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Ph.D Thesis

Corporate Governance Issues and Performance of Initial Public Offerings

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Summary

In my PhD thesis I analyze corporate governance issues of initial public offerings and their subsequent performance. The thesis consists of three chapters: Chapter 1 "Managerial Incentive Explanation of Equity Carve-outs Initial Returns", Chapter 2 "Are Incentive Stock Options Signaling Better Corporate Governance? - An Evidence from Equity Carve-outs" and Chapter 3 "Short Selling and the Subsequent Performance of Initial Public Offerings".

In the first two chapters of the thesis I focus on one type of initial public offerings called equity carve-outs and earnings management behavior of the managers as a common principal-agent problem at the IPOs. An equity carve-out is a type of corporate reorganization in which a conglomerate is selling one of its divisions to the public. As a part of the reorganization the division (middle-level) managers become CEOs of a publicly listed company. Compensation contracts of the subsidiary managers are revised in order to incorporate subsidiary share prices and profits as measure of performance. New contracts are becoming more efficient. Often incentive stock options granted on the IPO date are part of the revised contracts. Those options usually have an exercise (strike) price equal to the IPO offer price (IPO options in the rest of the text) with payoff equal to max (0, St - Offer Price). I hypothesize that subsidiary managers who received such incentive stock options don't have an incentive to push up the offering price of the IPO because it will decrease their future payoff. At the other side, subsidiary managers who don't have IPO options (have only shares) in their new contracts have an incentive to window dress the company before going public by using more aggressive accounting techniques in order to pump-up the performance around the IPO.

The core of my data set in both chapters is a hand-collected information about incentive stock option grants to division managers on the IPO date (IPO options) from the prospectuses of the initial public offerings (filing type S-1 in EDGAR database) .

When this information was not available in the prospectuses then I hand-collected it from the proxy statements (filing type DEF 14A in EDGAR database) in the year of the IPO.

Chapter 1 "Managerial Incentive Explanation of Equity Carve-outs Initial Returns" examines the hypothesis that managers select accruals at the time around the IPO opportunistically depending on their compensation packages. In this chapter the focus is on the first-day return of the carve-outs and I show that it is explained by the reporting distortions in the pre-IPO period, conditioned on whether the executives and directors of the subsidiary received IPO options (with exercise price is equal to the IPO offer price).

In absence of IPO options, accruals in the year before the issue are negative predictors in the cross-sectional variation of the first-day returns. In presence of IPO options this relationship is reversed and becomes positive: this is especially pronounced in cases where non-employee directors received such compensation packages.

I find that managers incentivized by IPO options are using less aggressive accounting techniques in the years around the IPO. Their reported earnings are more realistic compared to the other subsample of managers that did not receive such option grants. I conclude that incentive stock options are good governance mechanism to decrease opportunistic reporting by the managers in the years around the IPO.

The predictive power of the accruals on future returns and its direction differ depending on the executive compensation packages, suggesting that management intentionally manipulate earnings.

This finding contribute to the vast literature of earnings management. I show that predictive power of accruals differs depending on the executives compensation packages. This is an indirect proof that earnings are managed intentionally by the management. Accruals as a measure of earnings management and as predictor of future returns should be seen trough lens of the executives and how they are incentivized. My findings are potentially useful for investors and regulators. Investors are concerned about whether they are trading at the fair initial price and at which direction earnings management affects the short-term return. Accounting and financial regulators must be concerned about the informativeness of the accounting numbers and how accurately accounting information communicates firm performance to capital markets.

Chapter 2 "Are Incentive Stock Options Signaling Better Corporate Governance? - An Evidence from Equity Carve-outs" focuses on the long-run performance of equity carve-outs conditioned on whether the executives received incentive

stock options on the IPO date. Carve-outs that did not grant incentive stock options subsequently underperform both relative to the overall market and relative to a sample of carve-outs that granted stock options. The stock returns are robust to alternative specifications of abnormal returns.

In particular, I consider the returns to a zero-investment strategy which takes a long position in the stock of equity carve-outs that granted IPO options and short position in carve-outs that did not grant IPO options. I show that the alpha of following this strategy for three years (using value-weighted or equal-wighted returns) is positive in a four factor time-series return regression.

Further, I show that accruals in years around the IPO explain the cross-sectional variation of the long-run stock market and accounting underperformance. Contrarily, carve-outs that grant incentive stock options to their executives at the IPO date do not underperform appropriate benchmarks over three-year period following the IPO and use less aggressive accounting around the IPO.

The result in this chapter points out that incentive stock options are signaling better corporate governance to the market that result in better long-run stock market and accounting performance. There is distortion in behavior induced by the compensation packages of the executives and it does affect ultimate firm performance. Incentive stock options are good governance mechanism to decrease opportunistic reporting by the managers in the years around the IPO resulting in better long-run stock market and accounting performance.

This findings are potentially useful for investors and regulators. Investors may want to use the information on IPO options that is public before the IPO to discriminate among issuers. Particularly, this information is very useful because for most of the investors it is difficult to detect earnings management i.e. which part of the accruals are "normal" or unusually high for a given company given the business conditions. IPO options by it self should signal them less managed earnings i.e. better corporate governance. Finally, regulators must be concerned about the informativeness of the accounting numbers and how accurately accounting information communicates firm performance to the markets.

Chapter 3 "Short Selling and the Subsequent Performance of Initial Public Offerings" examines short sale volume on the offer day of initial public offerings and their subsequent performance. IPOs are major corporate events surrounded by much noise and pricing inefficiencies. I find it interesting to know whether short sellers posses superior information about the fundamentals of IPOs relative to other investors.

Up to my knowledge my paper is a first attempt to measure long-run performance of IPOs conditioned on short selling activity on the first trading day. The tests provide evidence of informed trading immediately at the IPO.

The main finding is that short sellers are well informed about the fundamental value of IPOs. Heavily-shorted IPOs on the offer day underperform both relative to the lightly-shorted IPOs and relative to the overall market in one-year window. On risk-adjusted basis when using calendar time-series portfolio approach, heavily-shorted IPOs on the offer day underperform lightly-shorted IPOs by an average of 9 basis points daily (22.68% annualized return) and 1.72% monthly average (20.64% annualized return). The stock returns are also robust to alternative specifications of abnormal returns (CARs and BHARs).

When using accounting measures such as net income, earnings per share and ROA I find that accounting performance declines significantly in the quarter after the IPO for companies that were shorted the most on the first trading day.

To support the main finding of this chapter I show that short sellers are sophisticate investors that possess information of the fundamentals of IPOs at least as informative as the analysts. Heavily-shorted IPOs get the least favorable initiation of analysts' recommendations that occur on average 28 trading days after the offer day in my sample. Further, I show that heavily-shorted IPOs have the highest predicted probability for downgrade by the analysts within the first year after the IPO.

I explore which types of IPOs are subject to more short selling on the offer day. I provide evidence that short sellers are picking hot issues with high demand and high first-day return. Heavily-shorted IPOs are overpriced on the end of the first-trading day on average by 35% relative to their industry peers. Short sellers go against the sentiment of the individual investors for hot issues. This result indicates that short sellers are more sophisticated than the other investors and go against the behavioral biases such as overoptimism that surrounds hot issues in order to make profit on longer run.

Overall the results indicate that, on average, short sellers are sophisticated investors that are well informed regarding the fundamental value of IPOs and important contributors to efficient stock prices. The finding should encourage regulators to provide more timely disclosure of short selling to all investors.

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На Моето Семејство

To My Family

Chapter 1

Managerial Incentives Explanation of Equity Carve-outs Initial Returns

Abstract

This paper studies the first-day return of 227 carve-outs during 1996-2013. I find that the first-day return of newly issued subsidiary stocks is explained by the reporting distortions in the pre-IPO period, conditioned on whether the executives and directors of the subsidiary received stock options with an exercise price equal to the IPO offer price. In absence of IPO options, accruals in the year before the issue are negative predictors in the cross-sectional variation of the first-day returns. In presence of IPO options this relationship is reversed and becomes positive: this is especially pronounced in cases where non-employee directors received such compensation packages. The predictive power of the accruals on future returns and its direction differ depending on the executive compensation packages, suggesting that management intentionally manipulate earnings.

JEL classifications: M41; G24; G32; G34; J33

Keywords: Earnings management; Initial public offerings; IPO underpricing; Equity carve-outs; Executive compensation; Stock options

1.1 Introduction

This paper investigates the first-day return of a sample of 227 equity carve-outs during 1996-2013 with an aggregate proceeds of $69 billion that represents 11.7% of the total IPO market (Ritter (2013) reported $591.8 billion of aggregate proceeds for the same period). It shows that when a conglomerate sells one of its devision to the public (carve-out), division managers of the newly issued subsidiary are choosing different income-increasing accounting policies depending on their compensation packages. These policies influence the initial performance of the new company. In a very specific environment when executives and directors of the subsidiary receive stock options with an exercise price equal to the IPO offer price (IPO options in the rest of the paper) I show that predictive power of accruals (measure of earnings management) on the initial return is decreasing and for higher compensation packages it reverses i.e. the relationship becomes positive. The offer price of these companies is set close to their industry peers, as well as their initial secondary market stock price. The paper shows that in this setting incentive stock options are good governance mechanism to decrease opportunistic reporting by the managers in the years around the IPO. Furthermore, this paper rise a red flag that accruals as predictors of magnitude and direction of the future returns should be seen conditioned on the executives' incentives suggesting that earnings are managed intentionally by the management.

Equity carve-outs are special class of IPOs where a company decides to sell a portion of one of its wholly owned subsidiary to the public. It is expected that those kind of IPOs have same stylized fact (anomalies) as all other IPOs: initial underpricing confirmed by several studies (McDonald and Fisher (1972); Logue (1973); Ibbotson (1975); Ritter (1984); Rock (1986); Ibbotson and Ritter (1988); Loughran and Ritter (2002); Ritter and Welch (2002); among others) and long-run underperformance confirmed by: Stern and Bornstein (1985); Ritter (1991); Loughran and Ritter (1995). However, Vijh (1999) shows that newly issued subsidiary stocks beat appropriate benchmarks over a three-year period following the carveout. This result is in striking contrast with the documented poor long-run performance of initial public offerings. Positive market reaction to an announcement of equity carve-outs is noted by Schipper and Smith (1986), while market reaction for SEOs announcement is negative. They offer a set of reasons based on divestiture gains, and one of them is designing more efficient compensation contracts for the subsidiary's managers. Vijh (2002) continues their work confirming that market reacts positively to an equity carve-outs and furthermore his results support the di-

vestiture gains hypothesis of carve-outs discriminating asymmetric information model proposed by Nanda (1991).

These findings lead to a conclusion that equity carve-outs have special features among IPOs that distinguishes them from standard IPOs. To the best of my knowledge, initial underpricing of equity carve-outs is rarely present in the literature. Only Benveniste (2008) finds that the subsidiary's first-day return is significantly related to its parent's return over the book-building period, but not related to its contemporaneous return. I find that the average first-day return in my sample of carve-outs is 17.99% that is significantly lower than the 21.6% average first-day return of 5402 IPOs during 1990-2013[1] (information available on Jay Ritter's web site).[2] Aggregate money left on the table in my sample of equity carve-outs is $9.3 billion. Ritter (1991) concludes that investors are periodically overoptimistic about the earnings potential of new issues.

My paper explores a possible sources for less optimism noted around equity carve-outs issues. According to the earnings management explanation of IPO anomalies issuing firms report high earnings around the IPO by reporting abnormal accruals aggressively, inflating the earnings. The stock market temporarily overvalues those firms. Teoh and Wong (1998) provide evidence that in standard IPOs issuers with unusually high accruals in the IPO year experience poor stock return performance in the three years thereafter.

Earnings reported in the financial statements (income statement) of each public company consist of cash flows from operations and accounting adjustments called accruals. The simplest way to think about the accruals is that they are difference between earnings and cash flows. When this amount is positive for example, it can be a sign (not necessarily) of artificially inflated earnings by use of "creative" legal accounting techniques. Managers have certain legal discretion over the accruals. On shorter run they can increase the accruals (leading to increased earnings), for example, by recognition of revenues earned on credit (before cash is received), delaying recognition of expenses (cash paid in advance), realizing unusual gains, decelerating depreciation. On longer run all of these accounting adjustments will be reversed resulting in lower earnings. Earnings management is certainly a sign of bad corporate governance. The bottom line is that accounting accruals are negative predictors of the future performance: so-called

[1]The first-day return is even higher if I exclude the period from 1990 until 1995 in order to correspond to my sample period of equity carve-outs.

[2]I thank Professor Ritter for making these data publicly available. See http://bear.warrington.ufl.edu/ritter/ipodata.htm.

investor fixation on earnings theory documented by Sloan (1996).

In order to be able to do the manipulation companies may create earnings reserves in pre-IPO period by using more conservative accounting techniques and report negative accruals (by postponing the sales or accelerating the depreciation for example). They report lower earnings than cash flows. This allow them to boost the earnings in the year of the IPO. The bottom line is that accounting accruals in pre-IPO year can predict the cross-sectional variation of the first-day return and due to the reversal of the accruals that inflate the earnings in the IPO year this relationship is negative. Up to this point the evidence doesn't prove that managers intentionally are adjusting accruals to exploit market credulity.

In order to disentangle and find evidence that earnings are managed intentionally by the management I use the unique environment surrounding the equity carve-outs. Schipper and Smith (1986) argue that carve-outs are associated with a restructuring of managers' responsibilities and incentives. Furthermore the incentive contracts of subsidiary managers are revised to incorporate subsidiary share prices and profits as measure of performance. Afterwords Aron (1991) points out that after the carveout the stock value of the subsidiary firm is a cleaner measure of managerial productivity. She shows that a stock-based compensation plan motivates the managers of the carved out subsidiary to work harder and better exploit investment opportunities. My research question is whether incentive stock options are a good governance mechanism to decrease opportunistic reporting by the managers. It turns out that they are, particularly in years around the IPO.

Following Lowry and Murphy (2007) I split the sample in two groups, companies that grant stock options to the top executives (ex-division managers) with an exercise price set equal to the offer price (I will use the name "IPO options" in future) and companies that do not incentivize their top management in such way. Forty-five percent of the sample (i.e. 102 companies out of 227) granted IPO options to the top management. Lowry and Murphy (2007) look at all IPOs and their hypothesis is that if executives can influence the IPO offer price there should be a positive relationship between IPO option grants and underpricing. They do not find evidence of a such relationship. In standard IPOs there are two sides of the incentives story of the executives that are in striking contrast: executives who receive IPO options will benefit from higher underpricing (lower offer price relative to the aftermarket price), but at the same time they will lose from underpricing if they hold shares or options granted before the IPO due to the dilution when shares are sold below the market price. In case of equity carve-outs

IPO options give unique one-side incentive to executives to push down the offer price because their pre-IPO holdings remain in the conglomerate (not in the newly carved out subsidiary) and they will lose less from the dilution of their previous holdings.

I predict that companies that grant options will have lower first-day return (underpricing). Executives cannot exercise their options immediately on the day of the issue, so they cannot profit from short-term performance of the company. More than 92% of the executives in the sample can exercise partially their options one year after the issue and then gradually with different annual percentages (with range from 10% to 50%) in the years that follows. The findings of the paper are in the line with the finding of Bergstresser and Philippon (2006) who show that during years of high accruals, CEOs exercise unusually large amounts of options. Executives of the carved out companies are not allowed to exercise their IPO options around the IPO, so I predict lower accruals around the IPO. Furthermore top management of newly carved out subsidiary typically comes from former division management of the parent company. As mid-level executives in the parent companies (having in mind underwriters, institutional investors and parent top executives), it is unlikely that they can influence the offer price. However, they could search for a possibility to decrease the investors' optimism trough less aggressive accounting (lower accruals leading to lower earnings) in the years around the IPO compared to the managers that did not receive IPO options. I do not find reversal of accruals in the IPO year for companies that grant IPO options to their executives, while for companies that did not grant IPO options I find reversal of the negative accruals in the pre-IPO period to the IPO year as a sign for earnings management (consistent with Sloan (1996)'s pattern). In absence of IPO options I find that accruals in the year before the issue negatively predict the first-day return. While in presence of IPO options this relationship is reversed and becomes positive.

The first-day return is a function of both: i) the first-day market price (driven by an individual investor) and ii) the offer price (driven by underwriters, parent company and institutional investors that are more informed compared to an individual investor). I find that carved out companies that grant IPO options on average experience less underpricing (16.27%) than companies that did not grant such options (19.39%). I interpret the smaller underpricing as a function of less managed earnings in the years around the IPO by incentivized managers. Further I find that for these companies the initial offer price is set more closely to the price of their industry peers while for companies that did not grant options to their executives the offer price overvalues the company on average by 12% compared to their industry peers. This finding is in the line

with the finding of Purnanandam and Swaminathan (2004) that the median IPO was significantly overvalued relative to industry peers. Contemporaneously, due to more realistic reported earnings, the market optimism decreases towards the companies that grant IPO options resulting in lower initial market price and lower first-day return.

In this unique setting of one-side incentive, I conclude that options, as part of compensation packages, play their main role i.e. aligning the interest of agents and investors. In this special case of IPOs interests are aligned with the parent as well. Parent usually retains the control in the carved out subsidiary. Average shares retained by the parent in the sample is 70%. Zingales (1995) shows that first selling a portion of the firm's shares to the individual investors and then selling a controlling block to bigger more sophisticated investors maximizes the seller's revenue. According to this finding parent company is less interested in the short-term performance of the subsidiary. Incentivized managers do not manage earnings around the IPO in order to show high short-term performance, instead they have an incentive to manage the company in such a way that the stock prices increases on longer run.

The last finding of the paper is that for companies that grant IPO options to the outside directors statistical results are strongest. I find a direct, unconditional on accruals, positive relationship between option grants to directors and the first-day return suggesting that directors might have direct influence over the offer price unlike the subsidiary managers.

The main conclusion of the paper is that incentive stock options grants are good governance mechanism to align the interests of the principals and agents in the years around the IPO. Managers of IPO options granting carve-outs are managing less the earnings in the years around the issue compared to managers of carve-outs that did not grant IPO options. The finding of this paper contributes to the literature on earnings management, initial public offerings underpricing and executives compensation adding insight on managerial incentives to manage earnings. The findings are potentially useful for investors and regulators.

The rest of the paper is organized as follows. Section 2 presents and motivates development of the main hypotheses. Section 3 describes the sample selection and data. Section 4 shows the empirical relationship between the accruals and the first-day return (and its two drivers) conditioned on IPO options grants. Section 5 provides robustness tests to support the main findings and Section 6 concludes.

1.2 Carve-outs underpricing and earnings management conditioned on managerial incentives

A company may decide to partially sell a portion of one of its subsidiaries to the public (so called equity carve-out strategy) for several reasons: raise capital, highlight a true value of the division etc. This strategy also allows to create more efficient compensation contracts for division's managers based directly on divisional performance. Often management's stock option plan in a carved out subsidiary is based on the offer price. Managers who receive such options benefit from a lower offer price meaning a lower exercise price of their options. An elaborate negotiation about the offer price takes place in the period before the IPO. The underwriters and the owners of the company engage in a discussion about the price at which the division's stock should be sold to the public. Demand for the new issue formed by the institutional investors also play a role in forming the final offer price. Middle level division managers cannot directly influence the offer price. They might avoid to window dress the division by using less aggressive accounting techniques (more realistic ones) in both the pre-IPO year and at the IPO year trying to push down the offer price down as much as possible and decrease the market optimism toward the new issue. Supporting fact is that these IPO options cannot be exercised immediately at the day of issue (usually after one year these options became partially exercisable). Managers who receive such options would not care much about the short-run performance of the subsidiary. This eventually decreases the usual investor's overoptimism towards the new issues that will negatively affect the second driver of the first-day return i.e. first-day market closing price resulting in lower first-day return.

Greenblatt (2010)[3] points out in his book " You can be a stock market genius": "...don't expect bullish pronouncements or presentations about a new carve-outs until a price has been established for management's incentive stock options... Sometimes a management silence about the merits of a new carve-out may not be bad news; in some case, it can be actually golden." I expect that these carve-outs are less "hot" issues and they will have negative mid-price revision as a result of decreased demand. I predict that these companies report more realistic earnings around the IPO. No reversal of accruals

[3]Joel Greenblatt is an American academic, hedge fund manager, investor, and writer. He is a value investor, and adjunct professor at the Columbia University Graduate School of Business. Through his firm Gotham Capital, Greenblatt presided over an impressive annualized return of 40% from 1985 to 2006.

from pre-IPO period is observed in the IPO year; this leads to smaller first-day return.

In contrast, carve-outs that did not incentivize their managers with IPO options care more about the short-term performance tying to increase offering proceeds and value of their holdings in the company. Degeorge and Zeckhauser (1993) point out that managers have extraordinary incentives to make their firms "shine" before floating. To use their example, consider a manager who owns 10 per cent of a firm that normally earns $1 million and that will sell at eight times earnings when it goes public. Every $1.000 increase in earnings before going public means another $800 for the manager. Then it is not surprising that managers want to present the best possible figures in their prospectuses. My predictions are that these managers who don't own IPO options (they usually own shares) create a reserve of earnings in the pre-IPO period by using more conservative accounting techniques (income decreasing) that allow them to inflate the earnings in the IPO year by reporting positive accruals aggressively. This leads to higher first-day return i.e. negative relationship between accruals form pre-IPO period and the first-day return.

To answer my research question whether incentive stock options are good governance mechanism to align the interests of shareholders and management and avoid one of the principal-agent problem i.e. earnings management I use the special environment of equity carve-outs where insiders may benefit when the company trades at more realistic initial price. My main hypothesis *(H1)* is as follows: *"Carve-outs that grant incentive stock options (with exercise price equal to the offer price) to their executives do not manage earnings in the IPO period and they experience less initial underpricing compared to carve-outs that did not grant such options."* Initial underpricing (first-day return) is a function of two variables: first-day market price and offer price. Both of them influence the first-day return in different direction. To support the main hypothesis I additionally test two hypothesis regarding how earnings management influences the two drivers of the initial return. The second hypothesis *(H2)* is that *"Carve-outs that grant incentive stock options (with exercise price equal to the offer price) to their executives do not manage earnings in the IPO period and they have more realistic offer price compared to the carve-outs that did not grant such options. The second group will be overvalued (higher offer price than their industry peers) due to earnings management.* The third hypothesis *(H3)* is as follows:*"Carve-outs that grant incentive stock options (with exercise price equal to the offer price) to their executives do not manage earnings in the IPO period and they experience less market overoptimism resulting in lower first-day closing price compared to the carve-outs that did not grant such options.*

Predicted relationships are as follows:

- For carve-outs that did not grant IPO options to their executives reversal of accruals should be observed in the IPO year (t) as a sign for earnings management. This has two opposite effects on the first-day return. Inflated earnings in the IPO year trigger the market overoptimism and lead to a higher first-day closing price i.e. higher first-day return. On the other hand inflated earnings might bias the offer price up and have a negative impact on the first-day return. Since individual investors are less informed and more anchored to earnings compared to institutional investors and underwriters I predict that the effect on the first-day market price will be stronger than the effect on the offer price resulting in higher first-day return. The bottom line of my predictions is that the relationship between accruals in the pre-IPO year (t-1) and the first-day return is negative.

$$(H3)\downarrow accruals_{t-1} \Longrightarrow \uparrow accruals_t \Longrightarrow\uparrow first\,day\,closing\,price \Longrightarrow\uparrow first\,day\,return$$

$$(H2)\downarrow accruals_{t-1} \Longrightarrow \uparrow accruals_t \Longrightarrow\uparrow offer\,price \Longrightarrow\downarrow first\,day\,return$$

$$(H1)\downarrow accruals_{t-1} \Longrightarrow stronger\,effect\,on\,the\,market \Longrightarrow\uparrow first\,day\,return$$

- For carve-outs that grant IPO options to their executives no reversal of accruals should be observed in the IPO year (t). Realistic earnings in the IPO period decrease the market overoptimism and lead to a lower first-day price compared to the other IPOs. On the other hand realistic earnings lead to more realistic offer price. Since individual investors are less informed and more anchored to earnings compared to institutional investors and underwriters I predict that the effect on the first-day market price is stronger than the effect on the offer price resulting in lower first-day return. The bottom line of my predictions is that the relationship between accruals in the pre-IPO year (t-1) and the first-day return will be positive for this subsample of carve-outs.

$$(H3)\downarrow accruals_{t-1} \approx accruals_t \Longrightarrow\downarrow first\,day\,closing\,price \Longrightarrow\downarrow first\,day\,return$$

$$(H2)\downarrow accruals_{t-1} \approx accruals_t \Longrightarrow\downarrow offer\,price \Longrightarrow\uparrow first\,day\,return$$

$$(H1) \downarrow accruals_{t-1} \Longrightarrow stronger\ effect\ on\ the\ market \Longrightarrow \downarrow first\ day\ return$$

Consistent with the prediction, I find the following development of accruals (see Figure 1.1): for companies that did not grant IPO options there is an increase of positive accruals in the year of the IPO suggesting that these companies are inflating the earnings around the IPO, while for companies that grant IPO options I do not observe such pick suggesting that they report more realistic earnings. In the first graph I compute the total accruals scaled by assets from companies's balance sheet statements (named BS Accruals), while in the second graph total accruals scaled by assets are collected directly form the operating part of the cash flow statements (named CF Accruals). The third graph represents development of the discretionary (abnormal) part of total accruals computed using performance-adjusted modified Jones model (DAC in the rest of the paper).

One possible way to test the hypothesis is to see whether the cross-sectional differences of the first-day return are explained by the changes in the accruals between the pre-IPO year (*t-1*) and IPO year (t) conditioned on whether the carved out company grant IPO options or not. Since accruals at the IPO year are observed only ex-post, more interesting test from individual investor's point of view would be whether accruals in the pre-IPO year conditioned on IPO options grants predict cross-sectional differences of the first-day returns. For carve-outs that did not grant IPO options this relationship should be negative as a sign for earnings management. In contrast this negative relationship should be offset in the other subsample of carve-outs that grant IPO options. In this setting all information is publicly available before or soon after the IPO. Cash flow and earnings for the pre-IPO year is public information and it can be found in the section financial statements of prospectus for the issue. If the investor is attracted to some carve-out, he can check the SEC filings for information about the compensation packages of the executives, more precisely for stock options grants connected to the IPO offer price.

