[35] Field, Laura and Hanka, Gordon, 2001, "The Expiration of IPO Share Lockups," *Journal of Finance*, 57, 478.

three day lockup by the average trading volume for the prior forty days ending six days before lockup.

### *Cumulative Abnormal Return by Time Period*

Table 4 represents the average cumulative abnormal return of the sample across a time series and each time span's respective summary statistics. I also use a two-sided sign test of the null hypothesis that the median CAR for each time period is zero. The sign test value calculated is a p-value. For the three day period surrounding the lockup date, the sample's CAR is negative .6 percent and is significantly negative (Z=-1.6061), the three day median is also shown to be negative .6 percent. Examining the individual CAR's for the three day lockup period, all of the returns for each of the three days proves to be negative. The day prior to lockup is the most negative with a significant value of negative .5 percent (z=-1.52), the actual lockup date CAR is negative .2 (Z=-0.04), as well as the day after lockup with an average negative CAR of negative .3 percent (Z=-1.44). The return for the five days surrounding lockup is more negative than the three day return, with a significantly negative CAR of negative .8 percent (Z=-2.41) and a median of negative .7 percent. Both the 40 days prior and post lockup yield insignificant returns relatively. For the time period of 40 days prior to lockup ending on two days prior to lockup, the return is .08 percent (Z=1.0505). Starting on the second day after lockup, the CAR for the 40 days post lockup yielded a CAR of 0.07 percent (Z=-.40).

| Time Range | Mean | Median | Z-Statistic of CAR | Sign Test (Prob. Level) |
|---|---|---|---|---|
| Day -41 to -2 | 0.008515 (-0.2623) | 0.00903 | 1.0505 | 0.0889 |
| Day -1 | -0.004765 (-0.02934) | -0.00439 | -1.5186 | 0.000153 |
| Day 0 | -0.001949 (-0.0383) | -0.00053 | 0.0436 | 0.8692 |
| Day +1 | -0.002901 (-0.0357) | -0.00095 | -1.4442 | 0.3508 |
| Day -5 to +1 | -0.00674 (-0.0956) | -0.00682 | -1.2752 | 0.2491 |
| Day -1 to +1 | -0.005513 (-0.0591) | -0.00578 | -1.6061 | 0.4240 |
| Day -2 to +2 | -0.008096 (-0.0460) | -0.00762 | -2.4106 | 0.0547 |
| Day +2 to +41 | 0.007556 (-0.2820) | -0.00774 | -0.3953 | 0.4756 |
| **Table 5: CAR Descriptive Statistics** | | | | |

*Cumulative Abnormal Returns by Sector*

      To better understand the effects of lockup agreements on buyout backed IPOs, the sample

CAR is divided by business sector to explore the effects of lockup agreements by sector. Of the

twelve sectors, eight had CAR values that were negative. The telecommunications, real estate,

and high-technology sectors yielded significantly negative values. The high-technology sector

has a CAR of negative 2.04 percent (Z=-2.06), while the telecommunications sector yielded a

CAR of negative 3.3 percent (Z=-2.09). The real estate CAR on average is negative 3.1 percent

(Z=-1.75), however, it should be noted that the real estate sector consisted of only three samples.

The consumer products and services sector returned the lowest CAR with a value of .3 percent

| | Cumulative Abnormal Return (Standard Error) | Min. | Max. | Median | Z-Statistic of CAR |
|---|---|---|---|---|---|
| *Total* *N=279* | -0.00551 (0.059045) | -0.49786 | 0.220946 | -0.00578 | -1.6061 |
| *Consumer Products & Services* *N=43* | 0.0033502 (0.046585) | -0.12069 | 0.17908 | 0.003549 | -0.3778 |
| *Consumer Staples* *N=10* | -0.0134894 (0.038492) | -0.07575 | 0.049655 | -0.01287 | -1.2167 |
| *Energy & Power* *N=26* | -0.0067186 (0.038871) | -0.08217 | 0.11183 | -0.00988 | -1.3439 |
| *Financials* *N=29* | -0.0098343 (0.03804) | -0.08656 | 0.072449 | -0.00685 | -1.2915 |
| *Healthcare* *N=21* | 0.001046 (0.057749) | -0.16864 | 0.116531 | 0.002437 | -0.5477 |
| *High-Technology* *N=42* | -0.0203863 (0.067965) | -0.20609 | 0.161775 | -0.00853 | -2.06 |
| *Industrials* *N=32* | 0.0068836 (0.044976) | -0.06173 | 0.160811 | 0.004238 | -0.3009 |
| *Materials* *N=21* | -0.0066058 (0.033651) | -0.06634 | 0.057462 | -0.0083 | 0.2767 |
| *Media & Entertainment* *N=14* | -0.0059673 (0.049271) | -0.06553 | 0.083878 | -0.0121 | -0.9627 |
| *Real estate* *N=3* | -0.0309345 (0.03386) | -0.06853 | -0.00284 | -0.02143 | -1.7534 |
| *Retail* *N=26* | 0.0094493 (0.052079) | -0.08877 | 0.098154 | 0.008726 | 0.4481 |
| *Telecommunications* *N=12* | -0.0336755 (0.167386) | -0.49786 | 0.220946 | -0.01052 | -2.0915 |