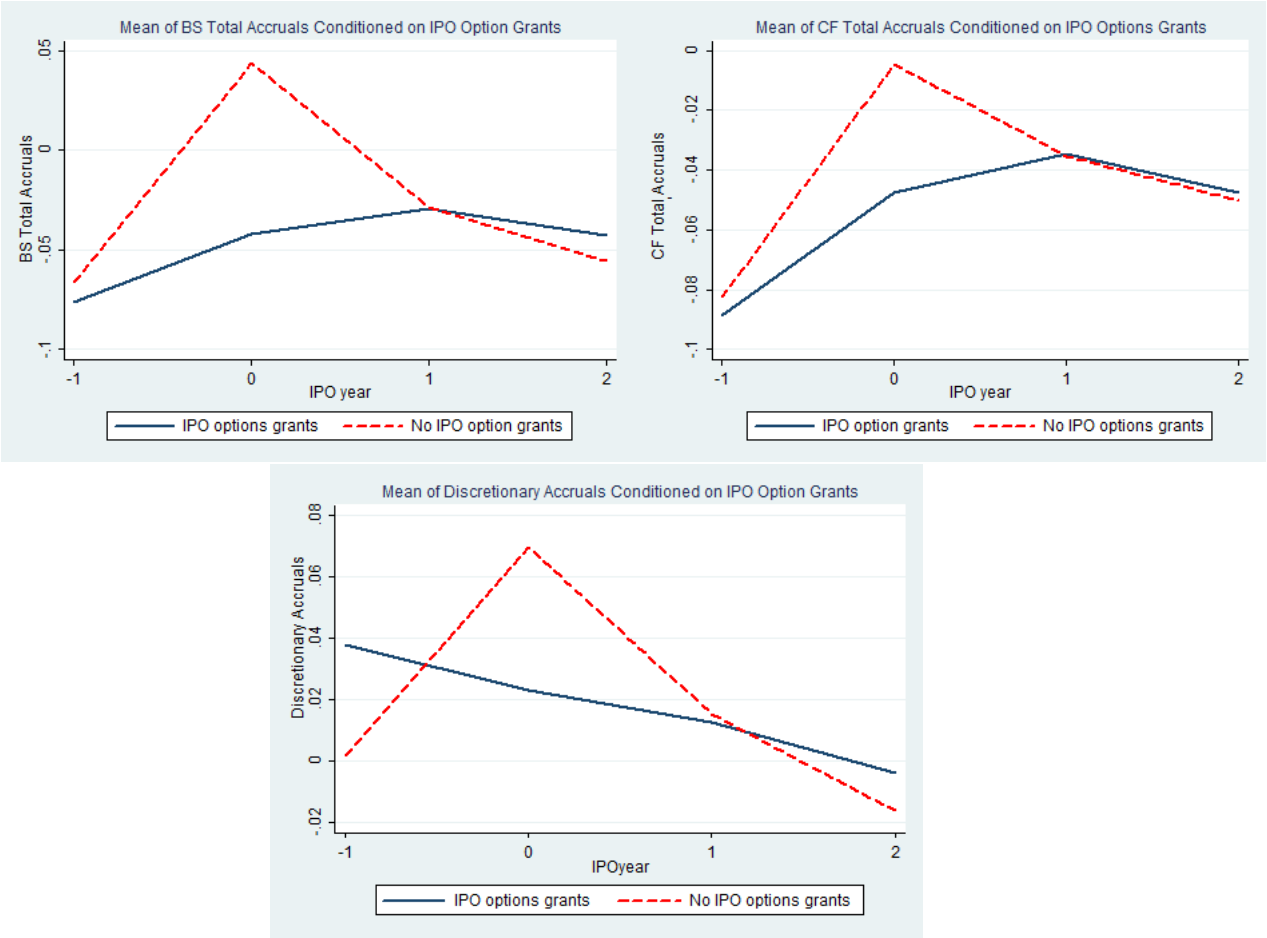


Figure 1.1: Mean of accruals conditioned on IPO options grants

1.3 Sample selection, data description, variables definition and empirical methodology

1.3.1 Sample selection and data description

I restrict my sample from May 1996 to December 2013 because IPO prospectuses are available on SEC's (Securities and Exchange Commission) EDGAR system (Electronic Data Gathering, Analysis and Retrieval system) starting from May 1996. First I collect data from the Thomson One SDC (Securities Data Company) database for US's issues.[4] The initial sample has 661 carve-outs for the period of almost 18 years. I require that the newly carved out subsidiary has available CRSP's (Center for Research in Security Prices) tapes and has available financial statements in Compustat database. After merging all three database the sample decreases to 381 carve-outs. Further I exclude 81 finance firms (SIC Codes 6000-6999) and 20 units offers yielding a sample of 280 carve-outs. I hand collect data from financial statements of the subsidiary in the prospectuses (filing type S-1 in EDGAR database) for two years preceding the IPO in order to be able to compute the accruals in the pre-IPO year. Additionally, I hand collect data for the option grants to executives and outside directors that have exercise price equal to the offer price (IPO options) from the prospectuses of the issue. If this information is not available in the prospectus then I collect it from the proxy statements (filing type DEF 14A in EDGAR database) of the IPO year. I lost additional firms that did not have available prospectus or proxy statement. My final sample has 227 equity carve-outs out of which 102 firms grant IPO options to their executives.

Table 1.1 provides descriptive statistics of the whole sample (column 1) and the two subsamples (columns 2 and 3) conditioned on whether the company grants stock options to the executives and outside directors with exercise price equal to the offer price. Companies that grant IPO options have lower accruals in the pre-IPO period and lower first-day return relative to companies that did not grant IPO options. Furthermore, they do not have huge reversal of the accruals in the IPO year (accruals remain negative) suggesting that they use less aggressive accounting techniques compared to the huge reversal of accruals in the IPO year for companies that did not grant IPO options. These differences in mean are statistically significant. IPO options granters on average are slightly smaller companies in terms of assets but they have higher sales and they are trading at statistically significant lower multiples (price-to-sales ratio). They

[4]In the Screening&Analysis common stock part, subsidiary IPO's (spinoffs) restriction is set "Yes".

also have lower debt ratio compared to the non-granting companies. As for the issue characteristics, carve-outs with IPO options are bigger issues that leave less money on the table (due to the lower underpricing). It turns out that they are less "hot" issues revising initial mid point of the price range downwards suggesting lower demand in the book-building process. On average in both groups the parent company kept the control over the subsidiary after the initial public offering.

In order to disentangle the effect of earnings management on the two drivers of the first-day return (offer price and market first-day price) I need a benchmark price that should be considered a fair price (I call it intrinsic price in the rest of the paper) of the subsidiary. For each carveout in the sample I find a non-IPO industry peers. To select appropriate matching firms, I consider all firms in Compustat in the fiscal year prior to the IPO year with available information about their sales. I eliminate those that went public in the respective year. For remaining firms I obtain SIC codes and share prices from CRSP. Those firms were matched with each carveout in the sample based on IPO date and 3-digit SIC code (Alford (1992) and Weiner (2005) argue that matching based on 3-digit SIC on average provides the best multiple valuation accuracy).

From the set of matching firms for each carveout I keep five comparable firms that are closest in sales scaled by total assets in the year prior to the IPO. Finally, out of the five selected peers I keep three comparable firms with closest operating income scaled by total assets to the respective carveout. Each carveout in the sample is matched with industry peers with comparable sales and profitability. I matched on industry because this is where I, most likely, can find matching firms with similar risk, profitability and growth. I matched on sales scaled by total assets to control for differences in size. I matched on operating income scaled by total assets to control for differences in profitability and to ensure that matching firms are as close as possible to the fundamentals of appropriate carveout. Bhojraj and Lee (2002) argue that adjustment to industry multiples based on firm operating performance (profitability) improve valuation accuracy. I decided to keep three (instead of only one) best matched companies and compute the average of their multiple (P/S ratio) in order to decrease the effect of a possible idiosyncratic shock on one single company on the IPO day. Table 1.2 compares the fundamentals of the carve-outs and matching firms.

Matching firms share similar sales and operating income distribution characteristics as the carve-outs for the both subsamples, IPO option granters and non granters. However, they trade at different price to sales ratios. The difference is especially pronounced

Table 1.1: Summary sample characteristics

	Whole Sample	***No IPO Options***	***IPO Options***
	(1)	(2)	(3)
Observations	227	125	102
Main variables statistics:			
first-day Return (%)	17.99%	19.39%	16.27%
BS Accruals $_{(t-1)}$	-0.0708	-0.0665	-0.0761
BS Accruals $_{(t)}$	0.0493	+0.0435	-0.0423*
CF Accruals $_{(t-1)}$	-0.0854	-0.0826	-0.0889
CF Accruals $_{(t)}$	-0.0239	-0.0046	-0.0475*
DAC $_{(t-1)}$	0.0177	0.0015	0.0377
DAC $_{(t)}$	0.0482	0.0694	0.0229*
Grants to Executives (mil.)	0.2510	0	0.5585
Grants to CEO (mil.)	0.1162	0	0.2587
Grants to Directors (mil.)	0.0177	0	0.0395
Company characteristics:			
Total Assets $_{(t-1)}$ (mil.)	1,330.57	1,430.04	1,208.67
Sales $_{(t-1)}$ (mil.)	1,147.66	1,056.86	1,258.94
Liabilities/Assets$_{(t-1)}$	0.85	0.89	0.79
P/Sales	13.63	20.09	5.71*
IPO characteristics:			
No of Shares Offered (mil.)	17.18	14.47	20.51
Offer Price	15.41	15.42	15.39
Average Proceeds (mil.)	303.99	288.82	322.59
Money Left on the Table (mil.)	41.11	41.55	40.58
Offer Price Revision (%)	0.11%	+1.83%	-1.99%
Shares Retained by the Parent (%)	69.79%	72.61%	66.33%

Asterisks denote significant differences between two subsamples based on t-statistics.

Table 1.2: Characteristics of the carve-outs and matching firms

The sample of carve-outs runs from May 1996 to December 2013. For each carve-out there are three matching firms that are industry peers with most similar sales and profitability. Price-to-Sales ratio of the carve-outs is the product of the offer price and shares outstanding (all share classes) over the reported sales one year prior to the IPO. Price-to-Sales ratio of the matching firms is the average of the three most similar industry peers. For each of the three matching firms Price-to-Sales is computed as a product of the trading price of the respective firm at IPO date times shares outstanding over the sales reported one year prior the cohort IPO year.

	Carve-outs				***Matching Firms***			
Characteristics	mean	25%	50%	75%	mean	25%	50%	75%
Whole Sample (227obs.)								
$\frac{Sales_{(t-1)}}{Total\ Assets_{(t-1)}}$	1.28	0.55	0.98	1.73	1.22	0.62	1.11	1.73
$\frac{Operating\ Income_{(t-1)}}{Total\ Assets_{(t-1)}}$	0.10	0.06	0.12	0.19	0.10	0.07	0.12	0.16
$\frac{Price_{(t)}}{Sales_{(t-1)}}$	13.63	1.11	2.24	6.24	4.49	0.60	1.20	2.65
IPO Options=0 (125 obs.)								
$\frac{Sales_{(t-1)}}{Total\ Assets_{(t-1)}}$	1.11	0.53	0.89	1.55	1.12	0.58	0.96	1.54
$\frac{Operating\ Income_{(t-1)}}{Total\ Assets_{(t-1)}}$	0.06	0.03	0.11	0.17	0.09	0.07	0.12	0.15
$\frac{Price_{(t)}}{Sales_{(t-1)}}$	20.09	1.39	2.83	8.10	5.78	0.72	1.34	2.59
IPO Options=1 (102 obs.)								
$\frac{Sales_{(t-1)}}{Total\ Assets_{(t-1)}}$	1.49	0.63	1.27	1.97	1.35	0.67	1.27	1.84
$\frac{Operating\ Income_{(t-1)}}{Total\ Assets_{(t-1)}}$	0.14	0.08	0.12	0.20	0.12	0.08	0.12	0.17
$\frac{Price_{(t)}}{Sales_{(t-1)}}$	5.71	0.84	1.76	3.75	2.91	0.55	0.97	2.83

in the subsample of carve-outs that did not grant IPO options. It seems that they are overvalued compared to their industry peers. This is in the line with my hypothesis that those companies manage earnings in the IPO period and that inflated earnings mislead the market participants resulting in overvaluation compared to the industry peers.

1.3.2 Variables definition

1.3.2.1 Stock option grants

I define an incentive option as IPO option only if the exercise price is equal to the offer price of the IPO. Grant to executives is the number of IPO options (in millions) granted to the top executives of the company including the CEO. Grants to CEO is the number of IPO options (in millions) granted to the CEO. Grants to directors is the number of IPO options granted to the outside directors. I also hand collect the data about the terms under which the agents can exercise the options. In more than 92% of the sample they can start partially exercising these options one year after the offering. Data on IPO options are hand collected from the prospectuses of the initial public offerings. If this information is not available in the prospectuses then I hand collected it from the proxy statements in the year of the IPO.

1.3.2.2 Measures of initial pricing

Following the literature, I define the first-day return as percentage difference of the first-day secondary market closing price and the offer price.

$$First\ Day\ Return = \frac{first\ day\ closing\ price - offer\ price}{offer\ price} * 100$$

Positive first-day return is a result of the following possibilities: either the offer price is set too low or the first-day closing market price is too high or both. In order to be able to decompose the first-day return I need a measure of a "fair" price of the offering. I compute the intrinsic (fair) price of each carveout with method of compatibles using price multiples. I am restricted to use only price-to-sales ratio (P/S) because sales figures are available for all companies. I am not able to use other multiples because a lot of carve-outs in my sample have losses in the year prior to the IPO and a lot of them are underfunded with negative value of their equity. Using other multiples like P/E, P/B, P/EBITDA is practically impossible without losing a lot of observation from the sample (around 20% of the sample). After matching based on sales and operating profit

I have three best matching industry peers for each carveout. For each matching firm (three for each carveout) I compute P/S ratio as follows:

$(\frac{P}{S})_{single\,match} = \frac{Market\,Price * Shares\,Outstanding}{Prior\,Fiscal\,Year\,Sales}$; where market price is CRSP stock price for the matching firm at the close of the respective IPO offer date of the carveout.

Than I compute the average of three P/S ratios to get one P/S ratio for each carveout:

$(\frac{P}{S})_{Match} = \frac{(\frac{P}{S})_{single\,match\,1} + (\frac{P}{S})_{single\,match\,2} + (\frac{P}{S})_{single\,match\,3}}{3}$

The intrinsic (fair) value of each carveout is computed by multiplying the average P/S ratio of the three industry peers with prior year fiscal sales of the appropriate carveout:

$Intrinsic\,Value = (\frac{P}{S})_{Match} * Sales_{(t-1)}$; while intrinsic price of the carveout is:

$Intrinsic\,Price = \frac{Intrinsic\,Value}{Shares\,Outstanding}$

I use the intrinsic (fair) price as a benchmark to compare the offer price and the first-day market price. I decompose the first-day return in its two drivers: offer price undervaluation (coming from low offer price) and market overpricing (coming from overoptimistic first-day closing market price):

$Offer\,Price\,Undervaluation = \frac{Intrinsic\,Price - Offer\,Price}{Offer\,Price} * 100$

$Market\,Overpricing = \frac{First\,Day\,Closing\,Price - Intrinsic\,Price}{Offer\,Price} * 100$

For clarity about the decomposition I use one recent example taken from my sample of equity carve-outs. Zoetis, Inc. is the world's largest producer of medicine and vaccinations for pets and livestock. The company was a subsidiary of Pfizer, the world's largest drug maker. Pfizer officially filed for registration of a Class A stock of Zoetis with the U.S. Securities and Exchange Commission on 10 August 2012. Zoetis' IPO on 1 February 2013 sold 86.1 million shares for US$ 2.2 billion. Pfizer retained 414 million Class B shares giving it an 83% controlling stake in Zoetis. At the time, Zoetis' debut was the largest IPO from a U.S. company since Facebook's $16 billion IPO on 18 May 2012. The offer price of Zoetis' shares was set at $26 per share (leading underwriters were JPMorgan Chase, Bank of America Merrill Lynch and Morgan Stanley). Shares sharply rose by the end of the first trading day to $35.01 per share. The first-day return of Zoetis' IPO was 19.27% ($\frac{35.01-26}{26} * 100$). Zoetis was trading at 3.05 times its reported sales of $4259 million in 2012 (one fiscal year prior to the IPO). Price-to-Sales ratio of Zoetis is computed as follows: $\frac{P}{S}Zoetis = \frac{\$26*(86.1+414)}{4259}$ (offer price is multiplied by number of all share classes). The first-day return could be result of either too low offer

price ($26) or too high first-day closing price ($35.01) or even both. I selected Zoetis' three industry peers based on sales and operating income: Neogen Corp., Biodilivery Sciences Inc. and Integra Life Science Inc. On first of February 2013 (the day of Zoetis' IPO) they had an average price-to-sales ratio of 3.35. That is slightly higher than Zoetis' price-to-sales ratio indicating that Zoetis was initially undervalued compared to its industry peers. According to my methodology the fair (intrinsic) price of Zoetis would have been $28.53 per share:

$$Intrinsic\,Value = (\frac{P}{S})_{Match} * Sales_{(t-1)} = 3.35 * 4,259 = \$14,267.65\,million$$

$$Intrinsic\,Price = \frac{Intrinsic\,Value}{Shares\,Outstanding} = \frac{14267}{(86.1+414)} = \$28.53\,per\,share$$

Using the calculated intrinsic price I decompose the first-day return of Zoetis into the part that comes from offer price undervaluation and market overpricing:

$$Offer\,Price\,Undervaluation = \frac{Intrinsic\,Price - Offer\,Price}{Offer\,Price} * 100 = \frac{28.53-26}{26} * 100 = 9.73\%$$

$$Market\,Overpricing = \frac{First\,Day\,Market\,Price - Intrinsic\,Price}{Offer\,Price} * 100 = \frac{35.01-28.53}{26} * 100 = 9.54\%$$

The initial return of Zoetis is decomposed into two parts: 9.73 percentage points due to initial undervaluation caused by low offer price and 9.53 percentage points due to market overpricing on the first trading day. The sum of the two components gives exactly 19.27% that is the first-day return of Zoetis. Having in mind the big picture of the paper I will add an info on executives pay of Zoetis and its reporting "habits". Zoetis granted 550,640 stock options to its executives with an exercise price equal to $26 (the IPO offer price) on first of February 2013 (the IPO date). More than a half of the options (285,306) were granted to the CEO Juan Ramon Alaix. Mr.Alaix joined Pfizer in 2003 and he was appointed as CEO of the division (Zoetis) in July 2012. The IPO options granted to him are subject to cliff vesting in three years. This means that he cannot exercise any of these options until first of February 2016. However he had an incentive to push down the offer price as much as possible resulting in 9.73% undervaluation compared to Zoetis' industry peers. The total accruals of Zoetis remained almost unchanged between year prior to the IPO and the IPO year. In both years and based on different specifications the accruals are negative (around -0.01) suggesting that Zoetis did not use "creative" accounting techniques to inflate the earnings and window dress the company before going public (documented procedure for an average IPO). Anecdotally, nowadays (two months before the end of the vesting period) Zoetis is trading around $45 per share. Potential profit of Mr.Alaix is around $5.5 million just from the grant of IPO options . This amount is more than twice his

cash compensation (salary and bonus) achieved in 2014.

1.3.2.3 Measures of earnings management (accruals)

Standard measure for earnings management in the literature are accruals. The simplest way to think about the accruals is that they are difference between earnings and cash flows. When this amount is positive for example, it can be a sign (not necessarily) of artificially inflated earnings by use of "creative" legal accounting techniques. One of the most popular way in which managers can engage in "window-dressing" before going public is that they can "borrow" earnings from other periods (future of past periods). If a manager knows that the company will go public next year, he could slow down earnings growth in the year before the IPO by postponing some sales deals for the next year for which cash was received in advance in the pre-IPO year or expensing some future expenses in the year prior to the IPO. This will create an earnings buffer that the managers could use to boost the performance in the IPO year by reporting higher sales or lower expenses that were suppose to be reported in the pre-IPO year. The time-shifting of earnings will be reflected in the financial statements trough the accruals. For example, postponed sales will increase the cash position and the current liabilities in the pre-IPO year and this will lead to lower accruals (see formulas below) and lower earnings in the pre-IPO year. Contrarily, in the IPO year when the sales will be actually reported, current liabilities will decrease and this will increase the accruals i.e. earnings.

There are many methodologies how one can compute the accruals. I use three measures of accruals. The first two measures are total accruals at each firm level that I compute from different statements (balance sheet or cash flow statement).

Balance sheet total accruals are computed with information found in the comparable balance sheets of each carve-out. I hand collect data from balance sheets for two years prior the IPO for each carve-out in order to be able to compute total balance sheet accruals for one year prior to the IPO.

$$BSAccruals_{i,t-1} = \frac{(\triangle CA_{i,t-1} - \triangle CL_{i,t-1} - \triangle Cash_{i,t-1} + \triangle STDEBT_{i,t-1} - DEP_{i,t-1})}{Assets_{i,t-2}}$$

where:
$\triangle CA_{i,t-1}$ is firm i's change in the current assets from year t-2 to t-1 that I hand collected from balance sheets reported in the prospectus (usual Compustat Item ♯4);

$\triangle CL_{i,t-1}$ is firm i's change in the current liabilities from year t-2 to t-1 that I hand collected from balance sheets reported in the prospectus (usual Compustat Item ♯5);
$\triangle Cash_{i,t-1}$ is firm i's change in cash from year t-2 to t-1 that I hand collected from balance sheets reported in the prospectus (usual Compustat Item ♯1);
$\triangle STDEBT_{i,t-1}$ is firm i's change in short-term debt from year t-2 to t-1 that I hand collected from balance sheets reported in the prospectus (usual Compustat Item ♯34);
$DEP_{i,t-1}$ is firm i's depreciation and amortization expense in year t-1 that I hand collected from income statement reported in the prospectus (usual Compustat Item ♯14);
$Assets_{i,t-2}$ is firm i's total assets in the year t-2 that I hand collected from balance sheet reported in the prospectus (usual Compustat Item ♯6).

Following Hribar and Collins. (2002) I hand collect cash flow total accruals directly from the operating part of the cash flow statements reported in the prospectuses as follows:

$$CFAccruals_{i,t-1} = \frac{-(CHGAR_{i,t-1} + CHGINV_{i,t-1} + CHGAP_{i,t-1} + CHGTAX_{i,t-1} + CHGOTH_{i,t-1} - DEP_{i,t-1})}{Assets_{i,t-2}}$$

where:
$CHGAR_{i,t-1}$ firm i's decrease/increase in accounts receivable (usual Compustat Item ♯302);
$CHGINV_{i,t-1}$ firm i's decrease/increase in inventory (usual Compustat Item ♯303);
$CHGAP_{i,t-1}$ firm i's increase/decrease in accounts payable (usual Compustat Item ♯304);
$CHGTAX_{i,t-1}$ firm i's increase/decrease in taxes payable (usual Compustat Item ♯305);
$CHGOTH_{i,t-1}$ firm i's net change in other current assets (usual Compustat Item ♯307);
$DEP_{i,t-1}$ is firm i's depreciation expense reported in the cash flow statement (usual Compustat Item ♯125);
$Assets_{i,t-2}$ is firm i's total assets in the year t-2 that I hand collected from balance sheet reported in the prospectus (usual Compustat Item ♯6).

The third type of accruals that I use as a measure of earnings management are discretionary accruals. In fact not all accruals are sign of earnings management, most of them are good mechanism to match revenues and expenses in the same fiscal year. Firstly Jones (1991) decomposes the total accruals in two parts: normal and discretionary. Than Dechow and Sweeney (1995) modified her model and Kothari and Wasley (2005) adjusted it controlling also for the performance of the companies. I estimate discretionary accruals using performance-adjusted modified Jones model. Total accruals for

firm i in year t are measured same as balance sheet total accruals ($BSAccruals_{i,t}$) in the equation above. The discretionary (abnormal) accruals for firm i in year t are the residuals $\xi_{i,t}$ from the following regression, that I estimate for each of the 99 two-digit SIC industry groups in each year t.

$$BSAccruals_{i,t} = \beta_{0J} + \beta_{1J}(\frac{1}{Assets_{i,t-1}}) + \beta_{2J}(\triangle Rev_{i,t} - \triangle AR_{i,t}) + \beta_{3J} PPE_{i,t} + \beta_{4J} ROA_{i,t-1} + \xi_{i,t}$$

where:

$\triangle Rev_{i,t}$ firm i's change in revenues (Compustat Item ♯12) divided by $Assets_{i,t-1}$ (Compustat Item ♯6) ;

$\triangle AR_{i,t}$ firm i's change in account receivables (Compustat Item ♯2) divided by $Assets_{i,t-1}$;

$PPE_{i,t}$ firm i's gross value of property, plant and equipment (Compustat Item ♯7) divided by $Assets_{i,t-1}$;

$ROA_{i,t-1}$ firm i's operating income before depreciation (Compustat Item ♯13) on assets in year *t-1*;

I use 2-digit SIC industry groups from the universe of firms in Compustat (IPOs are excluded) to compute industry-specific parameter estimates (β_J). Applying the industry estimates to company data give me firm-specific normal accruals. The difference between company's total accruals and estimated normal accruals are the discretionary (abnormal) accruals. Residuals of the model are actually my variable of interest i.e. discretionary (abnormal) accruals.

1.3.2.4 Other variables

The literature on IPOs is rich with studies exploring the determinants of the cross section of the first-day return. However most of the studies do not use same control variables. Butler and Kieschnick (2014) provide a benchmark specification and robust evidence on the empirical importance of control variables that should be included in a baseline regression on IPO underpricing. Starting from set of 48 possible controls used in the literature, they identify 15 as robust determinants of IPO initial return that should be included to minimize the risk of omitted variable bias. Most of the control variables that I use in all regressions are based on their finding. I use the following controls in all regressions: *Ln of Firm Sales, Total Liabilities to Asset Ratio, Ln of one plus the Ratio of Secondary Shares Retained to Shares Offered, Ln of Offer Price to Sales Ratio, Underwriter Rank, Nasdaq Dummy, Internet IPO Dummy, Average Underpricing in Previous 30 Days, Prior 30 Days Industry Return, Prior 30 Days Standard Deviation*

of Industry Return, Prior 30 Day CRSP EW Index, Ln of Industry Market Value to Sales Ratio, Offer Price Revision, Offer Price Revision when Negative, % of IPOs with Positive Price Revisions. The description of the control variables and data sources are in the Appendix of the paper.

1.4 Results

1.4.1 First-day return and earnings management

I start my analysis by exploring the cross-sectional variation of the first-day return in my sample of equity carve-outs over total accruals reported one year prior to the IPO conditioned on IPO options grants. I find this test very interesting because accruals one year prior the IPO are public information at the time of the IPO. I estimate the following equation under different specifications of accruals measures and IPO options grants:

$$FDR_i = \beta_0 + \beta_1 IPOoptions_i + \beta_2 (Accruals_{t-1})_i + \beta_3 (Accruals_{t-1})_i * IPOoptions_i + \beta_4' X_i + \varepsilon_i$$

where FDR_i is the first-day return of company i. $(Accruals_{t-1})_i$ is the total accruals in one year prior the IPO of company i and $IPOoptions_i$ are different specifications of IPO options grants. X_i is the battery of control variables that are likely to affect the first-day return. The variables of interest (first-day return, accruals and IPO option grants) are winsorized at 1% level in order to make sure that the results are not driven by the extremes of the distributions.

According to the earnings management explanation of IPO anomaly issuing firms report high earnings around the IPO by reporting accruals aggressively, inflating the earnings. In order to be able to do the manipulation companies create reserves of earnings in pre-IPO period by using more conservative accounting techniques and reporting negative accruals. If the company is manipulating the earnings then total accruals in pre-IPO year predict the cross-sectional variation of the first-day return. Due to the reversal of the accruals that inflate the earnings in the IPO year this relationship is negative. My hypothesis is that executives of equity carve-outs who receive options grants with exercise price equal to the offer price do not have an incentive to window dress the company before going public. They would rather report more realistic or conservative earnings in the IPO period in order to have exercise price of their options as low as possible. This reporting behavior decreases the usual market overoptimism toward the

new issues and leads to lower first-day return. In contrast, for carve-outs that did not grant such compensation packages I observe negative relationship between total accruals in the pre-IPO year and their first-day return as a sign of earnings manipulation (window dressing) in IPO period. The main results are in Table 1.3.

The first two columns are under specification where IPO options is a binary variable: 1 if anybody in the top executive team received an IPO option and 0 when nobody received such grants. Third and forth columns are under specification where IPO options is the number of IPO options (in million) granted to the top executives of the carveout company while in the next two columns (5 and 6) it is the number of IPO options granted just to the CEO. Columns 7 and 8 report the cross-sectional regressions where IPO options is the number of options (in million) granted to the board members of the carve-out. In all different specifications of IPO options first columns (column 1, 3, 5 and 7 respectively) are regressions where total accruals are measured from the balance sheet while in the second column (column 2, 4, 6 and 8 respectively) they are measured from the cash flow statement.

In all regressions and for all different specifications of IPO options and total accruals there is a negative statistically significant relationship between total accruals and first-day return for companies that did not grant IPO options (coefficient β_2)[5] that I interpret as a sign of earnings management. For the other subset of carve-outs that grant IPO options to the executives, coefficient of interest is the sum of β_2 and β_3. In all regressions both coefficients are statistically significant. The negative relationship between total accruals in the year preceding the IPO and first-day return (β_2) is offset by the coefficient β_3 that has opposite sign. This finding suggests that in the subsample of equity carveout that grant IPO options there is no evidence of earnings management in the period around the IPO.

Forty-eight companies grant IPO options also to the board members (non-employee directors). For these companies I find a direct positive significant relationship (coefficient β_1) between these grants and the first-day return even in absence of accruals. It is a sign that these directors might have an influence over the offer price of the IPO. More IPO options grants leads to higher first-day return driven by the lower offer price. They do have an incentive to push down the offer price because it is equal to the strike price in their option packages. The cross-sectional regression of the first-day return on directors IPO option grants unconditioned on the level of accruals is reported in Table

[5]Coefficient β_2 gives us the relationship between accruals and first-day return only for companies that did not grant IPO options (IPO options variable is set to be zero).

Table 1.3: Cross-sectional regressions of FDR on accruals conditioned on IPO options

The sample runs from May 1996 to December 2013. The dependent variable is the first-day return defined as percentage difference between first-day market closing price and the offer price. IPO Options are defined as incentive stock options grants at the IPO date with exercise price equal to the IPO offer price. IPO Options(0,1) is dummy variable set to 1 if executives received IPO options 0 otherwise (column 1 and 2). Executives' IPO options is the number of IPO options (in millions) grants to the executives (column 3 and 4) while CEO Option Grants is the number of IPO options granted to the CEO (column 5 and 6). Directors Options Grants is the number of IPO options granted to the board members (column 7 and 8). BS Accruals are total accruals computed from the comparable balance sheet of each carve-out one year prior to the IPO (columns 1,3,5 and 7) while CF Accruals are total accruals computed from the cash flow statements one year prior to the IPO (columns 2,4,6 and 8). Controlling variables are defined in the Appendix of the paper.

Dependent variable: $FDR_i = \beta_0 + \beta_1 IPOoptions_i + \beta_2 (Accruals_{t-1})_i + \beta_3 (Accruals_{t-1})_i * IPOoptions_i + \beta_4' X_i + \varepsilon_i$

first-day Return	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	IPO Options (0,1)		**Executives' IPO options**		**CEO Option Grants**		**Directors Option Grants**	
	BS Accruals	**CF Accruals**	**BS Accruals**	**CF Accruals**	**BS Accruals**	**CF Accruals**	**BS Accruals**	**CF Accruals**
Intercept	21.960	34.967	11.290	32.613	6.404	25.727	7.742	24.033
	(0.558)	(0.368)	(0.764)	(0.377)	(0.865)		(0.834)	(0.499)
IPO Options	1.369	2.531	3.002	6.888	2.222	9.526	**135.637*** **	**187.691*** **
	(0.779)	(0.607)	(0.541)	(0.196)	(0.825)	(0.372)	(0.002)	(0.000)
Accruals $_{(t-1)}$	**-26.302*** **	**-50.163*** **	**-18.282** **	**-48.523*** **	**-18.559*** **	**-47.297*** **	**-15.225** **	**-36.252*** **
	(0.001)	(0.000)	(0.005)	(0.000)	(0.004)	(0.000)	(0.012)	(0.000)
IPO Options*Accruals $_{(t-1)}$	**35.185*** **	**49.473*** **	**48.751** **	**74.569*** **	**113.909*** **	**167.610*** **	**809.168*** **	**1534.165*** **
	(0.002)	(0.005)	(0.002)	(0.001)	(0.001)	(0.001)	(0.007)	(0.000)
Controls:								
$ln(Firm\ Sales_{(t-1)})$	-3.631	-3.858	-3.331	-4.069	-2.872	-3.395	-3.103	-3.921
	(0.174)	(0.142)	(0.234)	(0.135)	(0.304)	(0.214)	(0.244)	(0.123)
$\frac{Total\ Liabilities_{(t-1)}}{Total\ Assets_{(t-1)}}$	**-5.294** **	**-5.837*** **	**-4.669** **	**-6.442*** **	**-4.676** **	**-6.351*** **	**-3.967** *	**-5.596*** **
	(0.014)	(0.006)	(0.025)	(0.002)	(0.025)	(0.003)	(0.052)	(0.006)
$ln(1+\frac{Shares\ Retained}{Shares\ Offered})$	6.365	7.359	7.773	7.242	7.486	6.863	4.660	4.011
	(0.221)	(0.151)	(0.138)	(0.154)	(0.151)	(0.177)	(0.369)	(0.415)
$ln(\frac{Price}{Sales_{(t-1)}})$	-0.332	-1.721	0.917	-1.793	1.176	-1.300	1.234	-0.957
	(0.921)	(0.611)	(0.787)	(0.597)	(0.728)	(0.701)	(0.709)	(0.768)
Underwriter Rank	-0.342	-0.251	-0.304	-0.204	-0.292	-0.208	-0.329	-0.343
	(0.636)	(0.723)	(0.674)	(0.771)	(0.686)	(0.768)	(0.655)	(0.622)
Nasdaq Dummy	-0.744	-0.436	-1.094	-1.042	-0.071	0.136	1.248	-1.294
	(0.899)	(0.940)	(0.852)	(0.855)	(0.990)	(0.981)	(0.835)	(0.816)
Internet IPO Dummy	**24.462** **	**20.873** *	**26.222** **	**21.974** *	**26.649** **	**22.484** *	11.219	2.283
	(0.045)	(0.084)	(0.034)	(0.065)	(0.030)	(0.060)	(0.361)	(0.845)
Average Underpricing	**0.320** *	**0.373** **	0.270	**0.371** **	0.268	**0.373** **	**0.346** **	**0.465*** **
	(0.066)	(0.030)	(0.119)	(0.029)	(0.122)	(0.028)	(0.046)	(0.006)
Prior 30 day Industry Return	20.173	13.945	19.705	12.645	19.442	12.302	22.591	20.249
	(0.143)	(0.304)	(0.156)	(0.350)	(0.160)	(0.364)	(0.101)	(0.124)
Prior 30 day SD of Ind.Ret.	-210.552	-250.921	-353.108	-411.862	-301.024	-351.591	165.336	229.619
	(0.774)	(0.728)	(0.631)	(0.563)	(0.680)	(0.621)	(0.821)	(0.742)
Prior 30 day EW Index	-7.438	-1.159	-6.152	1.425	-6.156	2.891	-1.826	-3.378
	(0.729)	(0.956)	(0.774)	(0.945)	(0.774)	(0.890)	(0.932)	(0.868)
$ln(\frac{Price}{Sales_{(t-1)}})_{industry}$	4.186	3.861	7.280	6.573	7.567	7.098	-1.387	-6.137
	(0.740)	(0.755)	(0.564)	(0.591)	(0.548)	(0.562)	(0.913)	(0.615)
Offer Price Revision	**0.322** **	**0.314** **	**0.294** *	**0.292** **	**0.297** *	**0.294** **	**0.351** **	**0.310** **
	(0.035)	(0.037)	(0.054)	(0.048)	(0.051)	(0.046)	(0.021)	(0.031)
Negative Offer Price Revision	0.227	0.318	0.191	0.277	0.173	0.254	0.343	0.337
	(0.453)	(0.285)	(0.532)	(0.349)	(0.568)	(0.392)	(0.261)	(0.250)
% of IPOs Price Revision Up	-0.151	-0.210	-0.141	-0.220	-0.146	-0.219	-0.086	-0.143
	(0.287)	(0.138)	(0.317)	(0.114)	(0.299)	(0.117)	(0.535)	(0.283)
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Observations	227	227	227	227	227	227	227	227
R-squared	48.70%	50.67%	48.77%	51.84%	49.04%	51.65%	49.65%	54.33%
Adj. R-squared	22.18%	25.18%	22.30%	26.95%	22.70%	26.67%	23.63%	30.73%
p-values in parentheses	*** p<0.01,	** p<0.05,	* p<0.1					

1.4. The estimated coefficient is positive and statistically significant at 5% level. I do not find this relationship for the grants to the top executives (including the CEO). This is not surprising because top executives usually are previous division managers in the conglomerate, so it is difficult to say that they could influence the offer price. However, it is highly probable that they have an influence over the divisions' reporting strategy.

Out of fifteen control variables that are likely to have impact over the first-day return only the debt ratio is statistically significant at 1% level almost in all regressions. Internet IPO dummy, average underpricing in previous month and offer price revision are only marginally significant. I control for time and industry fix effect in all regressions.

Haven seen coefficients' statistical significance, their economic magnitude is not that obvious. In order to have an idea how much of the cross-sectional variation of first-day return is explained by reporting distortions in the pre-IPO period I use average values of accruals in the year prior to the IPO and average values of IPO option grants (see Table 1.1). I plug those numbers in the regression equations used in Table 1.3 using the coefficient estimates.

Average accruals in one year prior the IPO can explain 2 to 4 percentage points (balance sheet accruals and cash flow accruals respectively) of the first-day return in absence of IPO options grants. In presence of IPO options grants this magnitude is significantly lower approaching 0 to maximum 1 percentage points for different specifications of total accruals and IPO option grants. This is in the line with the main hypothesis of the paper that managers who received IPO options are not managing earnings in the IPO period, so predictive power of the accruals on first-day return is decreasing.

The magnitude of the direct positive significant relationship (coefficient β_1) between grants to directors and the first-day return in absence of accruals is 5.4 percentage points and 7.4 percentage points of the first-day return for an average option grant to board members of 39,500 options (estimated coefficient β_1 is for one million of options). In presence of accruals using the estimated coefficients in column 7 and 8 of Table 1.3 for average accruals and average option grants the magnitude is around 2 percentage points for both specifications of accruals. The magnitude of the coefficient of directors' IPO option grants unconditional on the accruals (see Table 1.4) is 3.6 percentage points for an average option grant to board of directors members (39,500 options).

Figure 1.2 below shows graphically the predicted relationship between first-day return and total accruals calculated from the balance sheets for different levels of IPO

Table 1.4: Cross-sectional regression of the FDR on director's IPO option grants

The sample runs from May 1996 to December 2013. The dependent variable is the first-day return defined as percentage difference between first-day market closing price and the offer price. IPO Options are defined as incentive stock options grants at the IPO date with exercise price equal to the IPO offer price. Directors IPO Options is the number of IPO options granted to the board members. Controlling variables are defined in the Appendix of the paper.

Dependent variable.: first-day Return	$FDR_i = \beta_0 + \beta_1 DirectorsIPOoptions_i + \beta_2' X_i + \varepsilon_i$
Intercept	6.018
	(0.873)
Directors IPO Options	**91.431****
	(0.034)
Controls:	
$ln(Firm\,Sales_{(t-1)})$	-3.623
	(0.184)
$\frac{Total\,Liabilities_{(t-1)}}{Total\,Assets_{(t-1)}}$	-2.654
	(0.180)
$ln(1 + \frac{Shares\,Retained}{Shares\,Offered})$	6.894
	(0.191)
$ln(\frac{Price}{Sales_{(t-1)}})$	1.796
	(0.594)
Underwriter Rank	-0.648
	(0.386)
Nasdaq Dummy	-2.995
	(0.617)
Internet IPO Dummy	8.861
	(0.480)
Average Underpricing	0.285
	(0.104)
Prior 30 day Industry Return	**24.94***
	(0.078)
Prior 30 day SD of Ind.Ret.	89.07
	(0.906)
Prior 30 day EW Index	-7.352
	(0.737)
$ln(\frac{Price}{Sales_{(t-1)}})_{industry}$	1.692
	(0.896)
Offer Price Revision	**0.284***
	(0.066)
Negative Offer Price Revision	0.399
	(0.202)
% of IPOs Price Revision Up	-0.0685
	(0.630)
Industry Fixed Effects	YES
Year Fixed Effects	YES
Observations	227
R-squared	46.13%
Adj. R-squared	19.37%
p-values in parentheses	*** p<0.01, ** p<0.05, * p<0.1

option grants (25 percentile, median, mean and 75% percentile). For higher percentiles of IPO options grants the predictive relationship of the total accruals over the first-day return is changing and from negative it is becoming positive. The graphical relationship between first-day return and total accruals calculated from the cash flow statement looks very similar to Figure 1.2 and its not shown.

I estimate separate regressions for the two subsamples in order to support my finding that total accruals one year prior to the IPO have predictive power over the first-day return only for firms that did not grant IPO options to its executives. Table 1.5 reports the results. First two columns stand for the subsample of carve-outs that did not grant IPO options while column 3 and 4 are for the subsample of carve-outs that grant IPO options. Coefficient β_1 is statistically significant and negative only in the subsample of carve-outs that did not grant IPO options while for the other sample it is positive, but statistically insignificant. This is a supporting evidence that IPO option granting companies do not manage earnings in the IPO period and their first-day return cannot be predicted by reporting distortions one year prior to the IPO. For companies that did not grant IPO options to the executives accruals in one year prior the IPO are negative predictors in the cross-sectional variation of the first-day return suggesting that these companies are managing their earnings before going public.

Other possible way to test the hypotheses is to see whether the cross-sectional differences of the first-day return are explained by the changes in the accruals between the pre-IPO year (*t-1*) and IPO year (t) conditioned on whether the carved out company grant IPO options or not. However accruals at the IPO year (t) are observed one year after the IPO, so this test is providing only ex-post evidence and doesn't have predictive power over the first-day return. I estimate the following equation under different specifications of accruals measures and IPO options grants:

$$FDR_i = \beta_0 + \beta_1 IPOoptions_i + \beta_2 \triangle Accruals_i + \beta_3 \triangle Accruals_i * IPOoptions_i + \beta_4' X_i + \varepsilon_i$$

where FDR_i is the first-day return of company i. $\triangle Accruals_i$ are changes in total accruals between the pre-IPO year (*t-1*) and IPO year (t) of company i and $IPOoptions_i$ are different specifications of IPO options grants. X_i is the battery of control variables that are likely to affect the first-day return. The variables of interest are winsorized at 1% level. For carve-outs that did not grant IPO options I expect positive relationship between changes in total accruals from the pre-IPO year to the IPO year and their first-day return as a sign of earnings manipulation (window dressing). More increased accruals in the IPO year compared to the pre-IPO year should lead to higher first-day return. The results are reported in Table 1.6.

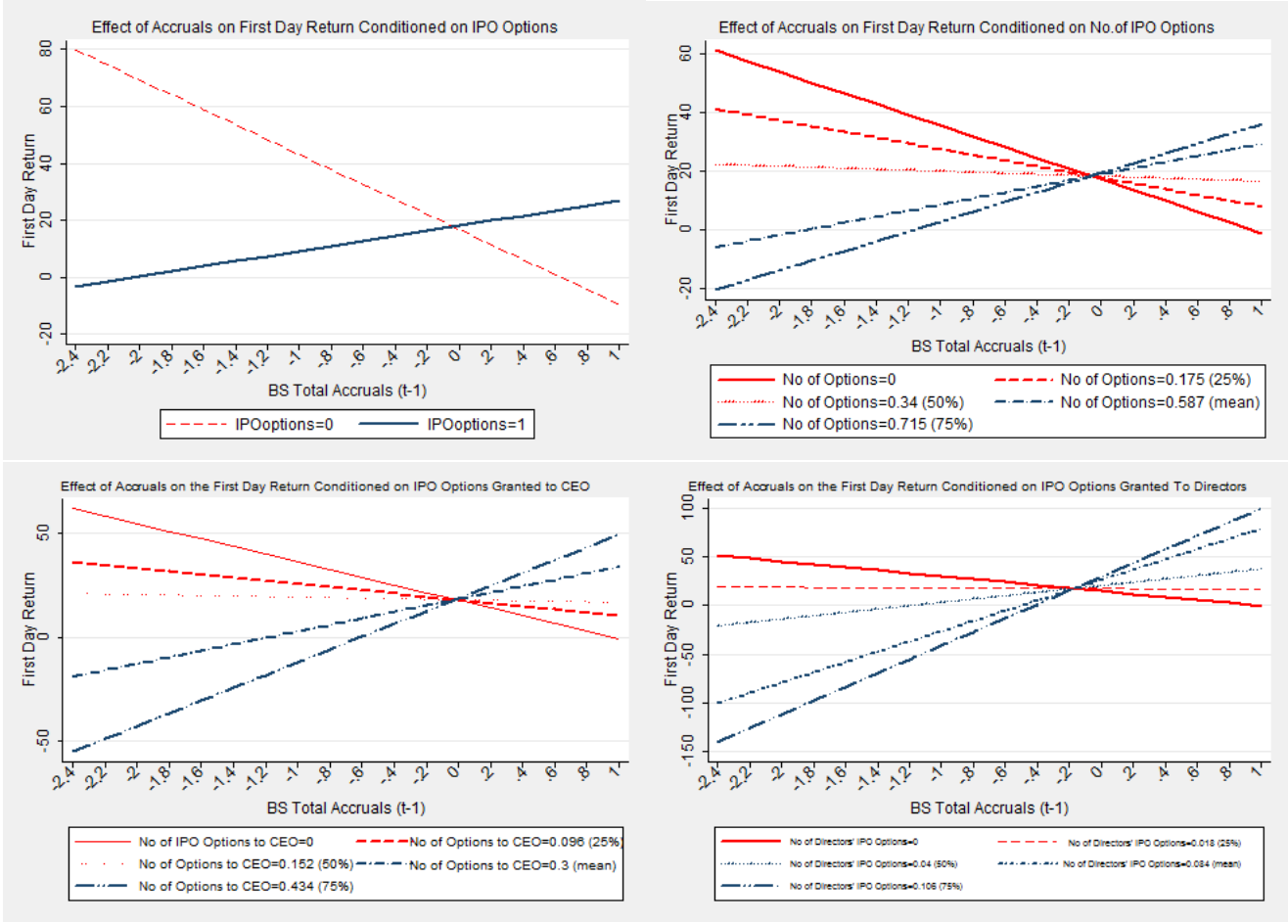


Figure 1.2: Effect of total BS accruals$_{(t-1)}$ on first-day return conditioned on IPO options

Table 1.5: Subsample regressions of first-day return on accruals

The sample runs from May 1996 to December 2013. The dependent variable is the first-day return defined as percentage difference between first-day market closing price and the offer price. IPO Options are defined as incentive stock options grants at the IPO date with exercise price equal to the IPO offer price. First two columns stand for the subsample of carve-outs that didn't grant IPO options while second two columns stand for the subsample of carve-outs that grant IPO options. BS Accruals are total accruals computed from the comparable balance sheet of each carve-out one year prior to the IPO (columns 1 and 3) while CF Accruals are total accruals computed from the cash flow statements one year prior to the IPO (columns 2 and 4). Controlling variables are defined in the Appendix of the paper.

Dependent variable: FirstDayReturn $FDR_i = \beta_0 + \beta_1(Accruals_{t-1})_i + \beta_2' X_i + \varepsilon_i$

	(1)	(2)	(3)	(4)
	NO IPO options subsample		**IPO options subsample**	
	BS Accruals	**CF Accruals**	**BS Accruals**	**CF Accruals**
Intercept	-0.435	31.072	13.709	13.441
	(0.994)	(0.582)	(0.713)	(0.719)
Accruals $_{(t-1)}$	**-24.772****	**-54.631*****	7.492	10.450
	(0.016)	(0.000)	(0.519)	(0.603)
Controls:				
$ln(Firm\ Sales_{(t-1)})$	-6.863	**-8.773***	-2.244	-2.069
	(0.210)	(0.093)	(0.606)	(0.637)
$\frac{Total\ Liabilities_{(t-1)}}{Total\ Assets_{(t-1)}}$	**-10.035*****	**-10.499*****	6.285	3.419
	(0.001)	(0.000)	(0.657)	(0.785)
$ln(1+\frac{Shares\ Retained}{Shares\ Offered})$	2.965	5.560	9.305	10.301
	(0.742)	(0.511)	(0.300)	(0.253)
$ln(\frac{Price}{Sales_{(t-1)}})$	-2.920	-7.821	2.253	2.274
	(0.628)	(0.188)	(0.713)	(0.713)
Underwriter Rank	0.696	0.986	-1.703	-1.593
	(0.516)	(0.331)	(0.284)	(0.310)
Nasdaq Dummy	-1.843	-3.663	-9.481	-8.451
	(0.871)	(0.731)	(0.349)	(0.400)
Internet IPO Dummy	-28.076	-29.096	**39.496***	**39.117***
	(0.217)	(0.171)	(0.081)	(0.089)
Average Underpricing	0.640*	**0.817****	-0.140	-0.156
	(0.057)	(0.013)	(0.666)	(0.627)
Prior 30 day Industry Return	**41.179***	33.468	-43.386	-45.135
	(0.078)	(0.126)	(0.174)	(0.155)
Prior 30 day SD of Ind.Ret.	108.679	307.254	-1133.547	-1198.829
	(0.947)	(0.843)	(0.320)	(0.292)
Prior 30 day EW Index	-30.193	-22.554	63.572	64.534
	(0.466)	(0.559)	(0.145)	(0.140)
$ln(\frac{Price}{Sales_{(t-1)}})_{industry}$	-30.958	-32.249	21.233	19.947
	(0.170)	(0.130)	(0.334)	(0.367)
Offer Price Revision	0.222	0.203	**1.304****	**1.330****
	(0.243)	(0.254)	(0.016)	(0.015)
Negative Offer Price Revision	0.394	0.487	-0.983	-1.050
	(0.376)	(0.245)	(0.217)	(0.193)
% of IPOs Price Revision Up	-0.113	-0.217	-0.065	-0.062
	(0.639)	(0.346)	(0.802)	(0.810)
Industry Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES
Observations	125	125	102	102
R-squared	64.26%	68.24%	64.26%	64.13%
Adj. R-squared	26.14%	34.35%	5.02%	4.65%
p-values in parentheses	*** p<0.01,	** p<0.05,	* p<0.1	

Table 1.6: Cross-sectional regressions of FDR on changes of accruals conditioned on IPO options

The sample runs from May 1996 to December 2013. The dependent variable is the first-day return defined as percentage difference between first-day market closing price and the offer price. IPO Options are defined as incentive stock options grants at the IPO date with exercise price equal to the IPO offer price. IPO Options(0,1) is dummy variable set to 1 if executives received IPO options 0 otherwise (column 1 and 2). Executives' IPO options is the number of IPO options (in millions) grants to the executives (column 3 and 4) while CEO Option Grants is the number of IPO options granted to the CEO (column 5 and 6). Directors Options Grants is the number of IPO options granted to the board members (column 7 and 8). ∆BS Accruals are changes in total accruals from pre-IPO year to the IPO year computed from the balance sheet of each carve-out (columns 1,3,5 and 7) while ∆CF Accruals are changes in total accruals from pre-IPO year to the IPO year computed from the cash flow statements (columns 2,4,6 and 8). Controlling variables are defined in the Appendix of the paper.

Dependent variable:	$FDR_i = \beta_0 + \beta_1 IPOoptions_i + \beta_2 \, \Delta \, Accruals_i + \beta_3 \, \Delta \, Accruals_i * IPOoptions_i + \beta_4' X_i + \varepsilon_i$							
first-day Return	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	IPO Options (0,1)		**Executives' IPO options**		**CEO Option Grants**		**Directors Option Grants**	
	∆BS Accruals	**∆CF Accruals**	**∆BS Accruals**	**∆CF Accruals**	**∆BS Accruals**	**∆CF Accruals**	**∆BS Accruals**	**∆CF Accruals**
Intercept	3.638	7.697	2.940	3.900	-0.250	-3.253	4.399	7.750
	(0.925)	(0.841)	(0.939)	(0.918)	(0.995)		(0.907)	(0.834)
IPO Options	0.552	1.325	-0.934	0.293	-5.489	-4.922	**90.810****	60.832
	(0.913)	(0.793)	(0.844)	(0.950)	(0.583)	(0.617)	(0.034)	(0.173)
$\Delta Accruals_{(t)-(t-1)}$	8.471	**21.503***	**8.116***	**24.795****	**8.220***	**24.035****	6.400	**19.265****
	(0.188)	(0.082)	(0.100)	(0.017)	(0.100)	(0.019)	(0.201)	(0.040)
IPO Options*$\Delta Accruals_{(t)-(t-1)}$	-6.645	-21.756	**-27.365***	**-80.622*****	**-60.111***	**-179.692*****	-81.563	**-830.233****
	(0.447)	(0.241)	(0.100)	(0.009)	(0.100)	(0.009)	(0.710)	(0.020)
Controls:								
$ln(Firm\,Sales_{(t-1)})$	-3.156	-3.229	-3.292	-3.008	-2.947	-2.376	-3.525	-3.501
	(0.258)	(0.243)	(0.260)	(0.291)	(0.313)	(0.406)	(0.201)	(0.195)
$\frac{Total\,Liabilities_{(t-1)}}{Total\,Assets_{(t-1)}}$	**-4.212***	-2.936	**-4.410***	-3.020	**-4.446***	-2.973	**-4.104***	-3.090
	(0.077)	(0.150)	(0.058)	(0.131)	(0.057)	(0.137)	(0.072)	(0.119)
$ln(1+\frac{Shares\,Retained}{Shares\,Offered})$	6.319	7.181	7.406	**9.103***	7.291	**9.093***	6.262	7.054
	(0.242)	(0.184)	(0.174)	(0.092)	(0.181)	(0.093)	(0.238)	(0.175)
$ln(\frac{Price}{Sales_{(t-1)}})$	2.052	1.305	1.727	1.006	1.876	1.187	1.858	0.573
	(0.555)	(0.707)	(0.625)	(0.772)	(0.594)	(0.732)	(0.587)	(0.867)
Underwriter Rank	-0.307	-0.302	-0.222	-0.180	-0.226	-0.200	-0.472	-0.490
	(0.697)	(0.701)	(0.777)	(0.815)	(0.773)	(0.796)	(0.549)	(0.524)
Nasdaq Dummy	-1.318	-0.880	-1.455	-0.670	-0.825	0.227	-1.783	-1.257
	(0.829)	(0.885)	(0.811)	(0.911)	(0.892)	(0.970)	(0.771)	(0.832)
Internet IPO Dummy	19.118	19.330	**22.511***	**23.909***	**22.454***	**23.847***	10.421	11.409
	(0.131)	(0.123)	(0.077)	(0.054)	(0.076)	(0.052)	(0.422)	(0.357)
Average Underpricing	0.274	**0.306***	0.249	**0.345***	0.252	**0.358****	0.289	**0.348****
	(0.126)	(0.089)	(0.161)	(0.051)	(0.155)	(0.044)	(0.101)	(0.046)
Prior 30 day Industry Return	21.772	17.581	20.180	12.929	19.966	11.952	**24.794***	19.008
	(0.127)	(0.219)	(0.158)	(0.364)	(0.161)	(0.402)	(0.082)	(0.175)
Prior 30 day SD of Ind.Ret.	-81.749	-138.747	-282.417	-182.854	-267.846	-113.229	179.455	220.714
	(0.915)	(0.854)	(0.715)	(0.805)	(0.729)	(0.878)	(0.815)	(0.766)
Prior 30 day EW Index	-4.295	2.204	-3.689	7.692	-3.713	9.203	-6.343	1.486
	(0.847)	(0.921)	(0.867)	(0.726)	(0.866)	(0.676)	(0.773)	(0.945)
$ln(\frac{Price}{Sales_{(t-1)}})_{industry}$	4.824	3.019	5.371	5.359	5.182	6.501	0.204	-0.790
	(0.712)	(0.818)	(0.679)	(0.675)	(0.690)	(0.612)	(0.988)	(0.951)
Offer Price Revision	**0.288***	**0.275***	**0.283***	0.229	**0.288***	0.233	**0.296***	0.228
	(0.068)	(0.079)	(0.070)	(0.138)	(0.066)	(0.130)	(0.056)	(0.137)
Negative Offer Price Revision	0.238	0.293	0.252	0.294	0.238	0.267	0.376	0.479
	(0.449)	(0.347)	(0.424)	(0.340)	(0.449)	(0.385)	(0.241)	(0.121)
% of IPOs Price Revision Up	-0.078	-0.137	-0.097	-0.164	-0.102	-0.156	-0.065	-0.104
	(0.592)	(0.366)	(0.501)	(0.258)	(0.482)	(0.278)	(0.651)	(0.459)
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Observations	227	227	227	227	227	227	227	227
R-squared	45.11%	45.58%	45.84%	47.59%	45.84%	47.61%	46.60%	48.76%
Adj. R-squared	16.74%	17.46%	17.84%	20.51%	17.86%	20.54%	19.00%	22.28%
p-values in parentheses	*** p<0.01,	** p<0.05,	* p<0.1					

The first two columns are under specification where IPO options is a binary variable. Third and forth columns are under specification where IPO options is the number of IPO options (in million) granted to the top executives of the carve-out company while in the next two columns (5 and 6) it is the number of IPO options granted just to the CEO. Columns 7 and 8 report the cross-sectional regressions where IPO options is the number of options (in million) granted to the board members of the carve-out. In all different specifications of IPO options first columns (column 1, 3, 5 and 7 respectively) are regressions where changes in total accruals are measured from the balance sheet while in the second column (column 2, 4, 6 and 8 respectively) they are measured from the cash flow statement. In almost all regressions and for all different specifications of IPO options and total accruals there is a positive statistically significant relationship between the changes in total accruals and first-day return for companies that did not grant IPO options (coefficient β_2) that I interpret as a sign of earnings management. The positive relationship between changes in total accruals between the IPO year and the pre-IPO year and the first-day return (β_2) is offset by the coefficient β_3 that has opposite sign. This finding gives an ex-post evidence that in the subsample of equity carve-outs that grant IPO options there is no evidence of earnings management in the period around the IPO (both in the pre-IPO year and in the IPO year).