**Table 6**

*Abnormal Trading Volume*

From the results, it is shown that there is a major increase in trading volume for the three

days surrounding the lockup date. On average, there is a 24.24 percent increase in trading

volume for the three days surrounding the lockup period. This increase is substantially lower

than the results of previous literature. Field and Hanka found an 80 percent increase in trading

volume for the three days surrounding the lockup period (Field and Hanka 2001).


*Multivariate Analysis*

    To better understand the determinants of the CAR and abnormal volume surrounding the

three day lockup period, I ran a multivariate regression each for the CAR and the abnormal

volume. In addition to the surrounding three-day CAR and abnormal volume, other repressors

included:


| *Number of Lockups>1* | = | If the number of lockups exceeded 1 |
| *Percent Locked Up* | = | Percentage of Shares Locked Up |
| *Market Capitalization* | = | Market Capitalization of Firm (measured in $thousands) |
| *Sector Dummy* | → | 12 Industry Sector Dummies |
| *Time Period Dummy* | → | 1990s & 2000s Dummies |
| *Index Dummy* | → | NYSE & NASDAQ Dummies |


    The regression results are displayed in Table 5 which includes the coefficients for each

variable and their respective statistics. The regression for the surrounding three day CAR shows

that the three day abnormal volume proves to be a significantly negative variable at the 99%

confidence level. In addition, the dummy variables for the decades of the 1990s and 2000s prove

to be statistically significant at the 90% confidence level. Inconsistent with Field and Hanka

(2001), the results did not render the variable for the percent of shares locked up as a

significantly negative variable. Another interesting statistic is that the NASDAQ dummy resulted

in positively significant value while the NYSE dummy is significantly negative. This is

intriguing because the NASDAQ index is composed primarily of high-technology companies,

which previous literature (Field and Hanka (2001) and Bradford et. al (2000)) has shown to be a significantly negative variable. I attribute this difference to the exclusion of venture-capital firms, and therefore, developing high-technology from my data set. The regression for the three day abnormal volume rendered different variables statistically significant. For example, the three day CAR was significant at the 99% confidence level. In addition, the sectors of financials, healthcare, high-technology, as well as media and entertainment proved to be statistically significant at the 90% confidence level.

|  | (1) | (2) |
|---|---|---|
|  | **Dependent Variable: CAR** | **Dependent Variable: Abnormal Volume** |
| *Independent Variables* | *Coefficient* | *Coefficient* |
| *Abnormal Volume* | -0.0092** | |
|  | (0.0245) | |
| **CAR** | | -5.6462** |
|  | | (1.5039) |
| **Intercept** | -.1174 | 0.3853 |
|  | (0.0789) | (1.9141) |
| *Number of Lockups >1* | -0.0166 | -0.4036 |
|  | (0.0151) | (0.3747) |
| *Percent Locked Up* | -0.0153 | 0.4299 |
|  | (0.0169) | (.4180) |
| *Market Capitalization* | $1.81 \times 10^{-10}$ | $4.35 \times 10^{-9}$ |
|  | $(2.59 \times 10^{-10})$ | $(6.41 \times 10^{-9})$ |
| *Consumer Products & Services* | 0.0326 | -1.019861 |
|  | (0.0356) | (0.8800) |
| *Consumer Staples* | 0.0120 | -1.5943 |
|  | (0.0394) | (0.9709) |
| *Energy & Power* | 0.0149 | -1.3312 |
|  | (0.0363) | (0.8943) |
| *Financials* | 0.0121 | -1.6541* |
|  | (0.0361) | (0.8892) |
| *Healthcare* | 0.0223 | -1.5931* |
|  | (0.0370) | (0.9102) |
| *High-Technology* | 0.0020 | -1.5062* |
|  | (0.0359) | (0.8830) |
| *Industrials* | 0.0316 | -1.1912 |
|  | (0.0356) | (0.8789) |
| *Materials* | 0.0163 | -1.4540 |
|  | (0.0365) | (0.9000) |
| *Media & Entertainment* | 0.0166 | -1.6212* |
|  | (0.0377) | (0.9295) |
| *Retail* | 0.0360 | -1.287668 |
|  | (0.0363) | (0.8980) |
| *Telecommunications* | -0.0038 | -0.3150 |
|  | (0.0384) | (0.9506) |
| *1990-1999 Dummy* | 0.0994* | 1.1535 |
|  | (0.0597) | (1.4842) |
| *2000-2010 Dummy* | 0.1080* | 0.6731 |
|  | (0.0591) | (1.4721) |
| *Days Locked Up=180 Dummy* | -0.0112 | 0.0341 |
|  | (0.0196) | (0.4860) |
| *Days Locked Up>180 Dummy* | -0.0129 | -0.1584 |
|  | (0.0267) | (0.6622) |
| *NASDAQ Dummy* | 0.0033 | 0.2303 |
|  | (0.0363) | (0.8996) |
| *NYSE Dummy* | -0.0031 | 0.0654 |
|  | (0.0361) | (0.8950) |
| *Observations* | 279 | 279 |
| **Adjusted R-Squared** | 0.0462 | 0.0691 |