1.4.2 Decomposition of the first-day return

I decompose the first-day return in two parts: first one comes from low offer price (undervaluation) and second one comes from high first-day market price (overpricing) by using industry peers' multiples. I explained the details of the methodology in section 3.2.2. Table 1.7 reports the average first-day return and its two parts for the entire sample (column 1) and for the two subsamples of equity carve-outs: those that did not grant IPO options (column 2) and those that grant IPO options (column 3). All variables are winsorized at 1% in order to make sure that extreme values of the distribution don't drive the results.[6]

[6]Due to winsorizing the sum of offer price undervaluation and market price overpricing does not give exactly the first-day return.

Table 1.7: Summary statistics of the decomposed first-day return

Column 1 stands for the decomposed first-day return of the entire sample that runs from May 1996 to December 2013. Column 2 and 3 are for the subsamples of carve-outs conditioned on IPO option grants. First-day return is defined as percentage difference between first-day closing market price and the offer price. Offer price undervaluation is defined as percentage difference between intrinsic price and the offer price, while market price overpricing is percentage difference between first-day closing market price and the intrinsic price. Intrinsic price is computed by the average value of the price-to-sales ratios of three most similar (matched by sales and profitability) industry peers at the IPO date multiplied by the sales of the respective carve-out.

	Whole Sample	***No IPO Options***	***IPO Options***
	(1)	(2)	(3)
Observations	227	125	102
First-Day Return (%)	17.99%	19.39%	16.27%
Offer Price Undervaluation (%)	-7.91%	-12.12%	-2.76%*
Market Price Overpricing (%)	25.21%	30.50%	18.73%*

*) Asterisks denote significant differences between two subsamples based on t-statistics.

$$First\ Day\ Return = \frac{first\ day\ closing\ price - offer\ price}{offer\ price} * 100$$

$$Offer\ Price\ Undervaluation = \frac{Intrinsic\ Price - Offer\ Price}{Offer\ Price} * 100$$

$$Market\ Overpricing = \frac{First\ Day\ Closing\ Price - Intrinsic\ Price}{Offer\ Price} * 100$$

I find that carve-outs that did not grant IPO options are actually overvalued by 12.12% on average compared to their industry peers i.e. their offer price is set higher than the price at which industry peers were trading at the day of the IPO. This result is consistent with the finding of Purnanandam and Swaminathan (2004) that the median IPO was significantly overvalued at the offer price from 14% and above depending on the peer matching criteria. It is also in the line with my predictions that these companies are inflating the earnings by using abnormal positive accruals in the IPO period. Institutional investors are misled in the book-building process and as a result the offer price is set higher than the fair value of the company. Individual investors are misled as well and they are overoptimistic toward the new issue resulting in very high first-day secondary market closing price that deviates from the industry peers on average by 30.5%. As expected the effect on the individual investors is stronger because they are less informed and more anchored to earnings than the institutional investors. On the other hand, the offer price of carve-outs that grant IPO options to their executives is set close to their industry peers. They are overvalued only by 2.76% on average and I interpret this as a sign for more realistic reporting in the IPO period. Market overoptimism is significantly lower than the other subsample resulting in lower first-day return.

In order to test the second and third hypothesis of the paper (*H2* and *H3*) whether the overvaluation of the offer price and overpricing by the market are affected by reporting distortion in the year prior to the IPO and how this relationship differs between two subsets of equity carve-outs I estimate the following equations under different specifications of IPO options grants:

$$Offer\ price\ undervaluation = \beta_0 + \beta_1 IPOoptions_i + \beta_2 (DAC_{t-1})_i + \beta_3 (DAC_{t-1})_i * IPOoptions_i + \beta_4' X_i + \varepsilon_i$$

$$Market\ overpricing = \beta_0 + \beta_1 IPOoptions_i + \beta_2 (DAC_{t-1})_i + \beta_3 (DAC_{t-1})_i * IPOoptions_i + \beta_4' X_i + \varepsilon_i \ ;$$

where $IPOoptions_i$ are different specifications of IPO options grants and X_i is the battery of control variables that are likely to affect the first-day return explained in the Appendix. Note that here I am using discretionary accruals $(DAC_{(t-1)})_i$ as a more direct measure of earnings management.[7]

The results are in Table 1.8. In the first three column I regress the offer price undervaluation under different specifications of IPO options grants (binary, number of options granted to executives and number of options granted to the CEO) while in the next three columns the dependent variable is the market price overpricing.

In the first three regressions (column 1, 2 and 3) for all different specifications of IPO options there is a positive statistically significant relationship between discretionary accruals and offer price undervaluation for companies that did not grant IPO options (coefficient β_2). Lower (for example negative) discretionary accruals in the pre-IPO period lead to lower offer price undervaluation or in my case of equity carve-outs on average to overvaluation for the subsample of companies that did not grant IPO options to their executives. I interpret this finding as a sign of earnings management. Lower accruals in the pre-IPO period allow these companies to have "reserves" and report higher accruals in the IPO year that increase the earnings. As a result of inflated earnings the offer price of the carve-out is set higher than the industry peers i.e. the company is overvalued.

For the other subsample of carve-outs that granted IPO options to their executives this relationship is offset by the interaction term that has opposite sign (coefficient of interest is the sum of β_2 and β_3). As argued before these managers do not have an

[7]Total accruals are not always a sign for earnings management (their reversal and dynamics during the time might be). I estimate the discretionary (abnormal) accruals using the performance-adjusted modified Jones model as explained in section 3.2.3 using the industry peers and assuming that on average their accruals should be considered as normal for respective company. The most simple way to look at discretionary accruals is like a difference between total accruals and normal accruals. They are clearly more direct measure to detect earnings managment than total accruals.

incentive to set higher offer price, in contrast they have an incentive to set the offer price as low as possible because this is the strike price of their options and they will profit more when they will exercise the options after the vesting period. There is no direct relationship between the offer price and the IPO options grants, but this is expected because it's hard to believe that previous division managers can influence directly the offer price. However, they do have an influence over the reporting practices of the division. I argue that they do not use aggressive accounting techniques to inflate the earnings in the IPO period. As a matter of fact I do find that on average their offer price is set more closely to their industry peers.

Next (in column 4, 5 and 6) I regress the market overpricing measure to see how reporting distortions in the pre-IPO period affect the first-day market closing price conditioned on IPO option grants. As expected for all different specifications of IPO options there is a negative statistically significant relationship between discretionary accruals and market overpricing for companies that did not granted IPO options (coefficient β_2). Low level of accruals in the pre-IPO period leads to higher first-day market price and higher first-day return. Investors anchored to earnings are mislead by the abnormal accruals and they are overoptimistic about those issues. In my sample of equity carve-outs the average market overpricing is 30.5%.

In contrast, for carve-outs that grant IPO options to their executives overoptimism is significantly lower than the other sample because these executives do not have an incentive to inflate the earnings in the IPO year. Indeed, they have an incentive to sacrifice the short-term performance for the sake of the long-run performance. My results are supporting the hypothesis that companies that grant IPO options do not manage earnings in the IPO period, so first-day market price cannot be predicted by reporting distortion in the year prior to the IPO. In Table 1.6 the negative coefficient of discretionary accruals (that I interpret as a sign of earnings management) is offset by the interaction term that has opposite sign.

1.4.2.1 Instrumental variable estimation

Under the managerial influence hypothesis, reporting "habits" and the two components of the first-day return are endogenously determined by subsidiary management. Table 1.9 addresses these endogeneity issues by estimating determinants of earnings management and the components of the first-day return in two-stage least-squares system of regressions. My focus is the subsample of carve-outs that grant IPO options. I want to

Table 1.8: Regressions of the components of the first-day return on accruals conditioned on IPO options

The sample runs from May 1996 to December 2013. The dependent variable in the first three columns is the offer price undervaluation defined as percentage difference between the intrinsic price and the offer price. The dependent variable in the last three columns is market price overpricing defined as percentage difference between the first-day closing market price and the intrinsic price. Intrinsic price is computed by the average value of the price-to-sales ratios of three most similar (matched by sales and profitability) industry peers at the IPO date multiplied by the sales of the respective carve-out. IPO Options are defined as incentive stock options grants at the IPO date with exercise price equal to the IPO offer price. IPO Options(0,1) is dummy variable set to 1 if executives received IPO options 0 otherwise (column 1 and 4). Executives' IPO options is the number of IPO options (in millions) grants to the executives (column 2 and 5) while CEO Option Grants is the number of IPO options granted to the CEO (column 3 and 6). DAC are discretionary accruals computed using performance-adjusted modified Jones model. Controlling variables are defined in the Appendix of the paper.

	Dependent variable: Offer Price Undervaluation			*Dependent variable: Market Price Overpricing*		
	(1)	(2)	(3)	(4)	(5)	(6)
	IPO Options (0,1)	**Executives' Options**	**CEO's Options**	**IPO Options (0,1)**	**Executives' Options**	**CEO's Option**
Intercept	-127.355	-132.845	-131.346	121.839	125.947	123.348
	(0.228)	(0.209)	(0.217)	(0.261)	(0.246)	(0.258)
IPO Options	-4.183	-8.430	-15.673	4.721	7.060	11.851
	(0.762)	(0.521)	(0.572)	(0.740)	(0.600)	(0.676)
$DAC_{(t-1)}$	**38.894****	**25.685***	**27.243***	**-39.666****	**-27.165***	**-29.272****
	(0.033)	(0.070)	(0.058)	(0.034)	(0.062)	(0.047)
IPO Options*$DAC_{(t-1)}$	**-47.929****	**-61.588*****	**-143.831*****	**47.961****	**63.785*****	**152.739*****
	(0.028)	(0.009)	(0.009)	(0.033)	(0.008)	(0.007)
Controls:						
$ln(Firm\,Sales_{(t-1)})$	-2.458	-1.599	-2.098	0.418	-0.181	0.437
	(0.745)	(0.839)	(0.791)	(0.957)	(0.982)	(0.957)
$\frac{Total\,Liabilities_{(t-1)}}{Total\,Assets_{(t-1)}}$	-1.919	-2.126	-1.964	-0.306	-0.165	-0.370
	(0.737)	(0.706)	(0.728)	(0.958)	(0.977)	(0.949)
$ln(1+\frac{Shares\,Retained}{Shares\,Offered})$	-3.256	-3.004	-3.021	10.159	9.677	9.659
	(0.827)	(0.840)	(0.839)	(0.506)	(0.525)	(0.526)
$ln(\frac{Price}{Sales_{(t-1)}})$	**-42.683*****	**-43.605*****	**-44.323*****	**46.148*****	**47.286*****	**48.106*****
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Underwriter Rank	1.175	1.156	1.215	-1.614	-1.570	-1.623
	(0.571)	(0.575)	(0.556)	(0.448)	(0.459)	(0.443)
Nasdaq Dummy	**30.349***	**33.324****	**33.060****	**-32.157***	**-35.022****	**-34.572****
	(0.072)	(0.047)	(0.050)	(0.063)	(0.042)	(0.045)
Internet IPO Dummy	-9.636	-5.963	-6.148	15.193	12.294	12.551
	(0.776)	(0.859)	(0.854)	(0.663)	(0.722)	(0.715)
Average Underpricing	0.733	0.741	0.741	-0.607	-0.615	-0.612
	(0.135)	(0.127)	(0.128)	(0.227)	(0.217)	(0.219)
Prior 30 day Industry Return	0.213	-6.710	-6.149	19.460	25.977	23.545
	(0.996)	(0.864)	(0.854)	(0.627)	(0.518)	(0.557)
Prior 30 day SD of Ind.Ret.	1389.195	1340.535	1477.920	-1637.512	-1609.080	-1742.564
	(0.507)	(0.517)	(0.475)	(0.446)	(0.449)	(0.411)
Prior 30 day EW Index	44.020	50.237	50.280	-45.734	-52.300	-52.482
	(0.473)	(0.409)	(0.408)	(0.467)	(0.402)	(0.400)
$ln(\frac{Price}{Sales_{(t-1)}})_{industry}$	-23.084	-15.818	-14.955	30.909	23.754	22.870
	(0.521)	(0.657)	(0.675)	(0.403)	(0.516)	(0.531)
Offer Price Revision	-0.487	-0.460	-0.468	0.775*	0.750*	0.759*
	(0.259)	(0.282)	(0.274)	(0.081)	(0.088)	(0.084)
Negative Offer Price Revision	-0.326	-0.289	-0.260	0.477	0.420	0.381
	(0.706)	(0.739)	(0.764)	(0.591)	(0.637)	(0.668)
% of IPOs Price Revision Up	-0.193	-0.148	-0.136	0.191	0.141	0.125
	(0.628)	(0.708)	(0.732)	(0.640)	(0.729)	(0.758)
Industry Fixed Effects	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES
Observations	227	227	227	227	227	227
R-squared	57.91%	58.53%	58.51%	60.36%	60.99%	61.70%
Adj. R-squared	36.16%	37.10%	37.07%	39.88%	40.84%	40.96%
p-values in parentheses	*** p<0.01,	** p<0.05,	* p<0.1			

support the finding that IPO option granting companies are less engaged in earnings management in the IPO period and as a result their first-day return cannot be predicted by reporting distortions in the pre-IPO period.

Finding an instrument that is correlated with earnings management (discretionary accruals), but not correlated to the error term is a very challenging task. I hypothesize that managers who are hiding the real performance of the company are trying to mislead the audience by more complicate prospectuses for the issue. "Hotter" issues are followed by more updates and more pages in each update compared to less "hot" issues. I find that number of pages and updates of the prospectuses are positively correlated to the earnings management measure but they are uncorrelated to the components of the first-day return. I hand collect the number of pages in the prospectus for each carve-out and I multiply it by the number of updates. The identifying variable for discretionary accruals as measure for earnings management is total number of pages of the prospectuses for each carve-out.

The dependent variable in the first-stage (column 1 in Table 1.8) is the discretionary accruals in the year prior to the IPO. Total number of pages in the prospectuses for each carve-out is significantly and positively related to the earnings management measure. More pages in the prospectuses lead to higher accruals and less pages in the prospectuses lead to lower accruals.

The second-stage regressions (column 2 and 3) address the managerial influence hypothesis after controlling for endogeneity. The regression in Column 2 indicates that lower discretionary accruals in the pre-IPO year lead to higher undervaluation of the offer price compared to industry peers i.e. lower offer price than the peers. In the subsample of carve-out that grant IPO options subsidiary management has an incentive to push down the offer price by using more conservative accounting techniques. On the other hand, regression in Column 3 indicates that lower discretionary accruals in the pre-IPO year lead to lower overpricing i.e. lower secondary market first-day price.

The estimated coefficients of the discretionary accruals in the second stage regressions (column 2 and 3) are symmetric. Both of them are statistically significant with almost same magnitude but with opposite direction (sign). An average discretionary accruals of 0.0377 in the pre-IPO year for the subsample of carve-outs that grant IPO options to their management explains 3.5 percentage points of the offer price undervaluation compared to the industry peers. This is offset by 3.6 percentage points of secondary market overpricing. The total effect on the first-day return is almost zero.

Therefore, even after controlling for potential endogeneity, I find that the predictive

power of discretionary accruals in pre-IPO year on future returns for the companies that grant IPO options decreases to zero on average. This finding supports the main finding of the paper that IPO options are good governance mechanism to decrease opportunistic reporting by the managers in the years around the IPO.

1.5 Robustness tests

1.5.1 Initial Return

Ruud (1993) points out that positive mean first-day returns are partially due to unobserved left (negative) tail of distribution of initial return because of underwriters' price support in the first days of the IPO. Underwrites legally can and do intervene to support IPO prices (Rule 10b-7, Securities Act of 1934). The effect of such support is to reduce the number of negative initial returns from what would otherwise be observed in the market. In sum, underwriter price support or stabilization are alternating the distribution of initial returns (positively skewed): stock prices are allowed to rise but are prevented from falling below the offer price until the issue is fully sold. As a conclusion, first-day closing market price might not be good proxy for the expected market value of the company, it is also due to the short-term price pressure created by the underwrites.

In order to make sure that this phenomena does not affect my results I use second day market price and seventh day secondary market price (when price will be stabilized after the initial pressure) to measure initial return and market overpricing. I compute the initial return as follow:

$$Initial\ Return\ (2nd\ Day\ Price) = \frac{second\ day\ market\ closing\ price - offer\ price}{offer\ price} * 100$$

$$Initial\ Return(7th\ Day\ Price) = \frac{seventh\ day\ market\ closing\ price - offer\ price}{offer\ price} * 100$$

I repeat all regressions reported in Table 1.3 by using second and seventh day return as dependent variables. The results that total accruals in the pre-IPO year can partially explain the cross-sectional variation of the initial return conditioned on IPO options grants are robust also to these two specifications of initial returns. Table 1.10 reports the results where the dependent variable is the initial return calculated by using second day market price. The results are robust to this test. In some cases the magnitude is even higher (for CEO and directors option grants).

Table 1.9: Two-stage least-squares regressions explaining offer price undervaluation and market price overpricing for the subsample of companies that granted IPO options

The first column reports the results from the first stage regression where the dependent variable are dicreationary accruals computed using performance-adjusted modified Jones model while the explainatory variable are total number of pages in prospectuses for each carve-out that granted IPO options. The esimated value of the discretionary accruals is used to explain offer price undervaluation (defined as percentage difference between the intrinsic price and the offer price) reported in column 2 and market price overpricng (percentage difference between the first-day closing market price and the intrinsic price) reported in column 3 for the subsample of carve-outs that grant IPO options. Intrinsic price is computed by the average value of the price-to-sales ratios of three most similar (matched by sales and profitability) industry peers at the IPO date multiplied by the sales of the respective carve-out. Controlling variables are defined in the Appendix of the paper.

	First-stage results	*Second-stage results*	
	Dep. var: $DAC_{(t-1)}$	*Dep.var.*: Offer Price Undervaluation	*Dep.var.*: Market Price Overpricing
Intercept	0.748	66.301	-52.268
	(0.332)	(0.347)	(0.456)
Number of Pages in the Prospectuses	**0.0003*** **		
	(0.010)		
$DAC_{(t-1)}$		**-93.674*** **	**96.089*** **
		(0.007)	(0.006)
Controls:			
$ln(Firm\ Sales_{(t-1)})$	-0.125	6.980	-9.371
	(0.186)	(0.389)	(0.246)
$\frac{Total\ Liabilities_{(t-1)}}{Total\ Assets_{(t-1)}}$	**-0.685*** **	**-73.305** **	**77.901** **
	(0.007)	(0.025)	(0.016)
$ln(1+\frac{Shares\ Retained}{Shares\ Offered})$	-0.022	-23.470	**33.360** **
	(0.904)	(0.169)	(0.049)
$ln(\frac{Price}{Sales_{(t-1)}})$	-0.165	**-27.739** **	**29.335** **
	(0.187)	(0.019)	(0.013)
Underwriter Rank	0.016	0.218	-1.845
	(0.613)	(0.941)	(0.530)
Nasdaq Dummy	0.073	**56.381*** **	**-65.614*** **
	(0.725)	(0.004)	(0.001)
Internet IPO Dummy	-0.156	**-86.884** **	**112.713*** **
	(0.715)	(0.026)	(0.004)
Average Underpricing	-0.005	-0.601	0.480
	(0.428)	(0.305)	(0.409)
Prior 30 day Industry Return	-0.256	**-100.775** *	58.271
	(0.686)	(0.081)	(0.310)
Prior 30 day SD of Ind.Ret.	7.030	1846.563	-3125.490
	(0.764)	(0.393)	(0.146)
Prior 30 day EW Index	0.500	**174.193** **	-111.819
	(0.563)	(0.030)	(0.161)
$ln(\frac{Price}{Sales_{(t-1)}})_{industry}$	-0.132	-65.376	**85.418** **
	(0.767)	(0.103)	(0.032)
Offer Price Revision	**-0.023** *	**-2.052** **	**3.413*** **
	(0.058)	(0.043)	(0.001)
Negative Offer Price Revision	**-0.050** **	2.559	**-3.722** **
	(0.011)	(0.132)	(0.028)
% of IPOs Price Revision Up	-0.001	-0.142	0.086
	(0.896)	(0.763)	(0.855)
Industry Fixed Effects	YES	YES	YES
Year Fixed Effects	YES	YES	YES
Observations	102	102	102
R-squared	70.64%	65.77%	73.14%
Adj. R-squared and Partial R-squared	21.95% / 14.95%		
	F-stat = 6.7	Wald chi2=240.1	Wald chi2=312.2
	Prob>F=0.010	Prob>chi2=0.000	Prob>chi2=0.000

Table 1.10: Cross-sectional regressions of the initial return (2nd day market price)

The sample runs from May 1996 to December 2013. The dependent variable is the initial return defined as percentage difference between the second day market closing price and the offer price. IPO Options are defined as incentive stock options grants at the IPO date with exercise price equal to the IPO offer price. IPO Options(0,1) is dummy variable set to 1 if executives received IPO options 0 otherwise (column 1 and 2). Executives' IPO options is the number of IPO options (in millions) grants to the executives (column 3 and 4) while CEO Option Grants is the number of IPO options granted to the CEO (column 5 and 6). Directors Options Grants is the number of IPO options granted to the board members (column 7 and 8). BS Accruals are total accruals computed from the comaprable balance sheet of each carve-out one year prior to the IPO (columns 1,3,5 and 7) while CF Accruals are total accruals computed from the cash flow statements one year prior to the IPO (columns 2,4,6 and 8). Controlling variables are defined in the Appendix of the paper.

Dependent variable: $Initial\ Return_i = \beta_0 + \beta_1 IPOoptions_i + \beta_2(Accruals_{t-1})_i + \beta_3(Accruals_{t-1})_i * IPOoptions_i + \beta_4' X_i + \varepsilon_i$

Initial Return-2nd day price	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	IPO Options (0,1)		**Executives' IPO options**		**CEO Option Grants**		**Directors Option Grants**	
	BS Accruals	**CF Accruals**	**BS Accruals**	**CF Accruals**	**BS Accruals**	**CF Accruals**	**BS Accruals**	**CF Accruals**
Intercept	26.144	47.063	15.190	42.559	8.836	32.846	11.528	29.623
	(0.571)	(0.155)	(0.739)	(0.340)	(0.846)	(0.463)	(0.798)	(0.488)
IPO Options	0.062	2.544	3.461	9.652	2.321	13.901	**166.319*** **	**255.042*** **
	(0.992)	(0.670)	(0.561)	(0.133)	(0.849)	(0.281)	(0.002)	(0.000)
Accruals $_{(t-1)}$	**-21.295** **	**-57.751*** **	**-15.801** **	**-55.2030*** **	**-16.122** **	**-53.674*** **	-10.433	**-36.864*** **
	(0.031)	(0.000)	(0.043)	(0.000)	(0.038)	(0.000)	(0.154)	(0.001)
IPO Options*Accruals $_{(t-1)}$	**36.561*** **	**72.656*** **	**65.433*** **	**109.230*** **	**152.789*** **	**249.146*** **	**924.781** **	**2201.529*** **
	(0.009)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.012)	(0.000)
Controls:								
$ln(Firm\ Sales_{(t-1)})$	-2.497	-2.742	-2.128	-2.981	-1.557	-2.038	-2.014	-2.755
	(0.447)	(0.388)	(0.530)	(0.363)	(0.645)	(0.535)	(0.536)	(0.367)
$\frac{Total\ Liabilities_{(t-1)}}{Total\ Assets_{(t-1)}}$	-3.224	**-4.516** *	-2.885	**-5.366** **	-2.889	**-5.252** **	-1.875	**-4.082** *
	(0.219)	(0.077)	(0.252)	(0.034)	(0.249)	(0.038)	(0.450)	(0.091)
$ln(1+\frac{Shares\ Retained}{Shares\ Offered})$	5.919	7.426	7.725	7.295	7.375	6.797	4.048	2.691
	(0.355)	(0.232)	(0.223)	(0.234)	(0.243)	(0.267)	(0.523)	(0.649)
$ln(\frac{Price}{Sales_{(t-1)}})$	1.913	-0.884	2.446	-0.891	2.758	-0.222	2.803	0.359
	(0.644)	(0.829)	(0.553)	(0.828)	(0.501)	(0.957)	(0.489)	(0.927)
Underwriter Rank	-0.414	-0.317	-0.366	-0.249	-0.353	-0.257	-0.442	-0.410
	(0.642)	(0.713)	(0.677)	(0.769)	(0.687)	(0.762)	(0.623)	(0.624)
Nasdaq Dummy	-0.762	0.241	-0.941	-0.656	0.432	1.089	1.466	-0.928
	(0.916)	(0.973)	(0.895)	(0.924)	(0.952)	(0.875)	(0.842)	(0.890)
Internet IPO Dummy	**53.829*** **	**53.502*** **	**58.692*** **	**54.989*** **	**59.147*** **	**55.849*** **	**38.355** **	**27.542** *
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.012)	(0.052)
Average Underpricing	0.298	**0.381** *	0.242	**0.381** *	0.239	**0.385** *	0.336	**0.510** **
	(0.163)	(0.067)	(0.249)	(0.062)	(0.254)	(0.060)	(0.111)	(0.011)
Prior 30 day Industry Return	**32.919** *	24.985	**31.950** *	22.959	**31.712** *	22.485	**36.161** **	**33.602** **
	(0.053)	(0.130)	(0.058)	(0.161)	(0.059)	(0.170)	(0.033)	(0.034)
Prior 30 day SD of Ind.Ret.	-684.453	-744.971	-884.549	-967.468	-809.901	-878.770	-215.435	-71.040
	(0.450)	(0.394)	(0.321)	(0.261)	(0.361)	(0.306)	(0.810)	(0.933)
Prior 30 day EW Index	-25.941	-19.845	-24.927	-15.652	-24.960	-13.478	-20.085	-22.047
	(0.328)	(0.437)	(0.338)	(0.533)	(0.337)	(0.592)	(0.444)	(0.367)
$ln(\frac{Price}{Sales_{(t-1)}})_{industry}$	13.044	11.630	16.724	15.611	17.088	16.381	5.899	-1.987
	(0.402)	(0.439)	(0.275)	(0.290)	(0.263)	(0.268)	(0.704)	(0.892)
Offer Price Revision	0.297	**0.308** *	0.270	0.278	0.274	0.281	**0.336** *	**0.303** *
	(0.114)	(0.089)	(0.143)	(0.118)	(0.136)	(0.113)	(0.071)	(0.079)
Negative Offer Price Revision	0.288	0.355	0.219	0.288	0.199	0.254	0.427	0.360
	(0.440)	(0.326)	(0.553)	(0.420)	(0.589)	(0.476)	(0.253)	(0.306)
% of IPOs Price Revision Up	-0.186	**-0.283** *	-0.190	**-0.295** *	-0.196	**-0.295** *	-0.114	-0.182
	(0.288)	(0.099)	(0.267)	(0.079)	(0.250)	(0.080)	(0.500)	(0.257)
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Observations	227	227	227	227	227	227	227	227
R-squared	46.99%	50.60%	48.75%	52.27%	49.06%	52.13%	48.68%	55.00%
Adj. R-squared	19.60%	25.07%	22.26%	27.60%	22.73%	27.39%	22.15%	31.74%
p-values in parentheses	*** p<0.01,	** p<0.05,	* p<0.1					

The negative statistically significant relationship between total accruals and initial return for companies that did not grant IPO options (coefficient β_2) is preserved even if initial price pressure caused by underwriters intervention is eliminated. The negative relationship between total accruals in the year preceding the IPO and the initial return (β_2) is offset by the coefficient β_3 that has opposite sign as in the main finding of the paper (Table 1.3). This finding confirms the main result that in the subsample of equity carveout that granted IPO options there is no evidence of earnings management in the period around the IPO. The results are also robust when the initial return is measured using the market price one week (7 days) after the IPO. The results are reported in Table 1.11.

Next I compute the market overpricing measure using second and seventh day closing market pricing:

$$Market\ Overpricing\ (2^{nd}\ Day\ Price) = \frac{Second\ Day\ Closing\ Price - Intrinsic\ Price}{Offer\ Price} * 100$$

$$Market\ Overpricing\ (7^{th}\ Day\ Price) = \frac{Seventh\ Day\ Closing\ Price - Intrinsic\ Price}{Offer\ Price} * 100$$

I repeat the regressions from Table 1.8 (column 4, 5 and 6) in order to see weather reporting distortions in the pre-IPO period that affect the market overoptimism are not driven only by initial price pressure caused by the underwriters. The results are in Table 1.12. For all different specifications of IPO options there is a negative statistically significant relationship between discretionary accruals and market overpricing for companies that did not grant IPO options. Investors anchored to earnings are mislead by the abnormal accruals and they are overoptimistic about those issues. This relationship is offset by the coefficient β_3 for carve-outs that grant IPO options. The results are also robust when the market overpricing is measured using the market price one week (7 days) after the IPO.

1.5.2 Matching procedure

I compute the intrinsic (fair) value of the carve-outs using three matching firms from same industry (3-digit SIC) as explained in section 3.1 and 3.2.2. Taking an average of three matches might not be the best solution. The ideal way is to find company with same characters as the subject company and see at which multiple it was trading at the day of the IPO of the carveout. In order to see weather the results are robust to the matching procedure I change it as follows: from the set of matching firms from same industry, for each carveout I keep three (instead of five) comparable firms that

Table 1.11: Cross-sectional regressions of the initial return (7th day market price)

The sample runs from May 1996 to December 2013. The dependent variable is the initial return defined as percentage difference between seventh day market closing price and the offer price. IPO Options are defined as incentive stock options grants at the IPO date with exercise price equal to the IPO offer price. IPO Options(0,1) is dummy variable set to 1 if executives received IPO options 0 otherwise (column 1 and 2). Executives' IPO options is the number of IPO options (in millions) grants to the executives (column 3 and 4) while CEO Option Grants is the number of IPO options granted to the CEO (column 5 and 6). Directors Options Grants is the number of IPO options granted to the board members (column 7 and 8). BS Accruals are total accruals computed from the comaprable balance sheet of each carve-out one year prior to the IPO (columns 1,3,5 and 7) while CF Accruals are total accruals computed from the cash flow statements one year prior to the IPO (columns 2,4,6 and 8). Controlling variables are defined in the Appendix of the paper.

Dependent variable: $Initial\ Return_i = \beta_0 + \beta_1 IPOoptions_i + \beta_2(Accruals_{t-1})_i + \beta_3(Accruals_{t-1})_i * IPOoptions_i + \beta_4' X_i + \varepsilon_i$

Initial Return-7th day price	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	IPO Options (0,1)		**Executives' IPO options**		**CEO Option Grants**		**Directors Option Grants**	
	BS Accruals	**CF Accruals**	**BS Accruals**	**CF Accruals**	**BS Accruals**	**CF Accruals**	**BS Accruals**	**CF Accruals**
Intercept	20.390	33.040	9.131	27.198	3.531	18.844	8.975	19.452
	(0.636)	(0.441)	(0.829)	(0.521)	(0.934)	(0.657)	(0.831)	(0.629)
IPO Options	-0.755	1.089	0.079	4.850	-3.423	5.286	**136.847*** **	**221.773*** **
	(0.893)	(0.848)	(0.989)	(0.426)	(0.163)	(0.666)	(0.007)	(0.000)
Accruals $_{(t-1)}$	-12.930	**-35.944*** **	-9.964	**-35.824*** **	-10.053	**-34.219*** **	-5.644	**-21.84** **
	(0.158)	(0.009)	(0.169)	(0.004)	(0.163)	(0.006)	(0.407)	(0.041)
IPO Options*Accruals $_{(t-1)}$	**27.205** **	**53.180*** **	**52.86*** **	**85.343*** **	**122.532*** **	**192.718*** **	**802.529** **	**2041.24*** **
	(0.037)	(0.009)	(0.003)	(0.001)	(0.002)	(0.001)	(0.019)	(0.000)
Controls:								
$ln(Firm\ Sales_{(t-1)})$	-2.244	-2.298	-1.487	-2.009	-1.050	-1.274	-1.839	-2.217
	(0.463)	(0.447)	(0.637)	(0.519)	(0.739)	(0.683)	(0.544)	(0.441)
$\frac{Total\ Liabilities_{(t-1)}}{Total\ Assets_{(t-1)}}$	0.993	0.289	1.143	-0.434	1.161	-0.310	1.973	0.559
	(0.684)	(0.905)	(0.625)	(0.856)	(0.619)	(0.897)	(0.394)	(0.805)
$ln(1+\frac{Shares\ Retained}{Shares\ Offered})$	5.284	6.491	6.406	6.157	6.149	5.780	3.662	2.469
	(0.375)	(0.271)	(0.278)	(0.290)	(0.296)	(0.321)	(0.535)	(0.658)
$ln(\frac{Price}{Sales_{(t-1)}})$	1.726	0.059	2.456	0.330	2.659	0.838	2.397	0.995
	(0.654)	(0.988)	(0.522)	(0.932)	(0.486)	(0.829)	(0.525)	(0.787)
Underwriter Rank	-0.617	-0.561	-0.549	-0.479	-0.539	-0.484	-0.622	-0.607
	(0.457)	(0.493)	(0.502)	(0.553)	(0.509)	(0.549)	(0.458)	(0.442)
Nasdaq Dummy	-2.816	-2.086	-2.713	-2.532	-1.469	-1.026	-0.711	-2.742
	(0.677)	(0.754)	(0.683)	(0.698)	(0.826)	(0.876)	(0.917)	(0.664)
Internet IPO Dummy	**44.736*** **	**44.972*** **	**49.902*** **	**47.358*** **	**49.861*** **	**47.639*** **	**32.919** **	**24.438** *
	(0.002)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.020)	(0.067)
Average Underpricing	**0.353** *	**0.408** **	0.313	**0.413** **	0.313	**0.418** **	**0.388** **	**0.531*** **
	(0.077)	(0.040)	(0.110)	(0.033)	(0.110)	(0.032)	(0.049)	(0.005)
Prior 30 day Industry Return	**29.126** *	23.927	**27.217** *	20.959	**27.186** *	20.778	**31.574** **	**30.292** **
	(0.066)	(0.127)	(0.083)	(0.178)	(0.082)	(0.182)	(0.045)	(0.043)
Prior 30 day SD of Ind.Ret.	-829.16	-860.53	-1010.13	-1053.77	-928.21	-962.28	-441.284	-281.470
	(0.326)	(0.301)	(0.224)	(0.198)	(0.261)	(0.239)	(0.597)	(0.722)
Prior 30 day EW Index	-32.813	-28.828	-31.555	-24.817	-31.455	-23.050	-27.709	-30.073
	(0.185)	(0.236)	(0.193)	(0.299)	(0.194)	(0.336)	(0.257)	(0.193)
$ln(\frac{Price}{Sales_{(t-1)}})_{industry}$	10.413	9.350	13.514	12.563	13.812	13.178	4.362	-3.100
	(0.472)	(0.513)	(0.343)	(0.370)	(0.332)	(0.349)	(0.763)	(0.823)
Offer Price Revision	**0.351** **	**0.361** **	**0.336** *	**0.344** **	**0.338** **	**0.345** **	**0.388** **	**0.361** **
	(0.046)	(0.037)	(0.051)	(0.042)	(0.049)	(0.042)	(0.025)	(0.027)
Negative Offer Price Revision	0.149	0.180	0.066	0.103	0.055	0.081	0.254	0.158
	(0.667)	(0.598)	(0.849)	(0.762)	(0.874)	(0.812)	(0.464)	(0.634)
% of IPOs Price Revision Up	-0.219	**-0.281** *	-0.229	**-0.299** *	-0.233	**-0.296** *	-0.164	-0.208
	(0.181)	(0.086)	(0.152)	(0.062)	(0.144)	(0.065)	(0.300)	(0.170)
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Observations	227	227	227	227	227	227	227	227
R-squared	46.13%	47.71%	48.00%	49.54%	48.20%	49.36%	47.93%	53.13%
Adj. R-squared	18.30%	20.69%	21.13%	23.47%	21.43%	23.20%	22.15%	28.91%
p-values in parentheses	*** p<0.01,	** p<0.05,	* p<0.1					

Table 1.12: Regressions of the market price overpricing computed with alternative market prices

The sample runs from May 1996 to December 2013. The dependent variable in the first three columns is the market price overpricing defined as percentage difference between the second day closing market price and the intrinsic price. The dependent variable in the last three columns is market price overpricing defined as percentage difference between the seventh day closing market price and the intrinsic price. Intrinsic price is computed by the average value of the price-to-sales ratios of three most similar (matched by sales and profitability) industry peers at the IPO date multiplied by the sales of the respective carve-out. IPO Options are defined as incentive stock options grants at the IPO date with exercise price equal to the IPO offer price. IPO Options(0,1) is dummy variable set to 1 if executives received IPO options 0 otherwise (column 1 and 4). Executives' IPO options is the number of IPO options (in millions) grants to the executives (column 2 and 5) while CEO Option Grants is the number of IPO options granted to the CEO (column 3 and 6). DAC are discretionary accruals computed using performance-adjusted modified Jones model. Controlling variables are defined in the Appendix of the paper.

	Dep.var.: Market Overpricing (2nd day price)			*Dep.var.: Market Overpricing (7th day price)*		
	(1)	(2)	(3)	(4)	(5)	(6)
	IPO Options (0,1)	**Executives' Options**	**CEO's Options**	**IPO Options (0,1)**	**Executives' Options**	**CEO's Option**
Intercept	135.209	138.271	135.293	136.979	135.984	132.642
	(0.215)	(0.205)	(0.217)	(0.228)	(0.232)	(0.246)
IPO Options	3.341	5.957	9.318	2.198	3.427	4.684
	(0.815)	(0.659)	(0.744)	(0.883)	(0.808)	(0.875)
$DAC_{(t-1)}$	**-34.216***	**-24.119***	**-26.148***	**-35.181***	**-24.104***	**-26.118***
	(0.069)	(0.098)	(0.077)	(0.073)	(0.100)	(0.090)
IPO Options*$DAC_{(t-1)}$	**43.334***	**61.979****	**148.197*****	**47.454****	**66.554*****	**158.234*****
	(0.054)	(0.011)	(0.009)	(0.044)	(0.009)	(0.007)
Controls:						
$ln(Firm\ Sales_{(t-1)})$	0.344	-0.119	0.513	0.378	-0.420	1.030
	(0.965)	(0.988)	(0.950)	(0.963)	(0.960)	(0.903)
$\frac{Total\ Liabilities_{(t-1)}}{Total\ Assets_{(t-1)}}$	-0.287	-0.237	-0.432	3.592	3.688	3.495
	(0.961)	(0.967)	(0.941)	(0.560)	(0.543)	(0.565)
$ln(1+\frac{Shares\ Retained}{Shares\ Offered})$	9.147	8.777	8.738	8.908	8.147	8.172
	(0.552)	(0.566)	(0.567)	(0.578)	(0.610)	(0.608)
$ln(\frac{Price}{Sales_{(t-1)}})$	**44.923*****	**46.109*****	**46.911*****	**44.507*****	**46.237*****	**47.000*****
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Underwriter Rank	-1.649	-1.602	-1.651	-1.863	-1.776	-1.833
	(0.441)	(0.451)	(0.437)	(0.404)	(0.423)	(0.409)
Nasdaq Dummy	**-32.671***	**-35.283****	**-34.766****	**-34.240***	**-36.878****	**-36.194****
	(0.061)	(0.041)	(0.045)	(0.060)	(0.041)	(0.045)
Internet IPO Dummy	16.965	14.775	14.949	26.733	24.835	24.585
	(0.628)	(0.670)	(0.664)	(0.465)	(0.492)	(0.494)
Average Underpricing	-0.537	-0.540	-0.536	-0.432	-0.431	-0.425
	(0.288)	(0.279)	(0.283)	(0.412)	(0.408)	(0.414)
Prior 30 day Industry Return	15.748	21.834	19.435	18.112	23.451	21.102
	(0.696)	(0.388)	(0.629)	(0.667)	(0.577)	(0.615)
Prior 30 day SD of Ind.Ret.	-1876.0	-1843.2	-1966.3	-2122.6	-2089.9	-2199.4
	(0.385)	(0.388)	(0.356)	(0.347)	(0.348)	(0.322)
Prior 30 day EW Index	-50.467	-56.969	-57.041	-64.482	-70.342	-70.287
	(0.425)	(0.363)	(0.362)	(0.329)	(0.282)	(0.282)
$ln(\frac{Price}{Sales_{(t-1)}})_{industry}$	32.110	25.548	24.722	31.427	24.549	23.662
	(0.387)	(0.486)	(0.500)	(0.417)	(0.522)	(0.536)
Offer Price Revision	**0.773***	**0.755***	**0.764***	**0.833***	**0.820***	**0.827***
	(0.084)	(0.087)	(0.083)	(0.074)	(0.075)	(0.073)
Negative Offer Price Revision	0.574	0.495	0.458	0.448	0.338	0.305
	(0.519)	(0.579)	(0.607)	(0.630)	(0.717)	(0.742)
% of IPOs Price Revision Up	0.133	0.083	0.068	0.049	0.005	-0.019
	(0.747)	(0.838)	(0.867)	(0.910)	(0.992)	(0.964)
Industry Fixed Effects	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES
Observations	227	227	227	227	227	227
R-squared	60.03%	60.79%	60.86%	58.41%	59.18%	59.26%
Adj. R-squared	39.37%	40.53%	40.63%	36.92%	38.09%	38.20%
p-values in parentheses	*** p<0.01,	** p<0.05,	* p<0.1			

are closest in sales scaled by total assets in the year prior to the IPO. Out of the three selected peers I keep only one (instead of three) comparable firm with closest operating income scaled by total assets to the respective carveout. I consider this firm as best match for each carveout. Table 1.13 compares the fundamentals of the carve-outs and their best match.

Under this matching procedure matching firms again share similar sales and operating income distribution characteristics as the carve-outs for the both subsamples: IPO option graters and no IPO option granters. However they trade at different price to sales ratio.

The subsample of carve-outs that did not grant IPO options seems overvalued compared to their industry peers. This is in the line with my hypothesis that those companies manage earnings in the IPO period and inflated earnings mislead the market participants resulting in overvaluation compared to the industry peers.

Then I decompose the first-day return in two parts under the new matching procedure: undervalued offer price and overpriced first-day market price by using industry peers' multiples. Table 1.14 reports the average first-day return and its two parts for the entire sample (column 1) and for the two subsamples of equity carve-outs: those that didn't grant IPO options (column 2) and those that granted IPO options (column 3). All variables are winsorized at 1% in order to make sure that extreme values of the distribution don't drive the results.

I find again that carve-outs that did not grant IPO options are actually overvalued by 10.33% on average compared to their best matched firm (on sales and profitability) from same industry on the same date. On the other hand the carve-outs that grant IPO options have offer price very close to the their industry peer (they are overvalued only by 2.7% on average). The deviation of the first-day market closing price from the intrinsic (fair) price is much higher for the subsample of carve-outs that did not grant IPO options indicating that for these carve-outs the market overoptimism is much higher than for carve-outs that grant IPO options to their executives.

Table 1.13: Characteristics of the carve-outs and their best match

The sample of carve-outs runs from May 1996 to December 2013. For each carve-out there is only one matching firm that is industry peer with most similar sales and profitability. Price-to-Sales ratio of the carve-outs is the product of the offer price and shares outstanding (all share classes) over the reported sales one year prior to the IPO. Price-to-Sales ratio of the matching firm is computed as a product of the trading price of the respective firm at IPO date times shares outstanding over the sales reported one year prior the cohort IPO year.

	Carve-outs				***Matching Firms***			
Characteristics	mean	25%	50%	75%	mean	25%	50%	75%
Whole Sample (227obs.)								
$\frac{Sales_{(t-1)}}{Total\ Assets_{(t-1)}}$	1.28	0.55	0.98	1.73	1.23	0.61	1.06	1.68
$\frac{Operating\ Income_{(t-1)}}{Total\ Assets_{(t-1)}}$	0.10	0.06	0.12	0.19	0.10	0.07	0.12	0.17
$\frac{Price_{(t)}}{Sales_{(t-1)}}$	13.63	1.11	2.24	6.24	3.61	0.44	1.11	2.74
IPO Options=0 (125 obs.)								
$\frac{Sales_{(t-1)}}{Total\ Assets_{(t-1)}}$	1.11	0.53	0.89	1.55	1.11	0.54	0.94	1.53
$\frac{Operating\ Income_{(t-1)}}{Total\ Assets_{(t-1)}}$	0.06	0.03	0.11	0.17	0.09	0.06	0.12	0.17
$\frac{Price_{(t)}}{Sales_{(t-1)}}$	20.09	1.39	2.83	8.10	4.12	0.54	1.41	3.31
IPO Options=1 (102 obs.)								
$\frac{Sales_{(t-1)}}{Total\ Assets_{(t-1)}}$	1.49	0.63	1.27	1.97	1.37	0.67	1.23	1.88
$\frac{Operating\ Income_{(t-1)}}{Total\ Assets_{(t-1)}}$	0.14	0.08	0.12	0.20	0.12	0.09	0.12	0.17
$\frac{Price_{(t)}}{Sales_{(t-1)}}$	5.71	0.84	1.76	3.75	2.98	0.36	0.88	2.37

Table 1.14: Summary statistics of the decomposed first-day return under different matching criteria (using single match)

Column 1 stands for the decomposed first-day return of the entire sample that runs from May 1996 to December 2013. Column 2 and 3 are for the subsamples of carve-outs conditioned on IPO option grants. First-day return is defined as percentage difference between first-day closing market price and the offer price. Offer price undervaluation is defined as percentage difference between intrinsic price and the offer price, while market price overpricing is percentage difference between first-day closing market price and the intrinsic price. Intrinsic price is computed by the price-to-sales ratio of the most similar (matched by sales and profitability) industry peer at the IPO date multiplied by the sales of the respective carve-out.

	Whole Sample	***No IPO Options***	***IPO Options***
	(1)	(2)	(3)
Observations	227	125	102
First-Day Return (%)	17.99%	19.39%	16.27%
Offer Price Undervaluation (%)	-6.90%	-10.33%	-2.70%*
Market Price Overpricing (%)	24.80%	29.43%	19.13%*

*) Asterisks denote significant differences between two subsamples based on t-statistics.

$$First\ Day\ Return = \frac{first\ day\ closing\ price - offer\ price}{offer\ price} * 100$$

$$Offer\ Price\ Undervaluation = \frac{Intrinsic\ Price - Offer\ Price}{Offer\ Price} * 100$$

$$Market\ Overpricing = \frac{First\ Day\ Closing\ Price - Intrinsic\ Price}{Offer\ Price} * 100$$

In order to test weather the overvaluation of the offer price and overpricing by the market are affected by reporting distortion in the year prior to the IPO and how this relationship differs between two subsets of equity carve-outs I estimate the same linear models as in Table 1.8 with dependent variables computed under the new matching procedure (see Table 1.15). Positive statistically significant relationship remained unchanged between discretionary accruals and offer price undervaluation for companies that did not grant IPO options (coefficient β_2) under the new matching procedure. Lower discretionary accruals in the pre-IPO period lead to lower offer price undervaluation or in my case of equity carve-outs on average to overvaluation for the subsample of companies that did not grant IPO options to their executives. For the other subsample of carve-outs that granted IPO options to their executives this relationship is offset by the interaction term that has opposite sign (coefficient of interest is the sum of β_2 and β_3). The results are also robust when I use second and seventh day market price to compute market overpricing measure.

Table 1.15: Regressions of the components of the first-day return under different matching procedure (using single match)

The sample runs from May 1996 to December 2013. The dependent variable in the first three columns is the offer price undervaluation defined as percentage difference between the intrinsic price and the offer price. The dependent variable in the last three columns is market price overpricing defined as percentage difference between the first-day closing market price and the intrinsic price. Intrinsic price is computed by the value of the price-to-sales ratio of the most similar (matched by sales and profitability) industry peer at the IPO date multiplied by the sales of the respective carve-out. IPO Options are defined as incentive stock options grants at the IPO date with exercise price equal to the IPO offer price. IPO Options(0,1) is dummy variable set to 1 if executives received IPO options 0 otherwise (column 1 and 4). Executives' IPO options is the number of IPO options (in millions) grants to the executives (column 2 and 5) while CEO Option Grants is the number of IPO options granted to the CEO (column 3 and 6). DAC are discretionary accruals computed using performance-adjusted modified Jones model. Controlling variables are defined in the Appendix of the paper.

	Dependent variable: Offer Price Undervaluation			*Dependent variable: Market Price Overpricing*		
	(1)	(2)	(3)	(4)	(5)	(6)
	IPO Options (0,1)	**Executives' Options**	**CEO's Options**	**IPO Options (0,1)**	**Executives' Options**	**CEO's Option**
Intercept	-174.376	-206.348	-206.192	177.083	205.172	203.029
	(0.189)	(0.120)	(0.123)	(0.193)	(0.131)	(0.138)
IPO Options	-2.488	**-32.480****	**-59.102***	2.044	**30.289***	52.994
	(0.886)	(0.049)	(0.090)	(0.909)	(0.073)	(0.138)
$DAC_{(t-1)}$	**50.942****	28.474	**31.647***	**-58.624****	**-34.194***	**-38.024****
	(0.026)	(0.107)	(0.079)	(0.013)	(0.060)	(0.040)
IPO Options*$DAC_{(t-1)}$	**-59.867****	**-63.171****	**-156.210****	**67.748****	**72.661****	**181.505*****
	(0.029)	(0.032)	(0.023)	(0.016)	(0.016)	(0.010)
Controls:						
$ln(Firm\ Sales_{(t-1)})$	1.645	6.790	5.751	-4.720	-9.364	-8.111
	(0.863)	(0.491)	(0.562)	(0.628)	(0.355)	(0.425)
$\frac{Total\ Liabilities_{(t-1)}}{Total\ Assets_{(t-1)}}$	-0.302	-1.042	-0.725	-2.945	-2.154	-2.524
	(0.966)	(0.883)	(0.918)	(0.689)	(0.766)	(0.728)
$ln(1+\frac{Shares\ Retained}{Shares\ Offered})$	23.841	20.754	21.236	-18.677	16.081	-16.617
	(0.204)	(0.264)	(0.254)	(0.330)	(0.399)	(0.384)
$ln(\frac{Price}{Sales_{(t-1)}})$	**-34.362*****	**-32.330*****	**-33.854*****	**36.310*****	**34.931*****	**36.632*****
	(0.004)	(0.007)	(0.005)	(0.003)	(0.005)	(0.003)
Underwriter Rank	2.272	2.588	2.620	-2.594	-2.863	-2.892
	(0.383)	(0.478)	(0.312)	(0.331)	(0.280)	(0.276)
Nasdaq Dummy	**44.183****	**49.682****	**50.463****	**-45.816****	**-51.538****	**-51.961****
	(0.038)	(0.018)	(0.017)	(0.035)	(0.017)	(0.017)
Internet IPO Dummy	-43.346	-29.899	-33.658	61.490	48.230	51.894
	(0.310)	(0.478)	(0.423)	(0.161)	(0.265)	(0.229)
Average Underpricing	0.609	0.631	0.644	-0.334	-0.353	-0.362
	(0.322)	(0.298)	(0.289)	(0.596)	(0.570)	(0.561)
Prior 30 day Industry Return	6.233	-10.409	-6.309	14.863	31.162	26.648
	(0.899)	(0.832)	(0.897)	(0.767)	(0.535)	(0.596)
Prior 30 day SD of Ind.Ret.	1771.973	1484.642	1808.756	-1903.227	-1620.240	-1943.089
	(0.501)	(0.566)	(0.485)	(0.480)	(0.542)	(0.465)
Prior 30 day EW Index	79.155	87.366	88.699	-84.980	-93.097	-94.380
	(0.304)	(0.251)	(0.245)	(0.282)	(0.233)	(0.227)
$ln(\frac{Price}{Sales_{(t-1)}})_{industry}$	1.944	13.147	14.086	4.426	-7.615	-8.624
	(0.966)	(0.768)	(0.752)	(0.924)	(0.868)	(0.851)
Offer Price Revision	-0.552	-0.485	-0.509	0.845	0.780	0.805
	(0.308)	(0.364)	(0.342)	(0.129)	(0.156)	(0.143)
Negative Offer Price Revision	0.181	-0.013	0.085	0.017	0.175	0.066
	(0.868)	(0.990)	(0.938)	(0.988)	(0.875)	(0.953)
% of IPOs Price Revision Up	-0.514	-0.509	-0.485	0.453	0.440	0.411
	(0.306)	(0.304)	(0.329)	(0.378)	(0.387)	(0.419)
Industry Fixed Effects	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES
Observations	227	227	227	227	227	227
R-squared	54.34%	55.46%	55.31%	55.81%	56.74%	56.68%
Adj. R-squared	30.74%	32.44%	32.22%	32.97%	34.38%	34.29%
p-values in parentheses	*** p<0.01,	** p<0.05,	* p<0.1			

1.6 Conclusion

This paper examines the hypothesis that managers select accruals at the time around the IPO opportunistically depending on their compensation packages. I use the specific environment when a conglomerate is selling one of it's devision to the public (equity carve-out) to show that division managers are choosing different accounting policy that depends on how they are incentivized and these policies influence the initial performance of the company. I find that the first-day return of the newly issued subsidiary stock is partially explained by the reporting distortions in the pre-IPO period conditioned on whether the executives and directors of the subsidiary received stock options with an exercise price equal to the IPO offer price (IPO options). In case of equity carve-outs IPO options give unique one-side incentive to executives to push down the offer price as much as possible, unlike in standard IPOs where there are two sides of the incentives story of the executives that are in striking contrast: profit from the IPO options and loss from the diluted previous holdings in the company. Since division managers are mid-level executives in the parent company they do not have an influence over the offer price directly. I find a sign of such relation only for carve-outs that granted IPO options to their board members (positive and statistically significant relationship between IPO option grants and initial return). However, I find that managers incentivized by IPO options are using less aggressive accounting techniques in the years around the IPO. Their reported earnings are more realistic compared to the other subsample of managers that did not receive such option grants. I find that pre-IPO total accruals are negatively related to initial return only for carve-outs that did not grant IPO options to their executives which I interpret as earnings management. Additionally, I find that only these carve-outs are overvalued compared to their industry peer. In presence of IPO options the negative relationship between total pre-IPO accruals and initial return is reversed to become positive indicating that managers that are incentivized by IPO options are sacrificing the short term performance (initial return) and trying to have an offer price as low as possible. They do not seek to increase their offering proceeds, by temporarily deceiving investors by opportunistically manipulating earnings through accruals management before going public. Further, I find that these issues are followed by less overoptimism (overpricing) in the secondary market resulting in lower first-day return and it is partially explained by the discretionary accruals in the year prior to the IPO. I conclude that incentive stock options are good governance mechanism to decrease opportunistic reporting by the managers in the years around the IPO.

The findings contribute to the vast literature of earnings management. I show that predictive power of accruals differs depending on the executives compensation packages. This is an indirect proof that earnings are managed intentionally by the management. Accruals as a measure of earnings management and as predictor of future returns should be seen trough lens of the executives and how they are incentivized. My findings are potentially useful for investors and regulators. Investors are concerned about whether they are trading at the fair initial price and at which direction earnings management affects the short-term return. Accounting and financial regulators must be concerned about the informativeness of the accounting numbers and how accurately accounting information communicates firm performance to capital markets.

Appendix: Control Variable Definitions

The appendix lists the control variables used in all regressions in this paper. Column 1 provides the variable name. Column 2 describes how the variable was computed and Column 3 provides the data source. Column 4 cites one paper that uses the variable.