*Notes: Cumulative Abnormal Return (CAR) and Abnormal Volume are measured over three days surrounding lockup expiration. \*=Significant at 90% Level, \*\*=Significant at 99% Level*

# Table 7: CAR and Abnormal Volume Regression Results

## VII.    Conclusion

The purpose of this study is to examine the effects of lockup agreements on buyout backed IPOs. Unlike previous literature which examined the effect of lockup agreements on the entire IPO population, my data sample consisted solely of buyout backed IPOs. The data sample consisted of 279 companies spanning the time period of 1990 to 2010.

Consistent with my hypothesis, I find that buyout backed IPOs suffer a less negative CAR for the three-day period compared to prior literatures findings. I also find a significantly negative return of negative .6 percent CAR for the three-day period surrounding the lockup expiration date (Z=-1.61). This contrasts the significantly negative 1.5 percent CAR found by Field and Hanka (2001). This result is consistent with my hypothesis that the CAR for buyout backed firms would be less than for a sample containing venture-capital backed companies or the general IPO population. Field and Hanka found a negative 1.5 percent CAR overall and a negative 2.3 percent CAR for venture-capital backed companies.[36] Economists such as Bradley and Jordan (2000) have discovered the skewing effects of including venture-capital companies in their sample. They find the "abnormal returns in the period surrounding lockup expiration are mostly due to the 45 percent of the firms in our sample with venture capital backing […] such firms lose, on average, three to four percent of their value in this period."[37]

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[36] Field, Laura C., and Gordon Hanka. "The Expiration of IPO Share Lockups." *Journal of Finance* 56.2 (April 2001): 471-500. Print
[37] Bradley, Daniel, Bradford Jordan, and Ivan Roten. 2001, "Venture Capital and IPO Lockup Expiration: An Empirical Analysis." 24. Print.

The start of the 21$^{st}$ century proved to be a very eventful time for b industry. In an industry where the cost of debt is a critical component of the business strategy, the ease of lending standards coupled with inexpensive credit enabled the private equity industry to perform an enormous buying binge. When the market collapsed, it forced private equity firms to postpone many of their investment's IPOs, and therefore, postpone the benefits of their investment. With the majority of lockup agreements now lasting at least six months, these private equity firms will be forced to wait even longer to liquidate their investment. Although lockup agreements help support stock price, it seems interesting that a private equity firm, who is typically the majority shareholder, does not better structure the lockup agreement so they could better be able to liquidate their investment in economic downturns such as today. From what I have investigated through SEC S-1 documentation, private equity firms never insert clauses enabling them to liquidate if need be. Because lockup agreements are not required by law, it would seem beneficial for private equity firms to structure the agreements in this manner.

As Brav and Gompers (2003) notes, "because the parameters of the lockup are well specified (in terms of length and number of shares locked) and known at the time of the IPO, if markets perfectly anticipated the release there should not be an abnormal price reaction at the time of the expiration."[38] However, economists consistently find a negative abnormal stock return for the period surrounding lockup expiration. Abiding by the efficient market hypothesis (EMH), a firm's stock price should be reflective of all available and relevant information.[39] If

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[38] Brav, Alan, and Paul A. Gompers. "The Role of Lockups in Initial Public Offerings." *The Review of Financial Studies* 16.1 (Spring 2003): 2. Print.
[39] "Market Efficiency Definition." *Investopedia.com*. Web. 24 Apr. 2011.
<http://www.investopedia.com/terms/m/marketefficiency.asp>.

this is the case, there should be no abnormal price reaction surrounding the lockup expiration.

This creates future avenues for research of lockup agreements and their relation to the EMH.

## VIII. Appendix

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