Variable	Description	Data Source	Reference
$ln(Firm\ Sales_{(t-1)})$	Ln of annual sales (REVT) reported one year prior to the IPO	Hand-collected	Arugaslan and Kieschnick (2004)
$\frac{Total\ Liabilities_{(t-1)}}{Total\ Assets_{(t-1)}}$	Ratio of Total Liabilities (LT) to Total Assets (AT) reported one year prior to the IPO	Hand-collected	Habib and Ljungqvist (2001)
$ln(1+\frac{Shares\ Retained}{Shares\ Offered})$	$Shares\ Retained = Shares\ Outstanding - Shares\ Sold$ Shares outstanding equals the sum from all share classes	CRSP Daily, SDC, Compustat	Bradley and Jordan (2002)
$ln(\frac{Price}{Sales_{(t-1)}})$	$ln(\frac{Offer\ Price*Shares\ Otstanding}{Sales_{(t-1)}})$ Shares outstanding equals the sum from all share classes	CRSP Daily, SDC Hand-collected	Purnanandam and Swaminathan (2004)
Underwriter Rank	Matched lead SDC bookrunners code to modified Carter-Manaster rankings on Jay Ritter website	SDC, Jay Ritter Website	Carter and Manaster (1990)
Nasdaq Dummy	Dummy=1 if IPO listed on Nasdaq	SDC	Bradley and Jordan (2002)
Internet IPO Dummy	Dummy=1 if the firm is classified as internet firm	Jay Ritter Website	Aggarwal and Womack (2002)
Average Underpricing in previous month	Average IPO first trading day return in the month prior to IPO issue date	Jay Ritter Website	Cliff and Denis (2004)
Prior 30 day Industry Return	$\hat{\mu}_{j,t} = \frac{1}{30}\sum_{i=t-31}^{t-1} Two\ Digit\ SIC\ Industry\ Return_{i,j}$ where t is the IPO issue date and j is one of 99 industry groups	CRSP Daily	Edelen and Kadlec (2005)
Prior 30 day SD of Ind.Ret.	$\sigma_{j,t} = \left\{\frac{1}{29}\sum_{i=t-31}^{t-1}\left(Two\ Digit\ SIC\ Industry\ Return_{i,j} - \hat{\mu}_{j,t}\right)^2\right\}^{\frac{1}{2}}$	CRSP Daily	Ljungqvist and Wilhelm (2002)
Prior 30 day EW Index	$\hat{\mu}_t = \frac{1}{30}\sum_{i=t-31}^{t-1} CRSP\ Equal\ Weighted\ Index\ Return_i$ where t is the IPO issue date	CRSP Daily	Ljungqvist and Wilhelm (2002)
$ln(\frac{Price}{Sales_{(t-1)}})_{industry}$	Rolling 12 month median of industry (2-digit SIC) market to sales ratio market value=price close annual fiscal*shares outstanding	Compustat	Purnanandam and Swaminathan (2004)
Offer Price Revision	$\frac{(Offer\ Price - Middle\ Filing\ Range)}{Middle\ Filing\ Range} * 100$	SDC	Bradley and Jordan (2002)
Negative Offer Price Revision	Equals Offer Price Revision if Offer Price Revision<0; otherwise=0	SDC	Lowry and Schwert (2002)
% of IPOs Price Revision Up	% of IPOs priced above the midpoint of the original price range one month prior the IPO month	Jay Ritter Website	Loughran and Ritter (1995)

Chapter 2

Are Incentive Stock Options Signaling Better Corporate Governance? - An Evidence from Equity Carve-outs

Abstract

I analyze the long-run performance and earnings management behavior of equity carve-outs conditioned on whether the executives received incentive stock options at the IPO date. Carve-outs that did not grant incentive stock options subsequently underperform both relative to the overall market and relative to a sample of carve-outs that granted stock options. I show that in absence of incentive stock options, companies adopt more income-increasing accounting techniques around the IPO. Accruals in years around the IPO explain the cross-sectional variation of the long-run stock market and accounting underperformance. Contrarily, carve-outs that grant incentive stock options to their executives at the IPO date do not underperform appropriate benchmarks over three-year period following the IPO and use less aggressive accounting around the IPO. My results point that incentive stock options are signaling better corporate governance to the market that result in better long-run stock market and accounting performance.

JEL classifications: M41; G12; G24; G34; J33

Keywords: Earnings management; Initial public offerings; IPO long-run performance; Equity carve-outs; Executive compensation; Incentive stock options

2.1 Introduction

An equity carve-out is a type of corporate reorganization, in which a conglomerate is selling one of its devision to the public (IPO). As a part of the reorganization the division (middle-level) managers become CEOs of a publicly listed company. Compensation contracts of the subsidiary managers are revised in order to incorporate subsidiary share prices and profits as measure of performance. New contracts are becoming more efficient. Often incentive stock options granted at the IPO date are part of the revised contracts. Those options usually have an exercise (strike) price equal to the IPO offer price (IPO options in the rest of the paper) with payoff equal to max (0, St - Offer Price). Subsidiary managers who received such incentive stock options don't have an incentive to push up the offering price of the IPO because it will decrease their future payoff. At the other side, subsidiary managers who don't have IPO options (have only shares) in their new contracts have an incentive to window dress the company before going public by using more aggressive accounting techniques in order to pump-up the performance around the IPO. As a result of their earnings management behavior around the IPO subsequently these carve-outs experience long-run stock market and accounting underperformance both relative to the overall market and relative to the sample of carve-outs that granted incentive stock options. I find that the long-run underperformance is explained by the earnings management measure (level of accruals, both total and discretionary) around the IPO.

In this paper I study the long-run performance of equity carve-outs conditioned on whether they award the ex-subsidiary managers incentive stock options at the IPO date. I show that incentive stock options are signaling better corporate governance to the market (less managed earnings) resulting in better long-run stock market and accounting performance.

Carve-outs that don't grant stock options at the IPO date underperform both in terms of stock returns and in terms of accounting profits (return on assets). The underperformance is significant both relative to the overall market and relative to the sample of carve-outs that granted stock options. The long-run underperformance is explained by the high accruals around the IPO. Absence of incentive stock options in the revised contracts is a signal for bad corporate governance measured with earnings management (accruals) resulting in poor long-run performance.

Long-run underperformance of standard IPOs has been confirmed by several studies: Stern and Bornstein (1985); Ritter (1991); Loughran and Ritter (1995). Furthermore,

Teoh and Wong (1998) provide an evidence that issuers with unusually high accruals in the IPO year experience poor stock return performance in the three years thereafter. There is an evidence in the literature that equity carve-outs do not share same characteristics as standard IPOs. Namely, Vijh (1999) shows that newly issued subsidiary stock beat appropriate benchmarks over a three-year period following the carve-out. In this paper I show that only better governed carve-outs that don't have incentive to manage earnings during the IPO outperform appropriate benchmarks. On the other hand, carve-outs with poor corporate governance that manipulate earnings around the IPO underperform appropriate benchmarks sharing same stylized fact of long-run underperformance as standard IPOs.

Only in case of equity carve-outs incentive stock options granted at the IPO date (usually with exercise price equal to the offer price) give unique one-side incentive to the executives not to push up the offer price by using income-increasing techniques around the IPO because it will decrease their future payoffs. Higher offer price will not increase their previous holdings because they remained in the conglomerate. In standard IPOs there are two sides of the incentive story of the executives that are in striking contrast: executives who received options will loose from higher offer price, but at the same time they will benefit if they hold shares or options granted before the IPO. Lowry and Murphy (2007) look at all IPOs and their hypothesis is that if executives can influence the IPO offer price there should be a positive relationship between IPO option grants and the first-day return. They do not find evidence of a such relationship.

Seistrajkova (2015) finds that carve-out companies that grant IPO options on average experience less initial underpricing compared to companies that did not grant IPO options. She interpret the smaller underpricing as a function of less managed earnings in the years around the IPO. Furthermore she finds that for carve-outs that granted IPO options, the offer price is set more closely to the price of their industry peers, while for carve-outs that did not grant options the offer price overvalues the company on average by 12% compared to their industry peers. This paper is continuity of the her previous work that shows that carve-outs that didn't incentivezed their managers with IPO options underperform on long-run compared to different benchmarks. The underperformance is explained by earnings management behavior around the IPO.

My sample covers all carve-outs for period from May 1996 to December 2013. I hand collect data on IPO options grants from prospectuses of the issues and from proxy statements at the IPO year. I show first that there is a decline in performance (both stock market and accounting) for carve-outs that did not granted IPO options.

Their cumulative abnormal returns following the IPO are significantly negative over three year window that begins one week after the IPO. On the other hand, companies that grant IPO options do not suffer a significant decline in performance. This result holds both for stock market return and accounting returns.

The stock returns are robust to alternative specifications of abnormal returns. In particular, I consider the returns to a zero-investment strategy which takes a long position in the stock of equity carve-outs that granted IPO options and short position in carve-outs that did not grant IPO options. I show that the alpha of following this strategy for three years (using value-weighted or equal-wighted returns) is positive in a four factor time-series return regression.

According to Barber and Lyon (1997) long-term investor experience is better captured by compounding short-term returns to obtain long-term buy-and-hold returns. The long run event studies aim to assess the value of investing in the average sample firm with respect to an appropriate benchmark over the horizon of interest. Thus the correct measure should be the buy-and-hold return. I show that the results are robust also to this specification of abnormal returns. Companies that did not grant IPO options have significantly negative BHAR over six months, one year, two years and three years window beginning one week after the IPO using both value-weighted and equally-weighted returns.

In all long-run event studies joint hypothesis problem may cloud the interpretation of the results for abnormal returns. Thats why I measure the effect of option grants using accounting returns (return on assets) as well. I find that ROA declines over the three years following the IPO only for carve-outs that did not grant IPO options. For those companies ROA three years after the IPO is roughly 13 percentage points lower than in the year of the IPO. A decline in ROA following the IPO for companies that did not grant incentive stock options should capture only the decline in real performance without having joint hypothesis problem of mispecified model. Furthermore, I show that ROA significantly increases in the IPO year compared to pre-IPO year only for carve-outs that did not grant IPO options, that is in the line with the hypotheses that these companies are window dressing the company before going public.

Finally, I argue that bad stock market and accounting long-run performance of companies that didn't grant incentive stock options at the IPO date can be explained by reporting distortions around the IPO. These companies are window dressing the company before going public by using income-increasing accounting techniques that result in high accruals. High accruals around the IPO are followed by poor long-run

stock market and accounting performance. Contemporaneously, executives of carved out companies that received IPO options don't have an incentive to window dress the company because it will increase the offer price that will have negative impact on their future payoff. They are not managing earnings around the IPO resulting in better long-run performance compared to the other subsample of carve-outs that didn't incentivezed their managers with IPO options.

All of these results suggest a mechanism by which incentive stock options have real effect on the performance. Further, they have important implication for corporate governance. In this specific case of equity carve-outs I show that incentive stock options are signaling the market better corporate governance in light of less managed earnings.

2.2 Data

The core of my data set is a hand-collected information about the incentive stock option grants to any executive at the IPO date for each respective carve-out. I define an incentive stock option as IPO option only if the exercise price is equal to the offer price of the IPO. The dummy variable is set to one if any executive received such incentive stock option. Data on IPO options are hand collected from the prospectuses of the initial public offerings (filing type S-1 in EDGAR database) . If this information is not available in the prospectuses than I hand collected it from the proxy statements (filing type DEF 14A in EDGAR database) in the year of the IPO.

I restrict the sample of carve-outs from May 1996 to December 2013 because IPO prospectuses are available on SEC's (Securities and Exchange Commission) EDGAR system (Electronic Data Gathering, Analysis and Retrieval system) starting from May 1996. I use data from the Thomson One SDC (Securities Data Company) database for US's issues.[1] I require that the newly carved out subsidiary has available CRSP's (Center for Research in Security Prices) tapes and has available financial statements in Compustat database. Further, I exclude finance firms (SIC Codes 6000-6999) and units offers. I hand collect data from financial statements of the subsidiary in the prospectuses (filing type S-1 in EDGAR database) for two years preceding the IPO in order to be able to compute the accruals in the pre-IPO year. My final sample has 225 equity carve-outs out of which 100 firms grant IPO options to their executives. The final sample has aggregate proceeds of $69 billion that represents 11.7% of the total

[1]In the Screening&Analysis common stock part, subsidiary IPO's (spinoffs) restriction is set "Yes".

IPO market (Ritter (2013) reported $591.8 billion of aggregate proceeds for the same period).

To measure company characteristics and performance, I merge in data from CRSP and Compustat. In cross-sectional regressions with annual data I define firm size as the natural logarithm of total assets (Compustat item 6) at the beginning of the fiscal year. In returns data, I define firm size as market capitalization (price*shares outstanding). Book value of equity is shareholders' equity (Compustat item 216), while book-to-market is the book value of equity divided by the market value of equity. Return on asset is calculated as income before extraordinary items (Compustat item 18) over total assets (Compustat item 6).

The CRSP value-weighted and equally-weighted index respectively are used as proxy for market returns. To estimate the past performance of the carve-outs in the market model and four-factor model I used estimation window of 756 days (36 months or 3 years) before the IPO. Since subsidiary was not separate public company, stock data was not available for the estimation window. Thats why I match appropriate carve-out with the most similar company in the same industry based on market capitalization and book-to-market ratio. I used the returns of the matched firms in order to estimate the parameters in the estimation window.

I also merge in the Fama-French return factors. SMB and HML factors are constructed using six Fama-French portfolios formed on size and book-to-market. SMB (small minus big) is the average return on the three small portfolios minus the average return on the three big portfolios. HML (high minus low) is the average return on the two value portfolios minus the average return on the two growth portfolios. Mkt-Rf is the excess return on the market (proxied by CRSP indexes) minus Treasury bill rate from Ibbotson Associates. UMD (up minus down) is the average return on the two high prior return portfolios minus the average return on the two low portfolios.

Standard measure for earnings management in the literature are accruals. The simplest way to think about the accruals is that they are difference between earnings and cash flows. When this amount is positive for example, it can be a sign (not necessarily) of artificially inflated earnings by use of "creative" legal accounting techniques. One popular way in which managers can window dress the company before going public is to borrow earnings from future periods. He could speed earnings growth in the year of the IPO by recognising sales deals for which cash will be received in in one year after the IPO or posponing expensing some current expenses for which cash was paid in the IPO year. This will create higher earnings in the IPO year that will be eventually

reversed in the following years. The time-shifting of earnings will be reflected in the financial statements trough the accruals. For example, accelerated sales will increase the current assets in the IPO year and this will lead to higher accruals (see formulas below) and higher earnings in the IPO year.

There are many methodologies how one can compute the accruals. I use two measures of accruals. The first one are total accruals at each firm level that I compute from their balance sheet statements. Total accruals are computed with information found in the comparable balance sheets of each carve-out. I hand collect data from balance sheets for two years prior the IPO for each carve-out in order to be able to compute total balance sheet accruals for one year prior to the IPO.

$$Total\ Accruals_{i,t-1} = \frac{(\triangle CA_{i,t-1} - \triangle CL_{i,t-1} - \triangle Cash_{i,t-1} + \triangle STDEBT_{i,t-1} - DEP_{i,t-1})}{Assets_{i,t-2}}$$

where:
$\triangle CA_{i,t-1}$ is firm i's change in the current assets from year t-2 to t-1 that I hand collected from balance sheets reported in the prospectus (usual Compustat item 4);
$\triangle CL_{i,t-1}$ is firm i's change in the current liabilities from year t-2 to t-1 that I hand collected from balance sheets reported in the prospectus (usual Compustat item 5);
$\triangle Cash_{i,t-1}$ is firm i's change in cash from year t-2 to t-1 that I hand collected from balance sheets reported in the prospectus (usual Compustat item 1);
$\triangle STDEBT_{i,t-1}$ is firm i's change in short-term debt from year t-2 to t-1 that I hand collected from balance sheets reported in the prospectus (usual Compustat item 34);
$DEP_{i,t-1}$ is firm i's depreciation and amortization expense in year t-1 that I hand collected from income statement reported in the prospectus (usual Compustat item 14);
$Assets_{i,t-2}$ is firm i's total assets in the year t-2 that I hand collected from balance sheet reported in the prospectus (usual Compustat item 6).

The second type of accruals that I use as a measure of earnings management are discretionary accruals. In fact not all accruals are sign of earnings management, most of them are good mechanism to match revenues and expenses in the same fiscal year. Firstly Jones (1991) decomposes the total accruals in two parts: normal and discretionary. Than Dechow and Sweeney (1995) modified her model and Kothari and Wasley (2005) adjusted it controlling also for the performance of the companies. I estimate discretionary accruals using performance-adjusted modified Jones model. Total accruals for firm i in year t are measured same as balance sheet total accruals ($Total\ Accruals_{i,t}$)

in the equation above. The discretionary (abnormal) accruals for firm i in year t are the residuals $\xi_{i,t}$ from the following regression, that I estimate for each of the 99 two-digit SIC industry groups in each year t.

$$Total\ Accruals_{i,t} = \beta_{0J} + \beta_{1J}(\frac{1}{Assets_{i,t-1}}) + \beta_{2J}(\triangle Rev_{i,t} - \triangle AR_{i,t}) + \beta_{3J} PPE_{i,t} + \beta_{4J} ROA_{i,t-1} + \xi_{i,t}$$

where:

$\triangle Rev_{i,t}$ firm i's change in revenues (Compustat item 12) divided by $Assets_{i,t-1}$ (Compustat item 6);

$\triangle AR_{i,t}$ firm i's change in account receivables (Compustat item 2) divided by $Assets_{i,t-1}$;

$PPE_{i,t}$ firm i's gross value of property, plant and equipment (Compustat item 7) divided by $Assets_{i,t-1}$;

$ROA_{i,t-1}$ firm i's operating income before depreciation (Compustat item 13) on assets in year *t-1*;

I use 2-digit SIC industry groups from the universe of firms in Compustat (IPOs are excluded) to compute industry-specific parameter estimates (β_J). Applying the industry estimates to company data give me firm-specific normal accruals. The difference between company's total accruals and estimated normal accruals are the discretionary (abnormal) accruals. Residuals of the model are actually my variable of interest i.e. discretionary (abnormal) accruals, DAC in rest of the paper.

Table 2.1 gives summary statistics of the data for the overall sample and the two subsamples conditioned whether the company grants stock options to their executives with exercise price equal to the offer price. IPO options granters on average are smaller companies in terms of assets and market capitalization but they are trading at statistically significant lower price-to-book ratio (sign for undervaluation). As for the issue characteristics, both subsamples share similar characteristic in terms of average proceeds and offer price. However carve-out companies that grant IPO options on average experience less initial underpricing compared to companies that did not grant IPO options. In terms of stock market performance carve-outs that grant IPO options to their executives always outperform carve-outs that didn't grant IPO options using different event windows (6 months, one, two and three years). Same holds also for the accounting performance measured in return on assets (ROA). Companies that grant IPO options have lower accruals in the pre-IPO period and they do not have huge increase of the accruals in the IPO year suggesting that they use less aggressive accounting techniques compared to the huge increase of accruals in the IPO year for companies that did not grant IPO options. These differences in means are statistically significant.

Table 2.1: Summary Sample Statistics

	Whole Sample	***No IPO Options***	***IPO Options***
	(1)	(2)	(3)
Observations	225	125	100
Company and IPO characteristics:			
Total Assets $_{(t)}$ (mil.)	1,438.43	1,627.78	1,201.75
Market Capitalization$_{(t)}$ (mil.)	1,318.32	1,443.44	1,161.92
Price-to-Book Ratio $_{(t)}$	9.96	14.34	4.50
First Day Return (%)	18.21%	19.67%	16.38%
Offer Price	15.36	15.42	15.30
Average Proceeds (mil.)	286.53	288.70	283.81
Stock Market Raw Returns:			
6 months Cumulative Return (%)	7.79%	2.74%	7.92%
1 Year Cumulative Return (%)	16.76%	10.29%	15.11%
2 Years Cumulative Return (%)	33.75%	26.44%	26.93%
3 Years Cumulative Return (%)	54.06%	39.95%	71.63%
Accounting Performance:			
ROA $_{(t-1)}$	-0.1161	-0.2154	0.0026
ROA $_{(t)}$	-0.0020	-0.0150	0.0142
ROA $_{(t+1)}$	-0.0485	-0.0856	-0.0050
ROA $_{(t+2)}$	-0.0590	-0.1148	0.0070
ROA $_{(t+3)}$	-0.0734	-0.1548	0.0113
Earnings Management Measures:			
Total Accruals $_{(t-1)}$	-0.0659	-0.0665	-0.0652
Total Accruals $_{(t)}$	0.0088	0.0435	-0.0345
Change in Total Accruals	0.0745	+0.1100	0.0301
DAC $_{(t-1)}$	0.0319	0.0146	0.0528
DAC $_{(t)}$	0.0531	0.0694	0.0332
Change in Discretionary Accruals	0.0211	+0.0548	-0.0196

Figure 2.1a shows the raw returns in event time of the subsidiary stocks conditioned on whether the top executives received incentive stock options at the IPO date. Carve-outs that grant IPO options to their executives always outperform carve-outs that didn't incentivize their managers with IPO options.

2.3 Long-run Performance Conditioned on IPO Options

2.3.1 Stock Market Performance

2.3.1.1 Cumulative Abnormal Stock Returns

My goal is to understand the effect of incentive stock options granted on the IPO date on the subsequent performance of top executives and their companies. At beginning I measure investors reaction to IPO options grants over the three years following the IPO i.e. option grant date. To measure investor reaction I compute the cumulative abnormal returns around the IPO over different intervals. I calculate the abnormal returns using the standard market model and four-factor model. As event window, I consider six months (+6,+132), one year (+6,+258), two years (+6,+510) and three years (+6,+762) following the IPO with day 0 as the event date. I exclude the initial returns (first 6 trading days) until the stock price is stabilized after the initial booth.[2] For estimating the parameters α and β I used estimation window of 756 days before the IPO using returns of the most similar companies in the same industry that didn't went public. I matched based on market capitalization and price-to-book ratio. The CRSP value-weighted index is used to proxy for market returns in both models. In the four-factor model beside the market I include the other three factors: SMB (small minus big), HML (high minus low) and UMD (up minus down). Cumulative abnormal returns are calculated as the sum of abnormal returns for each company over the specific event window and then taking a cross-sectional average in both models.

Figures 2.1b and 2.1c show the cumulative abnormal returns in event time of the subsidiary stocks conditioned on whether the top executives received incentive stock options at the IPO date computed using the standard market model and four-factor

[2]The allotment of new shares at the offering price is not guaranteed. Thus, including initial return will overstate the returns that many investors can earn. Intervention of underwriters in sense of price support in this period is also more probable.

model. Using both models, carve-outs that granted IPO options outperform the carve-outs that didn't granted such incentive stock options in event time. The cumulative abnormal returns display different drift. Carve-outs that didn't granted IPO options are experiencing dramatic decline in returns in three years after the IPO, while there is an absence of a drift in abnormal returns for carve-outs that granted IPO options (the line is almost flat). The figure is very similar when using monthly returns. This is in the line with the main hypothesis that absence of IPO options signal to the market bad corporate governance resulting in poor long-run performance.

In Table 2.2, I present the results when using standard market model, while Table 2.3 presents results when using four-factor model. I find negative, statistically significant, cumulative abnormal performance over all used event windows only for carve-outs the didn't grant IPO options to their executives using both models. Carve-outs that granted IPO options do not earn abnormal return in three years after the IPO. The difference in performance between two subsamples is statistically significant in three years event window. Thus, firm performance, measured using stock return data, is lower for carve-outs that didn't grant IPO options. The results are robust to returns specification (using monthly instead of daily returns).

2.3.1.2 Calendar Time-Series Portfolios Approach

The comparison of carve-outs that granted IPO options and carve-outs the didn't grant IPO options to their executives should mitigate the joint hypothesis problem because we can assume that that any error in estimated expected return is the same across the two samples. Thats why I re-estimate the effect following a time-series portfolio approach and controlling for the Fama-French four factors. I consider the zero investment strategy that goes long the subsidiary stocks that granted IPO options and goes short the subsidiary stocks that didn't grant IPO options. I estimate the return regression keeping the stocks in the two portfolios for three years starting one week after the IPO. For window of three years I estimate the time series return regression using both, value-weighted and equally-weighted daily returns[3] in the two portfolios as dependent variable and size, book-to-market and momentum return factors as controls. The re-

[3]Loughran and Ritter (2000) show that the choice of the weighting method is a relevant question. If the interest is focused on quantifying the change in the average wealth of the investor as a consequence of a certain event, the correct method would be value weighting. However, if the interest lies in the implications of a potential stock market mispricing, a method based on equally weighted returns would be more appropriate. In order to give the greatest possible robustness to the results obtained I have used both methods.

Figure 2.1: Stock Market Performance

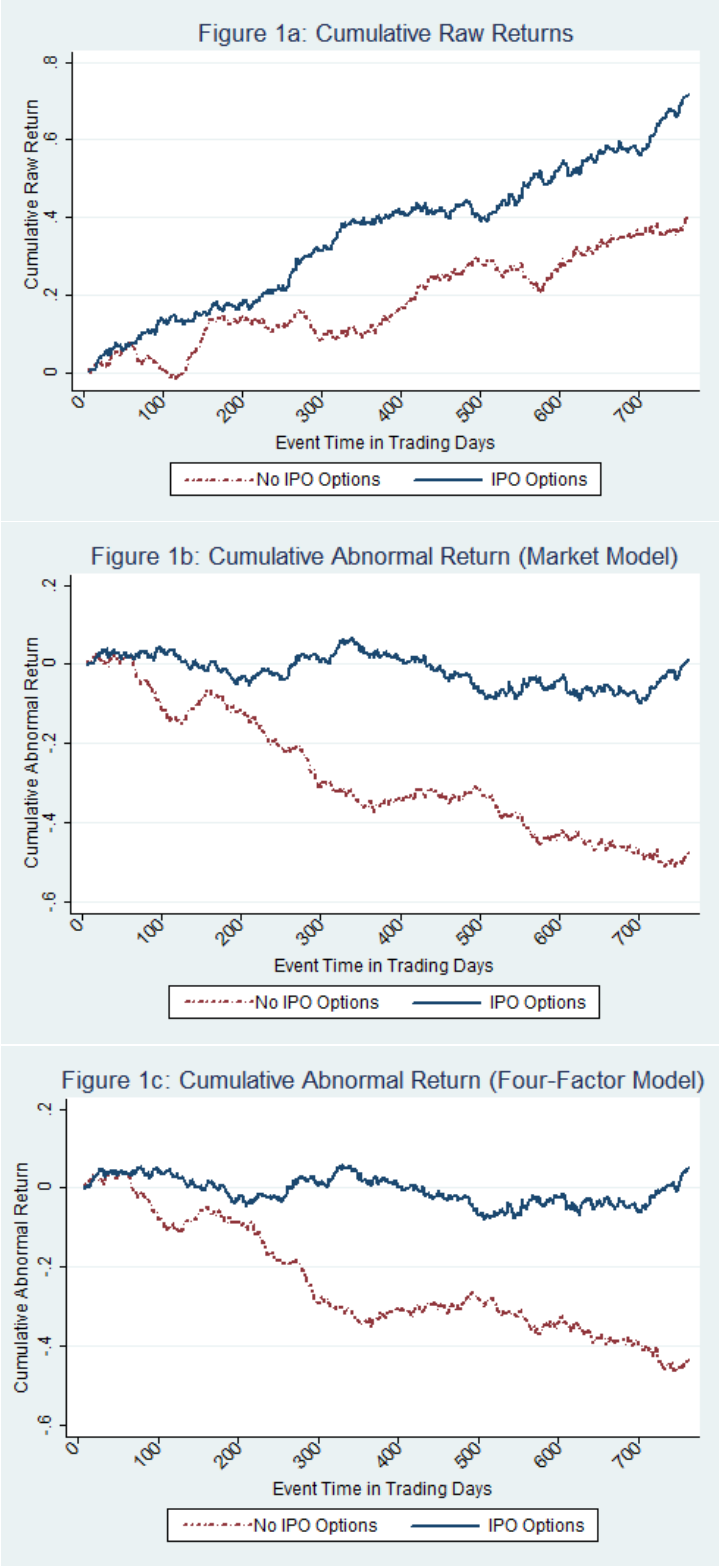


Table 2.2: Cumulative Abnormal Return (Market Model)

The sample runs from May 1996 to December 2013. The event dates are the IPO dates of appropriate carve-out. IPO options are defined as carve-out companies that granted incentive stock options grants to the subsidiary managers with exercise price equal to the IPO offer price. No IPO options are defined as carve-outs that didn't grant IPO options to their subsidiary managers. Abnormal daily returns are calculated using standard market model. The CRSP value-weighted index is used to proxy for market returns in the estimation of each firm alpha and beta. Estimation window is 756 days before the event date using daily returns of the most similar companies in the same industry to each respective carve-out (matched based on market capitalization and price-to-book ratio). Cumulative abnormal returns are calculated as the sum of abnormal returns over the event window. Average cumulative abnormal returns and t-statistics are presented below.

	Market Model CAR			
	Event Window: [+6,+132]	Event Window: [+6,+258]	Event Window: [+6,+510]	Event Window: [+6,+762]
No IPO options	**-0.153*** **	**-0.272*** **	**-0.339*** **	**-0.479*** **
	(3.61)	(3.71)	(3.81)	(3.00)
IPO options	-0.051	**-0.125***	**-0.225***	0.014
	(1.14)	(1.73)	(1.80)	(0.06)
Difference	**-0.102***	-0.146	-0.289	**-0.493***
	(1.638)	(1.399)	(0.763)	(1.840)
Observations	225	220	199	128

Absolute value of t-statistics in parentheses

*significant at 10%; **significant at 5%;*** significant at 1%

Table 2.3: Cumulative Abnormal Return (Four-Factor Model)

The sample runs from May 1996 to December 2013. The event dates are the IPO dates of appropriate carve-out. IPO options are defined as carve-out companies that granted incentive stock options grants to the subsidiary managers with exercise price equal to the IPO offer price. No IPO options are defined as carve-outs that didn't grant IPO options to their subsidiary managers. Abnormal daily returns are calculated using four-factor model. The excess return on the market is the CRSP value-weighted index minus treasury bill rate from Ibbotson Associates. Other three factors are SMB (small minus big), HML (high minus low) and UMD (up minus down). Estimation window is 756 days before the event date using daily returns of the most similar companies in the same industry to each respective carve-out (matched based on market capitalization and price-to-book ratio). Cumulative abnormal returns are calculated as the sum of abnormal returns over the event window. Average cumulative abnormal returns and t-statistics are presented below.

	Four-Factor Model CAR			
	Event Window: [+6,+132]	Event Window: [+6,+258]	Event Window: [+6,+510]	Event Window: [+6,+762]
No IPO options	**-0.125*** **	**-0.244*** **	**-0.304*** **	**-0.437*** **
	(3.14)	(3.23)	(3.13)	(2.61)
IPO options	-0.035	-0.111	-0.180	0.052
	(0.77)	(1.55)	(1.45)	(0.24)
Difference	-0.090	-0.133	-0.124	**-0.489***
	(1.499)	(1.25)	(0.794)	(1.830)
Observations	225	220	199	128

Absolute value of t-statistics in parentheses

*significant at 10%; **significant at 5%;*** significant at 1%

sults are in Table 2.4. I find as expected that the alpha of the zero investment portfolio is positive over the three year horizon both using value-weighted and equally-weighted daily returns. However the alpha is statistically insignificant. The results look almost the same when using monthly returns.

2.3.1.3 Buy-and-Hold Abnormal Returns (BHAR)

There is no consensus in the literature about which method is better: use of cumulative abnormal returns (CARs) or buy-and-hold returns (BHAR). Some of the works (for example, Fama (1998)) justify the use of cumulative abnormal returns (CARs). However, Barber and Lyon (1997) emphasize the advantage of BHARs for measuring the investor's experience, because the use of mean calendar-time returns or their sum (cumulative returns) does not adequately measure the returns obtained by an investor who holds a stock for a long period of time. According to these authors, the returns obtained by an investor in the long-run are better approximated by the compounding of the simple returns in the short run. Given that there does not exist consensus about the approach and in order to give robustness to the results I used both CAR and BHAR approach. Since I want to assess the value of investing in the average sample firm with respect to an appropriate benchmark over the horizon of interest and capture long-term investor experience I give small advantage to BHAR approach.

I calculate long-run returns by daily compounding during 126, 252, 514 and 756 days starting 6 days after the IPO, and I adjust them by the normal return approximated by CRSP value-weighted of equally-weighted index respectively:

$BHAR = \sum_{i=1}^{N} w_i \left[\prod_{t=t_i}^{T_i} (1 + R_{it}) - 1\right] - \sum_{i=1}^{N} \left[\prod_{t=t_i}^{T_i} (1 + E(R_{it})) - 1\right]$

Where R_{it} is the return on security i in day t, N is the number of securities, T is the number of days (126, 252, 514 and 756 days), t_i is the date of the closing price on the first day of trading and $E(R_{it})$ is the expected or normal return (CRSP value-weighted or equally-weighted index). Weights are defined as 1/N where N is the number of stocks in the portfolio.

Table 2.5 and Table 2.6 report the results computed using value-weighted and equally-weighted daily returns respectively. I find negative, statistically significant, buy-and-hold returns over all used event windows only for carve-outs the didn't grant IPO options to their executives using both models. Buy-and-hold returns for carve-outs that granted IPO options are insignificant almost always. Thus, firm performance, measured using buy-and-hold compounded stock return data, is lower for carve-outs that

Table 2.4: Calendar Time-Series Portfolios Approach

The buy-portfolio consists of IPO options granters over three year horizon from the day of the IPO. The sell-portfolio consists of carve-outs that didn't grant IPO options to their executives over three years horizon from the date of the IPO. Stocks in the first panel are weighted by their relative market capitalization. In the second panel stocks are equally weighted. The Fama/French factors are constructed using 6 Fama-French value-weighted portfolios formed on size and book-to-market. SMB (Small Minus Big) is the average return on the three small portfolios minus the average return on the three big portfolios. HML (High Minus Low) is the average on the two value portfolios minus the average return on the two growth portfolios. MktRf, the excess return on the market, is value-weighted CRSP return minus the Treasury bill rate (from Ibbotson Associates). UMD (Up Minus Down) is the average return on the two high prior return portfolios minus the average return on the two low prior return portfolios.

	Value-Weighted Returns 3 Years			Equally-Weighted Returns 3 Years		
	No IPO Options	IPO Options	Difference	No IPO Options	IPO Options	Difference
Mkt-Rf	**0.0104*** **	**0.0107*** **	0.0004	**0.0101*** **	**0.0101*** **	0.0001
	(50.25)	(44.61)	(1.29)	(52.06)	(52.14)	(0.10)
SMB	**0.0069*** **	**0.0082*** **	**0.0013** **	**0.0085*** **	**0.0081*** **	-0.0004
	(17.82)	(18.09)	(2.47)	(23.46)	(22.23)	(1.05)
HML	**-0.0018*** **	-0.0004	**0.0014*** **	**-0.0011*** **	**0.0023*** **	**0.0034*** **
	(4.43)	(0.82)	(2.62)	(2.90)	(6.05)	(7.80)
UMD	**-0.0013*** **	**-0.0013*** **	-0.0001	**-0.0025*** **	**-0.0023*** **	0.0002
	(4.65)	(4.21)	(0.20)	(9.81)	(9.00)	(0.69)
Constant	**-0.0091*** **	**-0.0089*** **	0.0002	**-0.0088*** **	**-0.0087*** **	0.0001
	(37.41)	(31.71)	(0.38)	(38.82)	(38.54)	(0.23)
Observations	4938	4941	4938	4938	4941	4938
R-squared	41.88%	36.47%	0.28%	46.22%	44.96%	1.42%

Absolute value of t-statistics in parentheses

*significant at 10%; **significant at 5%;*** significant at 1%

didn't grant IPO options. The results are very similar when using monthly returns.

I can conclude that the findings about the long-run stock market performance of carve-outs conditioned on incentive stock option grants at the IPO date are robust to different estimation approaches (CAR, calendar time-series and BHAR). The results are always in the line with the main hypothesis that carve-outs that didn't granted IPO options are underperforming both relative to the overall market and relative to a sample of carve-outs that granted IPO options.

2.3.2 Accounting Performance

2.3.2.1 Return on Assets

Next I consider whether there is a similar decline in performance following the IPO for companies that didn't grant IPO options using accounting data (instead of stock returns). Specifically, I consider whether the return on assets also declines in the three years following the IPO. Measuring the effect using accounting returns should capture only the decline in real performance mitigating the joint hypothesis problem. Return on asset is calculated as income before extraordinary items (Compustat item 18) over total assets (Compustat item 6).

Figure 2.2 shows the development of the mean return on assets for the two subsamples: IPO options granters and non-granters over five year period (one year before the IPO, at the IPO year and next three years following the IPO). There is a pronounced decline in return on assets after the IPO for the subsample of carve-outs that didn't grant IPO options even simply comparing the means. ROA is dramatically increasing in the IPO year compared to the pre-IPO year for this subsample and afterwards it is decreasing. This is in the line with earnings management hypothesis in the paper. These companies are window dressing the company by using creative income-increasing accounting techniques in the IPO year resulting in poor long-run performance in the years following the IPO. The subsample of carve-outs that granted IPO options to their executives at the other side, have very stable mean of ROA during observed period. The mean differences in ROA between the two subsamples for all periods are statistically significant at 5% level.

Table 2.5: Buy-and-Hold Returns Using Value-Weighted Daily Returns

The sample runs from May 1996 to December 2013. The event dates are the IPO dates of appropriate carve-outs. IPO options are defined as carve-out companies that granted incentive stock options grants to the subsidiary managers with exercise price equal to the IPO offer price. No IPO options are defined as carve-outs that didn't grant IPO options to their subsidiary managers. Buy-and-hold abnormal returns and t-statistics are presented below. Buy-and-hold returns are defined as:
$BHAR = \sum_{i=1}^{N} w_i \left[\prod_{t=t_i}^{T_i} (1 + R_{it}) - 1\right] - \sum_{i=1}^{N} \left[\prod_{t=t_i}^{T_i} (1 + E(R_{it})) - 1\right]$.
Where weights are defined as ratio of issuer's common stock market value and sum of the market values of all stocks. R_{it} is the daily return of each individual stock while $E(R_{it})$ is the CRSP daily value-weighted index that is used as proxy for expected or normal returns.

	BHAR (value-weighted daily returns)			
	Event Window: [+6,+132]	Event Window: [+6,+258]	Event Window: [+6,+510]	Event Window: [+6,+762]
No IPO options	**-0.0337*** **	**-0.0762*** **	**-0.0899*** **	**-0.0795*** **
	(2.73)	(5.18)	(5.03)	(3.62)
IPO options	0.0236	-0.0048	**-0.0582*** **	**-0.0560** **
	(1.27)	(0.26)	(3.51)	(2.50)
Difference	**-0.0573*** **	**-0.0714*** **	-0.0318	-0.0235
	(2.66)	(3.05)	(1.28)	(0.74)
Observations	225	225	225	225

Absolute value of t-statistics in parentheses

*significant at 10%; **significant at 5%;*** significant at 1%

Table 2.6: Buy-and-Hold Returns Using Equally-Weighted Daily Returns

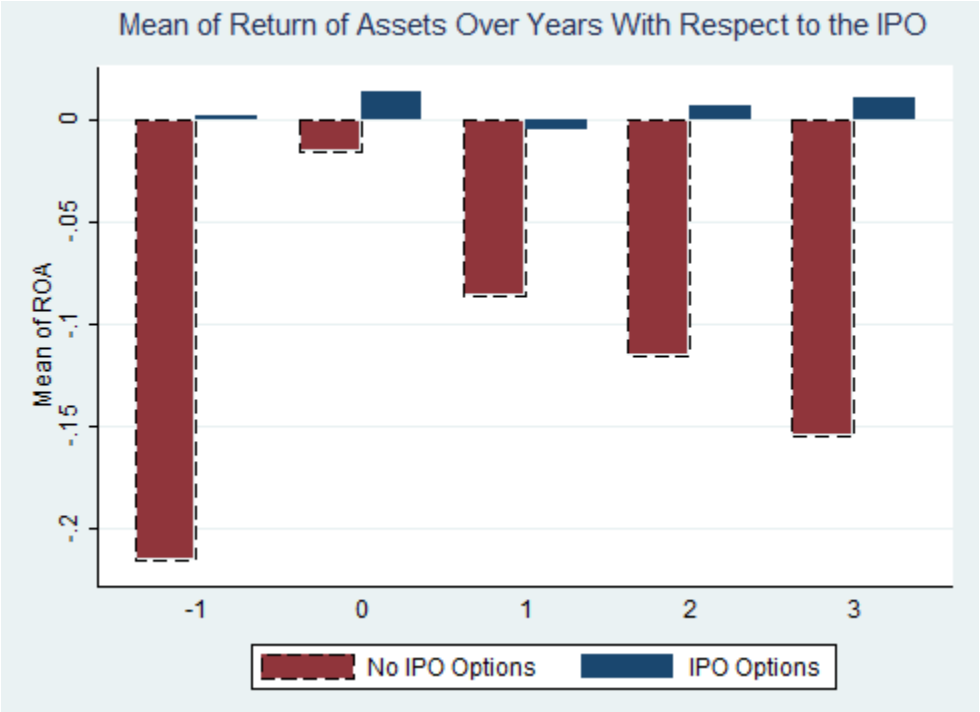
The sample runs from May 1996 to December 2013. The event dates are the IPO dates of appropriate carve-outs. IPO options are defined as carve-out companies that granted incentive stock options grants to the subsidiary managers with exercise price equal to the IPO offer price. No IPO options are defined as carve-outs that didn't grant IPO options to their subsidiary managers. Buy-and-hold abnormal returns and t-statistics are presented below. Buy-and-hold returns are defined as:
$BHAR = \sum_{i=1}^{N} w_i \left[\prod_{t=t_i}^{T_i} (1 + R_{it}) - 1\right] - \sum_{i=1}^{N} \left[\prod_{t=t_i}^{T_i} (1 + E(R_{it})) - 1\right]$.
Where weights are defined as 1/N (N is the number of stocks in the portfolio). R_{it} is the daily return of each individual stock while $E(R_{it})$ is the CRSP daily equally-weighted index that is used as proxy for expected or normal returns.

	BHAR (equally-weighted daily returns)			
	Event Window: [+6,+132]	Event Window: [+6,+258]	Event Window: [+6,+510]	Event Window: [+6,+762]
No IPO options	**-0.0386***	**-0.0672****	**-0.1539*****	**-0.2034*****
	(1.8)	(2.02)	(3.17)	(2.71)
IPO options	0.0194	-0.0428	-0.0769	-0.1098
	(0.39)	(1.28)	(1.40)	(1.58)
Difference	-0.0480	-0.0245	-0.0769	-0.0935
	(1.48)	(0.51)	(1.05)	(0.89)
Observations	225	225	225	225

Absolute value of t-statistics in parentheses

*significant at 10%; **significant at 5%;*** significant at 1%

Figure 2.2: Accounting Performance: Return on Assets



The effect is also persistent to more rigorous regression framework. In the first four columns of Table 2.7, I look at return on assets of carve-outs that didn't grant IPO options over four different windows around the IPO: the fiscal year proceeding the IPO trough the fiscal year of the IPO, the fiscal year of the IPO trough the fiscal year one year after the IPO, the fiscal year of the IPO trough the fiscal year two years after the IPO and the fiscal year of the IPO trough the fiscal year three years after the IPO. I regress ROA over each window on firm size, the lagged value of ROA, year fixed effects, industry fixed effects and a dummy variable for each fiscal year. The dummy variable allows me to identify the change in ROA for each respective year. Standard errors are clustered by firm. In column 1 the result shows that ROA is increasing in the IPO year compared to the pre-IPO year by 7.4 percentage points for the subsamples of carve-outs that didn't grant IPO options. In column 3 the result shows that ROA decreased two years after the IPO compared to the IPO year by 7.74 percentage points while in column 4 we can see that it decreased three years after the IPO compared to the IPO year by 13.52 percentage points. These results are statistically significant at 5% level. Next four columns (from 5 to 8) of Table 2.7 are for the subsamples of carve-outs that granted IPO options to their executives. The dummy variables of

fiscal years for these carve-outs are small in magnitude, almost always positive and statistically insignificant. So, the effect of increased ROA in the IPO year and then constantly decreasing in the subsequent three years after the IPO holds only for the carve-outs that didn't grant IPO options. Firm performance deteriorates following the IPO only for these carve-outs. Executives of carve-outs that received IPO options don't have incentive to manage earnings in the IPO year because it will decrease their future payoff and thats why they have an incentive to manage the firm in a way that it will add value on the long run.

2.4 Earnings Management and Long-run Performance

Earnings from financial reports (income statement) of each public company consist the cash flows from operations and accounting adjustments called accruals. Managers have certain legal discretion over the accruals. On shorter run they can increase the accruals (leading to increased earnings), for example, by recognition of revenues earned on credit (before cash is received), delaying recognition of expenses (cash paid in advance), realizing unusual gains, decelerating depreciation. On longer run all of these accounting adjustments will be reversed resulting in lower earnings. Earnings management is certainly a sign for bad corporate governance. The bottom line is that accounting accruals are negative predictors of the future performance: so-called investor fixation on earnings theory documented by Sloan (1996). However, some accruals adjustments are appropriate and necessary in order to have expenses and revenues correctly matched in the same period. Thus, it is difficult for the investors to know which part of the accruals are "normal" for the company given the business conditions.

The simplest way to think about the accruals is that they are difference between earnings and cash flows. When this amount is positive for example, it can be a sign (not necessarily) of artificially inflated earnings by use of "creative" legal accounting techniques. First, I evaluate total accruals using balance sheet data described in section 2. Total accruals are not always a sign for earnings management, their dynamics during the time might be. One part of the total total accruals is consider as normal. Thus, I estimate the discretionary (abnormal) accruals using the performance-adjusted modified Jones model as explained in section 2 using the industry peers and assuming that on average their accruals should be considered as normal for respective company. Discretionary accruals are actually the difference between total accruals and normal

Table 2.7: Accounting Performance

The sample runs from May 1996 to December 2013. IPO options are defined as carve-out companies that granted incentive stock options grants to the subsidiary managers with exercise price equal to the IPO offer price. No IPO options are defined as carve-outs that didn't grant IPO options to their subsidiary managers. The table below shows results from panel regressions where the dependent variable is return on assets for different window defined as income before extraordinary items over the total assets. Size is defined as natural logarithm of total assets at the beginning of the respective year. Year of the IPO, Year After the IPO, 2 Years After the IPO and 3 Years after the IPO are dummy variables set to 1 for the specified period, otherwise are zero. Year and industry fixed effects are included in all regressions. Standard errors are clustered by firms.

	No IPO Options				IPO Options			
	ROA_t	ROA_{t+1}	ROA_{t+2}	ROA_{t+3}	ROA_t	ROA_{t+1}	ROA_{t+2}	ROA_{t+3}
ROA_{t-1}	**0.1480*** **				**0.2776*** **			
	(3.68)				(2.77)			
ROA_t		**0.1455*** **	**0.1282** **	0.0257		**0.2770*** **	**0.4563** **	0.0712
		(3.60)	(2.58)	(1.13)		(2.75)	(2.49)	(0.71)
Size	0.0117	0.0098	0.0338	0.0371	0.0055	0.0058	0.0084	0.0022
	(0.58)	(0.49)	(1.47)	(1.44)	(0.56)	(0.58)	(0.78)	(0.15)
IPO Year	**0.0740** **				0.0034			
	(2.35)				(0.19)			
1 Year After the IPO		0.0016				-0.0247		
		(0.03)				(0.68)		
2 Years After the IPO			**-0.0774** **				0.0295	
			(2.32)				(1.07)	
3 Years After the IPO				**-0.1352** **				0.0075
				(2.17)				(0.38)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Observations	475	475	351	234	430	430	330	237
R-squared	27.40%	26.78%	29.93%	26.88%	25.14%	25.37%	35.17%	26.18%

Absolute value of t-statistics in parentheses

*significant at 10%; **significant at 5%;*** significant at 1%

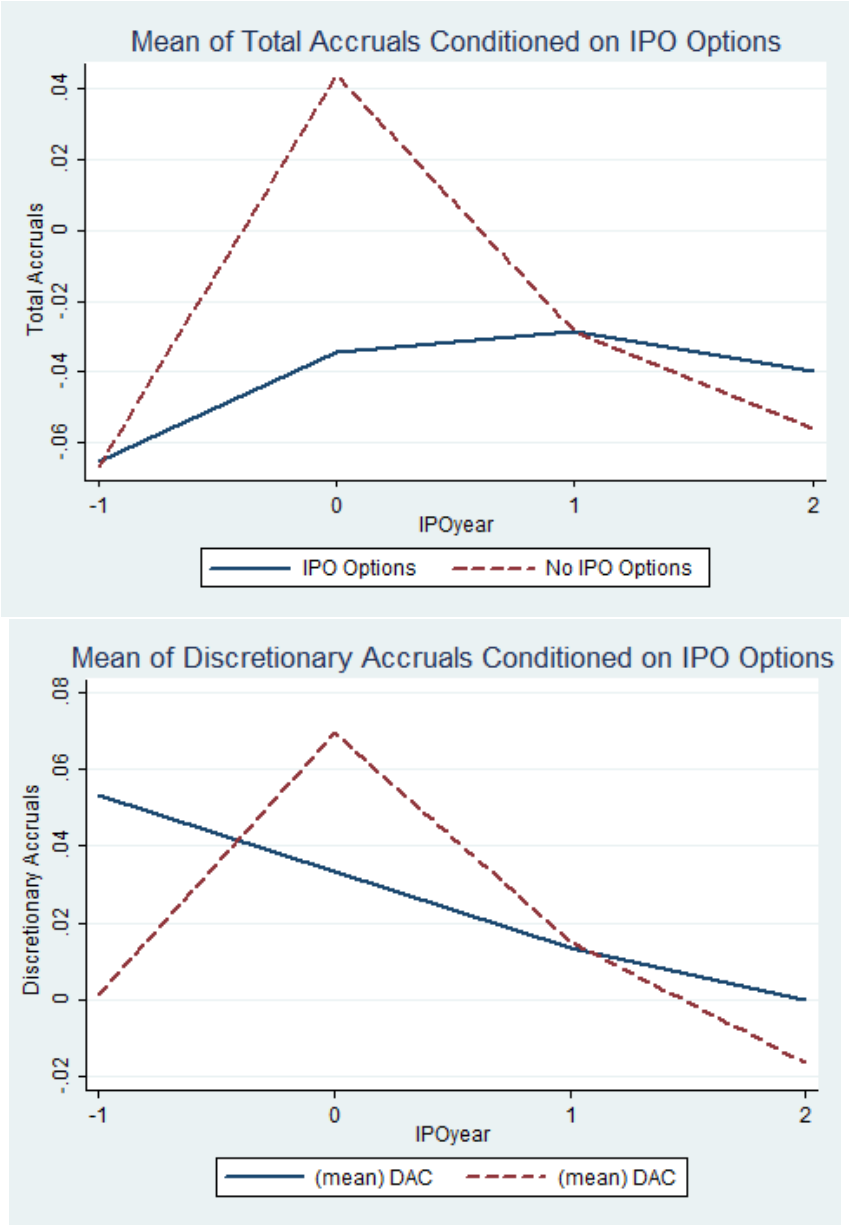
accruals. They are clearly more direct measure to detect earnings management than total accruals.

Teoh and Wong (1998) provide evidence that IPOs with unusually high accruals in the IPO year experience poor stock return performance in the three years thereafter. The hypothesis that accounting accruals predict post-IPO returns underperformance requires the presence of both earnings management and investor credulity. Their evidence does not prove that managers intentionally are adjusting accruals to exploit market credulity. In order to disentangle and find evidence that earnings are managed intentionally by the management I use the unique environment surrounding the equity carve-outs. If earnings management behavior differs depending on manager's compensation contracts and their different incentives to manage earnings it can be interpreted as indirect evidence that earnings are managed intentionally by the managers.

My hypothesis is that executives of equity carve-outs who receive incentive stock options grants with exercise price equal to the offer price do not have an incentive to window dress the company before going public. They would rather report more realistic or conservative earnings in the IPO period in order to have exercise price of their options as low as possible. Thus, IPO options should signal better corporate governance. On the other hand, carve-outs that did not grant such compensation packages are the ones with worse corporate governance and I should observe unusually high accruals around the IPO as a sign for earnings manipulation (window dressing) in IPO period. Degeorge and Zeckhauser (1993) point out that managers who have stake (shares) in the company have extraordinary incentives to make their firms "shine" before floating. To use their example, consider a manager who owns 10 per cent of a firm that normally earns $1 million and that will sell at eight times earnings when it goes public. Every $1.000 increase in earnings before going public means another $800 for the manager. Then it is not surprising that managers want to present the best possible figures in their prospectuses.

Consistent with the prediction, I find the following development of accruals (see Figure 2.3): companies that did not grant IPO options have pick of high accruals in the year of the IPO suggesting that these companies are inflating the earnings around the IPO, while for companies that grant IPO options I do not observe such pick suggesting that they report more realistic earnings. The first graph represents the total accruals scaled by assets from companies's balance sheet statements in event time, while the second graph represents development of the discretionary (abnormal) part of the total accruals computed using performance-adjusted modified Jones model (DAC).

Figure 2.3: Mean of Accruals in Event Time Conditioned on IPO Options



To examine the influence of the accruals on post-issue performance I performed the cross-sectional regressions of the stock market performance and accounting performance on accruals for both subsamples of carve-outs (IPO options granters and non granters).

2.4.1 Cross-Section of Stock Market Returns and Earnings Management

I regress cross-sectionally the IPO three-year post issue buy-and-hold returns on total and discretionary accruals before the IPO controlling for the size. The results are reported in Table 2.8 where BHAR is computed using daily returns and Table 2.9 where BHAR is computed using monthly returns.

Total and discretionary accruals have significantly negative estimated coefficients only for the subsample of carve-outs that didn't grant IPO options to their executives. One standard deviation increase in total and discretionary accruals in pre-IPO year implies a 15 percent and 30 percent 3-year return difference respectively when using daily returns, while using monthly returns the percentage increases to 20 and 38 return difference in three year. This is an indicator that only carve-outs without IPO options are the ones with high earnings management proxy in year preceding the IPO and they subsequently show greater stock underperformance. These companies are window dressing the company before going public resulting in long-run underperformance. For the subsample of carve-outs that grant IPO options to their executives estimated coefficients are very small and statistically insignificant indicating that these carve-outs are not managing earnings in the pre-IPO period that I interpret as a sign for better corporate governance. The results are robust when using the accruals at the IPO year as well, indicating that in absence of IPO options managers are window dressing the company one year before the IPO and in the IPO year.

2.4.2 Cross-Section of Accounting Returns and Earnings Management

In order to give the greatest possible robustness to the results about the relationship between earnings management and long-run performance I used accounting returns (instead of stock returns) as well. I regress return on assets (ROA) for different windows on changes of total and discretionary accruals between the IPO year and pre-IPO year for the two sample separately (IPO options granters and non granters). The goal is to see whether the change in earnings management behavior around the IPO is predicting long-run accounting performance and how the relationship differs between the two groups of equity carve-outs. The results are reported in Table 2.10 where panel A is showing the results for the subsample of carve-outs that didn't grant IPO options

Table 2.8: Cross-section of BHAR on Lagged Accruals (Using Daily Returns)

The sample runs from May 1996 to December 2013. IPO options are defined as carve-out companies that granted incentive stock options grants to the subsidiary managers with exercise price equal to the IPO offer price. No IPO options are defined as carve-outs that didn't grant IPO options to their subsidiary managers. The table below shows results from cross-sectional regression where the dependent variable is 3-year BHAR computed with daily returns. DAC_{t-1} are discretionary accruals one year prior to the IPO year computed using modified Jones model. $Total\ Accruals_{t-1}$ are defined as total accruals one year prior to the IPO computed from the prospectus' balance sheet statement. Size is defined as natural logarithm of total assets one year prior to the IPO.

Dependent variable: 3-years BHAR (daily returns)

	No IPO Options		IPO Options	
	DAC	Total Accruals	DAC	Total Accruals
DAC_{t-1}	**-0.3105****		-0.0262	
	(2.06)		(0.24)	
$Total\ Accruals_{t-1}$		**-0.7443*****		-0.0621
		(4.31)		(0.34)
Size	**0.0822*****	**0.0930*****	-0.0398	-0.0405
	(2.57)	(3.08)	(1.13)	(1.15)
Constant	**-0.6124*****	**-0.7163*****	-0.3220	-0.3307
	(3.50)	(4.27)	(1.60)	(1.62)
Observations	125	125	100	100
R-squared	7.15%	16.66%	1.29%	1.36%

Absolute value of t-statistics in parentheses

*significant at 10%; **significant at 5%;*** significant at 1%

Table 2.9: Cross-section of BHAR on Lagged Accruals (Using Monthly Returns)

The sample runs from May 1996 to December 2013. IPO options are defined as carve-out companies that granted incentive stock options grants to the subsidiary managers with exercise price equal to the IPO offer price. No IPO options are defined as carve-outs that didn't grant IPO options to their subsidiary managers. The table below shows results from cross-sectional regression where the dependent variable is 3-year BHAR computed with monthly returns. DAC_{t-1} are discretionary accruals one year prior to the IPO year computed using modified Jones model. $Total\ Accruals_{t-1}$ are defined as total accruals one year prior to the IPO computed from the prospectus' balance sheet statement. Size is defined as natural logarithm of total assets one year prior to the IPO.

Dependent variable: 3-years BHAR (monthly returns)

	No IPO Options		IPO Options	
	DAC	Total Accruals	DAC	Total Accruals
DAC_{t-1}	**-0.3946****		-0.0290	
	(2.35)		(0.30)	
$Total\ Accruals_{t-1}$		**-0.9314*****		-0.0787
		(4.90)		(0.50)
Size	0.0504	**0.0637***	0.0203	0.0214
	(1.42)	(1.92)	(0.66)	(0.69)
Constant	**-0.3272***	**-0.4562****	-0.1199	0.1324
	(1.68)	(2.47)	(0.68)	(0.74)
Observations	125	125	100	100
R-squared	5.11%	17.11%	0.47%	0.63%

Absolute value of t-statistics in parentheses

*significant at 10%; **significant at 5%;*** significant at 1%

to their executives, while panel B is showing the results for carve-outs that granted IPO options.

The changes of the total and discretionary accruals between IPO year and pre-IPO year (proxy for changes in the earnings management behavior around the IPO) have significantly negative estimated coefficients only for the subsample of carve-outs that didn't grant IPO options to their executives for almost all windows: year of the IPO, one year after the IPO and three years after the IPO. Only return on assets two years after the IPO is not explained by the changes of accruals between the IPO year and pre-IPO year (the relationship is statistically insignificant). One standard deviation increase in the changes of total and discretionary accruals around the IPO implies a 9 percent and 13 percent return on assets difference respectively three years after the IPO. This is an indicator that only carve-outs without IPO options are changing their reporting habit around the IPO (managing earnings) and they subsequently show greater accounting underperformance. These companies are window dressing the company before going public resulting in long-run underperformance. For the subsample of carve-outs that grant IPO options to their executives estimated coefficients are smaller and almost always statistically insignificant indicating that these carve-outs are not managing earnings in the pre-IPO period because changes in accruals can not predict the future accounting performance. There is a statistically significant but positive relationship for this subsample only when I regress return on assets two years after the IPO, that is completely opposite finding of earnings management. This positive relationship is offset the next year (three years after the IPO) because the two significant coefficients are with very similar magnitude but opposite signs. The results obtained when using accounting returns (instead of stock returns) support the main hypotheses of this paper that carve-outs that grant IPO options are better governed companies that are performing better on longer run compared to carve-outs that did not grant IPO options.

2.5 Conclusion

The relationship between corporate governance and firm performance is well documented in the literature. Performance based compensation contracts are for decades one of the most popular solution to align interests of the principal (shareholders) and agents (managers). It is believed that this mechanism controls managers to act in

Table 2.10: Cross-Section of ROA on Change in Accruals (Between IPO Year and pre-IPO Year)

The sample runs from May 1996 to December 2013. IPO options (Panel B) are defined as carve-out companies that granted incentive stock options grants to the subsidiary managers with exercise price equal to the IPO offer price. No IPO options (Panel A) are defined as carve-outs that didn't grant IPO options to their subsidiary managers. The table below shows results from cross-sectional regression where the dependent variable is Return on Assets for different windows (IPO year, 1,2 and 3 years after the IPO). $\triangle DAC$ is the change of discretionary accruals one year prior to the IPO year computed using modified Jones model. $\triangle Total\ Accruals$ are changes total accruals one year prior to the IPO computed from the prospectus' balance sheet statement.

	PANEL A: No IPO Options							
	ROA_t		ROA_{t+1}		ROA_{t+2}		ROA_{t+3}	
	$\triangle DAC$	$\triangle Total\ Accruals$	$\triangle DAC$	$\triangle Total\ Accruals$	$\triangle DAC$	$\triangle Total\ Accruals$	$\triangle DAC$	$\triangle Total\ Accruals$
$\triangle DAC$	**-0.0327****		**-0.0867****		-0.0022		-0.0905	
	(2.24)		(2.23)		(0.05)		(1.09)	
$\triangle Total\ Accruals$		**-0.0600****		**-0.1423****		0.0183		**-0.2346****
		(2.23)		(2.51)		(0.27)		(2.17)
Constant	-0.0176	-0.0084	**-0.0899****	**-0.0691***	**-0.1149****	**-0.1175****	**-0.1532***	-0.1173
	(1.18)	(0.55)	(2.59)	(1.97)	(2.64)	(2.64)	(1.98)	(1.53)
Observations	125	125	102	102	72	72	51	51
R-squared	3.92%	3.87%	4.75%	5.93%	0.10%	0.10%	2.35%	8.79%

	PANEL B: IPO Options							
	ROA_t		ROA_{t+1}		ROA_{t+2}		ROA_{t+3}	
	$\triangle DAC$	$\triangle Total\ Accruals$	$\triangle DAC$	$\triangle Total\ Accruals$	$\triangle DAC$	$\triangle Total\ Accruals$	$\triangle DAC$	$\triangle Total\ Accruals$
$\triangle DAC$	0.0068		-0.0211		0.0329		-0.0291	
	(0.39)		(0.69)		(1.27)		(1.30)	
$\triangle Total\ Accruals$		0.0331		-0.0480		**+0.1051*****		**-0.1152*****
		(1.25)		(1.02)		(2.81)		(3.22)
Constant	0.0144	0.0132	-0.0056	-0.0034	0.0123	0.0051	0.0061	0.0105
	(1.03)	(0.95)	(0.21)	(0.13)	(0.54)	(0.24)	(0.29)	(0.56)
Observations	100	100	87	87	61	61	49	49
R-squared	0.15%	0.16%	0.55%	0.12%	2.67%	11.80%	3.47%	18.09%

Absolute value of t-statistics in parentheses
*significant at 10%; **significant at 5%;*** significant at 1%

increasing value of the firm. While remuneration can be a solution to agency problem it can be also a source of a pricipal-agent problem like earnings manipulation. Relationship between executive pay and earnings management (pay to manipulation relationship) is also documented in the literature. However, there has been little emphasis in the literature on understanding if executive pay is signaling to the market better corporate governance and it's effect on ex-post performance.

This paper examines the relationship between long-run post-IPO return of equity carve-outs and incentive stock options grants at the IPO date. Furthermore, it uses earnings management as a measure of the level of corporate governance. I use very specific environment when a conglomerate is selling one of it's division to the public (equity carve-out) to show that division managers are choosing different income-increasing accounting policy depending on whether they were incentivized with incentive stock options or not. I show that the long-run performance is explained by the reporting distortions around the IPO conditioned on incentive stock option grants. Bottom line is that I find an evidence that incentive stock options are signaling better corporate governance, measured in earnings manipulation, resulting in better long-run performance. The results are suggesting that incentive stock options are signaling better corporate governance to the market.

Incentive stock options granted at the IPO date usually have an exercise price equal to the IPO offer price (IPO options). In case of equity carve-outs IPO options give an unique one side incentive to the executives to set the offer price as real as possible. In standard IPOs there are two sides of the incentive story that are in striking contrast: more realistic offer price will lead to profit from the IPO options but at the same time to loss from the diluted previous holdings. Previous holdings of the executives of equity carve-outs are influenced less by the offer price because these holdings are in the conglomerate. Executives of equity carve-outs incetiviezed with IPO options don't have an incentive to manipulate earnings around the IPO and they are using less aggressive income-increasing accounting techniques.

I show that equity carve-outs who grant IPO options to their executives exhibit different earnings management behavior and performance compared to the equity carve-outs that didn't grant IPO options:

- Carve-outs that didn't award their executives with IPO options suffer declining performance. The decline is observed in stock market performance for three years following the IPO and in accounting performance (return on assets) over the same

horizon. The decline is observed both relative to the firm's own performance prior the IPO and to the performance of equity carve-outs in which executives were awarded with IPO options. IPO options granters do not suffer decline both in stock market and accounting performance.

- Carve-outs that didn't grant IPO options have unusually high accruals in the IPO year (sign for earnings management) and it explains the poor stock return and the poor accounting performance in the three years thereafter. At the same time carve-outs that incentivized their managers with IPO options do not manage earnings around the IPO and their long-run performance is not explained by the changes in the reporting behavior around the IPO.

Together these results suggest that there is distortion in behavior induced by the compensation packages of the executives and it does affect ultimate firm performance. Incentive stock options are good governance mechanism to decrease opportunistic reporting by the managers in the years around the IPO resulting in better long-run stock market and accounting performance. IPO options are signaling better corporate governance to the market.

My findings are potentially useful for investors and regulators. Investors may want to use the information on IPO options that is public before the IPO to discriminate among issuers. Particularly, this information is very useful because for most of the investors it is difficult to detect earnings management i.e. which part of the accruals are "normal" or unusually high for a given company given the business conditions. IPO options by it self should signal them less managed earnings i.e. better corporate governance. Finally, regulators must be concerned about the informativeness of the accounting numbers and how accurately accounting information communicates firm performance to the markets.

Chapter 3

Short Selling and the Subsequent Performance of Initial Public Offerings

Abstract

This paper examines short sales transaction volumes on the first trading day of 610 initial public offerings (IPOs) from 2011 to 2015. The tests provide evidence of informed trading immediately at the IPO. Results reveal that short selling volume on the first trading day of the IPO is significantly negatively linked to subsequent stock returns and accounting performance. Heavily-shorted IPOs underperform lightly-shorted IPOs by a risk-adjusted average of 22.68% annualized return. Heavily-shorted IPOs have the highest probability of analyst downgrades within the first year after the IPO. Short selling is higher in hot IPOs with higher demand and higher first-day return. These stocks are overpriced at the end of the first trading day, implying that short sellers are sophisticated investors taking advantage of the overpricing. Overall, the results indicate that short sellers are important contributors to efficient stock prices.

JEL classifications: G14; G12; G24; M41
Keywords: Short Selling; Initial public offerings; IPO performance; Analysts Recommendations

3.1 Introduction

The focus of this paper is on short selling activity on the first trading day of initial public offerings (IPOs). Initial underpricing and long-run underperformance of IPOs has been confirmed by many studies (Stern and Bornstein (1985); Ritter (1991); Loughran and Ritter (1995); Rock (1986); Ritter (1984); Loughran and Ritter (2002)). The main idea of the paper is that IPOs represent potential examples of deviations of stock prices from fundamental values. The research question is whether the short sellers are more sophisticated than other investors in taking advantage of the mis-pricing, acting on time and making profits, ultimately resulting in bringing back stock prices to their fundamental values. I provide evidence of informed trading by short sellers immediately on the first trading day of the IPO. Results reveal that the short selling volume on the first trading day is significantly negatively linked to subsequent long-run stock returns and accounting performance.

Shares sold short, as a percentage of shares outstanding, has more than doubled in the past 30 years. One information provider, Markit, provides data on $2 trillion securities on loan as of the end of 2015. A short sale is generally a sale of a security by an investor who does not own the security. To deliver the security to the buyer, the short seller borrows the security and is charged interest for the loan. Short sales are usually trades in which the short seller anticipates subsequent underperformance of the security in order to make a profit.

There has been high interest in short selling in the academic literature in the past decade. Academics generally share the view that short sellers help markets correct deviations of stock prices from fundamental values. It is widely accepted that if short selling is costly and there are heterogeneous investors beliefs, a stock can be overpriced by the market and generate low subsequent returns. This hypothesis originated with Miller (1977) and his predictions have motivated many recent empirical studies.

The oldest literature finds that high short interest ratios forecast low returns (**?**Desai (2002)). Dechow (2001) documents that short sellers position themselves in stocks with low ratios of fundamentals (earnings and book value) to market values and cover their positions when ratios revert. Diether and Werner (2008) show that a trading strategy that buys stocks with low short selling activity and sells short stocks with high short selling activity generates an abnormal return of roughly 1.4% per month. To my knowledge my paper is a first attempt to measure long-run performance of IPOs conditioned on short selling activity on the first trading day.

Miller (1977) argues that there are restrictions on short selling following an IPO resulting in pricing inefficiencies in the short term which are subsequently reversed in the long term as these constraints are relaxed. Duffie and Pedersen (2002) in their theoretical model argue that if lendable securities are difficult to locate (for example after an IPOs, among other cases) then the price of the security is initially elevated, and expected to decline over time. On the other hand, Edwards and Hanley (2010) show that short selling occurs simultaneously with the open of trading (in 99.5% of IPOs) and without delay as previously thought, implying that other factors may account for underpricing.

I use short sale data available from the Financial Industry Regulatory Authority (FINRA). Pursuant to Securities and Exchange Commission (SEC) request, FINRA has agreed to make reported short sale trade data publicly accessible beginning September 30, 2009 (Regulation SHO) . I use the daily short sale volume files for the period starting from March 2011 until December 2015.

I restrict the sample to this period because staring from February 28, 2011 FINRA reports separately short sale volumes that are exempted from the restriction (Rule 201) of short selling. The SEC adopted Rule 201, so-called "Alternative Uptick Rule" in February 2010, which imposed restrictions on short selling. This rule is a variation of the 70-year-old "Uptick Rule" that was eliminated in 2007. The rule applies to securities following an intra-day price decline of more than 10% from the previous day's closing price. For such stocks, the SEC allows short selling only if the transaction price is above the national best bid.

There are transactions that are exempted from the restrictions of Rule 201. These transactions involve activities such as arbitrage of positions on options exchanges or foreign markets, hedging of derivatives due within a few days and the distribution by an underwriter of an IPO. Underwriters have an option to purchase additional shares from the issuer following the IPO (over-allotment or "green shoe" option). They may cover the overallocation either through the exercise of the over-allotment option (when the stock price is higher than the offer price) or through open market purchases (when the stock price is lower than the offer price), also known as syndicate short covering. Syndicate short covering is regulated by another rule by the SEC called Rule 104 of Regulation M and it is exempted from Rule 201.

By restricting the sample to start from March 2011 I can test which trades are more informative. Transactions that are subject to the restrictions of Rule 201 are trades in which short sellers anticipate subsequent underperformance. The main result

of this paper reveal that only transactions that are subject to short sale restrictions are significantly negatively linked to subsequent stock returns and accounting performance. As expected, trades that are exempted from restrictions are not informative about the true value of the respective IPO and its future return on the long run. They are more short-term oriented and they do not necessarily anticipate future underperformance.

I retrieved the data for IPOs and their characteristics from the Thomson Reuters Eikon database. After merging with FINRA short sale daily tapes, CRSP and Compustat, my final sample has 610 IPOs.

The stock returns are robust to alternative specifications of abnormal returns. First, I consider the returns to a zero-investment strategy which takes a long position in the stock of lightly-shorted IPOs (quartile 1) and short position in heavily-shorted IPOs (quartile 4) on the first trading day. I show that the alpha of following this strategy for one year is positive and statistically significant in a four-factor time-series return regression averaging 9 basis points using daily returns (22.68% annualized return) and 1.72% using monthly returns (20.64% annualized return).

Then I compute the cumulative abnormal returns using the standard market model and the four-factor model. One-year cumulative abnormal returns of IPOs that are heavily shorted on the first trading day are always negative and statistically significant for trades that are subject to the Rule 201 restrictions, averaging 15% annually both using the market and four-factor model. Short sellers of IPOs seems to be more long-term oriented with respect to short sellers of other securities. The approximate duration of the positions in this sample is on average 100 trading days. In fact, the shortest window for which I obtain negative statistically significant returns for heavily-shorted IPOs is 6 months (126 trading days). This result indicates that IPOs need longer period of time to return to their fundamental values.

According to Barber and Lyon (1997), long-term investor experiences are better captured by compounding short-term returns to obtain long-term buy-and-hold returns. Long-run event studies aim to assess the value of investing in the average sample firm with respect to an appropriate benchmark over the horizon of interest. Thus, the correct measure should be the buy-and-hold return. I show that the results are robust to this specification of abnormal returns. IPOs that were the most shorted on the first trading day have significantly negative BHAR of 7.74% and 6.01% with a one year window using both daily and monthly returns respectively. In the cross section BHAR is also negatively related to short sale volume on the first trading day.

In all long-run event studies, joint hypotheses problems may cloud the interpreta-

tion of the results for abnormal returns. This is why I measure the effect of short selling volume on the first trading day on accounting measures such as net income, earnings per share and accounting returns (return on assets, or ROA). I find that net income, earnings per share and ROA decline significantly in the quarter after the IPO for companies that were the most shorted on the first trading day. A decline in ROA following the IPO for companies that were heavily shorted should capture only the decline in real performance without having the joint hypothesis problem of a misspecified model. Furthermore, I show that ROA significantly increases in the quarter after the IPO only for companies that were lightly shorted on the first trading day.

To support the main finding of the paper, I show that there is a positive statistically significant relationship between the short selling volume on the first trading day and the first consensus analysts' recommendation (between 1 (Strong Buy) and 5 (Strong Sale)) that occur on average 28 trading days after the IPO. Heavily-shorted IPOs get the least favorable initiation of analysts' recommendations. Further, I show that heavily-shorted IPOs have the highest probability of downgrade by analysts within the first year after the IPO. A probit model shows that the predicted probability of a downgrade increases with the short selling volume on the first trading day. Heavily-shorted IPOs have the highest (32.12%) predicted probability to be downgraded within the first year after the IPO.

I explore on which basis short sellers choose IPOs on the offer day and why and how they anticipate long-run underperformance of these issues. In other words, I explore which types of IPOs are subject to more short selling on the offer day. I provide evidence that short sellers are picking hot issues with high demand. They go against the sentiment of individual investors for hot issues.

Similarly to Edwards and Hanley (2010) I find a positive relationship between first-day return and short selling on the first trading day of the IPOs. This finding at first glance seems to be against the hypothesis that short sellers correct observed underpricing. Underpricing measured as first-day return assumes that the market price on the first trading day is the correct one while the offer price is set too low by the underwriters. However, similarly to Purnanandam and Swaminathan (2004), I find that IPOs are overvalued at the offer price relative to industry peers.

The first-day return is a function of both: (i) the first-day market price (driven by individual investors) and (ii) the offer price (driven by the underwriters, issuing company and institutional investors that are more informed compared to an individual investor). I find that for IPOs that were heavily shorted, the initial offer price is set

more closely to the price of their industry peers. On the other hand the first-day closing market price displays significant deviations relative to the industry peers. Heavily-shorted IPOs are overpriced at the end of the first trading day on average by 35% relative to their industry peers, while overpricing of lightly-shorted IPOs is significantly smaller (averaging 12%). The difference is statistically significant and the relationship between the overpricing and the short sale volume on the first trading day is positive and statistically significant. This result indicates that short sellers are more sophisticated than other investors, who seem to be overoptimistic regarding the new issues. Keeping in mind the poor long-run performance of the heavily-shorted IPOs shown in this paper, I can conclude that short sellers go against the potential behavioral biases of the rest of the market and exploit overpricing to their benefit.

Overall the results indicate that, on average, short sellers are sophisticated investors and important contributors to efficient stock prices. This finding should encourage regulators to provide more timely disclosure of short selling to all investors.

The rest of the paper is structured as follows. Section 2 discusses the sample in more detail. Section 3 examines the long-run stock market performance of the IPOs conditioned on short selling activity on the first trading day. Section 4 analyzes the accounting performance conditioned on short selling volume. Section 5 provides tests of the relationship between the short selling volume and consensus analysts' recommendations. Section 6 discusses the connection between different IPO characteristics and short selling volume on the offer day with an emphasis on the first-day return. Section 7 concludes.

3.2 Data and Summary Statistics

To examine whether short selling volumes on the first trading day of IPOs are informative and predict the subsequent performance of the IPOs, I use daily short sale data publicly available from the Financial Industry Regulatory Authority (FINRA). I restrict the sample from March 2011 to December 2015 because, beginning on February 28, 2011, FINRA reports separately short sale volume that are exempted from the short sale restrictions of the Alternative Uptick Rule 201.[1] These transactions are not informative about the future long-run performance because such positions are usually

[1]Transactions that are exempted from short sale restrictions under the Rule 201 are: arbitrage of positions on options exchanges or foreign markets, hedging of derivatives due within a few days and the distribution by an underwriter of an IPO.

closed shortly after the IPO. On the other hand, trades that are subject to short selling restrictions[2]are considered to be informative, and are expected to predict the future long-run underperformance of the respective stock.

The data from FINRA include ticker, date, total short sale volume, short volume that is exempted from short sale restrictions and reporting facility identifier (NASDAQ, NYSE, ADF – Alternative Display Facility and ORF – Over-the-counter Reporting Facility). I aggregate individual short sale transactions for each day and company into daily short sale volume for each IPO on the first trading day.

Summary statistics for the full sample are presented in Column 1 of Table 3.1. In the next four columns, the sample is partitioned into quartiles based on the short sale volume on the offer day subject to short sale restrictions (excluding the shares that are exempted from short sale restrictions).

Panel A of Table 3.1 presents summary statistics for the short sale volume on the offer day of the 610 IPOs analyzed in this paper. There are on average 0.526 million shares shorted on the offer day that are subject to short sale restrictions. This represents 3.7% of total shares offered or 1% of the shares outstanding on the offer day.

If we assume that shareholders are homogeneous and short interest is constant, the length of time between opening and unwinding the position (D- duration of the position) can be approximated by using this formula:

$$D = \frac{1}{ShortSaleTurnover} \text{ ; where } ShortSaleTurnover = \frac{Shares\,Shorted}{Shares\,Outstanding}.$$

Using the average number of 1% short sale turnover on the offer day and assuming that 1% of the shares will be shorted each day, it would then take 100 trading days for the entire stock of outstanding shares to turn over. The average holding period of the short sellers of the IPOs in my sample is 100 trading days. This is significantly higher than reported by Boehmer and Zhang (2008), who find an average trading duration of 37 days for the positions of short sales in 2004 at NYSE.

The sample of IPOs and their offering characteristics is collected from Thomson Reuters Eikon database. Only U.S. issues with offer prices higher than five dollars are taken into consideration, excluding units offerings and closed-end funds. An IPO is included in the final sample only if it has prices available on CRSP (Center for Research in Security Prices) and has available financial statements in the Compustat database.

[2]Rule 201 applies to securities following an intra-day price decline of more than 10% from the previous day's closing price. For such stocks, SEC allows short selling only if the transaction price is above the national best bid.

Table 3.1: Summary Statistics

The sample runs from March 2011 to December 2015. The first column shows summary statistics for the full sample of IPOs. In the next four columns IPOs are ranked and split into quartiles based on short sale volume (excluding short sale volume exempted from short sale restrictions under the Rule 201) on the first trading day of the IPO, which is defined as aggregate reported share volume of executed short sale excluding short exempt trades. Short exempt volume stands for the aggregate reported share volume of executed short exempt trades and total short sale volume is aggregate reported share volume of executed short sales including short sales exempt trades. Only trades on the first trading day of the IPO are included. Panel B. reports mean statistics of the IPO characteristics while Panel C. reports average one-year returns of the IPOs based on different models (*significant at 10%; **significant at 5%;*** significant at 1% based on t-sats). Quarterly return on assets (ROA) is defined as net income over the total assets in the quarter of the IPO. Mean (consensus) analysts' recommendations are between 1 (Strong Buy) and 5 (Strong Sale). Marginal probability of downgrade is based on a probit model in which the dependent variable is set to 1 if the difference between the mean recommendation of the respective month and previous month is positive (e.g., Strong Sale (5) in current month - Strong Buy(1) in previous month gives a positive result of 4) within one year after the IPO.

Panel A.	Whole Sample	Quartile 1	Quartile 2	Quartile 3	Quartile 4
Firm Observations	610	153	152	153	152
Short Sale Volume Excluding Short Exempt	526,119	31,317	161,520	363,083	1,552,884
Short Exempt Volume	4,250	n/a	n/a	n/a	n/a
Total Short Volume	530,369	n/a	n/a	n/a	n/a
Panel B.					
Market Capitalization (mil.)	948.09	253.25	477.59	836.14	2230.68
No.of Shares Outstanding at the IPO (mil.)	50.94	17.16	32.04	47.46	107.33
No.of Shares Offered (mil.)	14.18	9.56	9.25	10.82	27.15
Offer Price	15.82	14.47	13.37	16.88	18.56
Gross Proceeds (mil.)	270.89	163.65	142.18	188.37	590.61
First-day Return (%)	15.71%	1.19%	8.62%	22.25%	30.85%
Panel C.					
1 Year Raw Return (%)	8.05%	6.5%	14.75%	10.97%	-0.03%
1 Year BHAR (%)	0.05%	-0.39%	6.41%***	1.90%***	-7.74%***
1 Year CAAR Market Model (%)	-4.74%*	-0.29%	0.66%	-3.93%	-15.42%***
1 Year CAAR 4-Factor Model (%)	-4.97%**	-2.52%	2.46%	-4.94%	-14.89%***
Panel D.					
Quarterly ROA (%)	-8.09%	-14.73%	-10.61%	-5.73%	-3.28%
Quarterly ROA(q+1) (%)	-4.07%	-5.78%	-4.36%	-3.75%	-3.28%
Mean Analyst Recommendation	1.85	1.60	1.71	1.87	2.13
Marginal Probability of Downgrade (%)	13.83%	18.84%	21.71%	23.78%	32.12%

After merging all four databases (FINRA, Eikon, CRSP and Compustat), the final sample has 610 IPOs. Additional IPO characteristics, like a negative price revision dummy and an internet IPO dummy, are retrieved from Jay Ritter's webpage.[3]

Table 3.1, Panel B presents initial statistics on the IPO characteristics for the full sample (column 1) and each quartile based on the short sale volume on the offer day (columns 2-5). Heavily-shorted IPOs (quartile 4) are bigger in all terms: market capitalization, offer price, number of shares offered and gross proceeds. At the same time, they also have the highest first-day return.

Panel C of Table 3.1 reports the abnormal returns of the IPOs using one-year window under different specifications of abnormal returns. To measure one-year subsequent buy-and-hold return of IPOs, I use CRSP value-weighted index as a proxy for the normal return. Heavily-shorted IPOs (quartile 4) are the only ones with negative (-7.74%) and statistically significant BHAR with a one-year window.

To estimate the past performance of the IPOs according to the market model and four-factor model, I use an estimation window of 504 trading days (two years) before the IPO using daily returns of the most similar company in the same FF48 industry matched based on market capitalization. I also merge with Fama-French return factors. The SMB and HML factors are constructed using six Fama-French portfolios formed on size and book-to-market. SMB (small minus big) is the average return on the three small portfolios minus the average return on the three big portfolios. HML (high minus low) is the average return on the two value portfolios minus the average return on the two growth portfolios. Mkt-Rf is the excess return on the market (proxied by CRSP indexes) minus the Treasury bill rate from Ibbotson Associates. UMD (up minus down) is the average return on the two highest-performing portfolios minus the average return on the two lowest performing portfolios. Cumulative average abnormal return for one year, using both the market and four-factor model, are negative (-15.42% and -14.89% respectively) and statistically significant only for heavily-shorted IPOs (quartile 4).

The first two rows of Panel D in Table 3.1 compare the quarterly return on assets (ROA) for the quarter of and quarter after the IPO date. Quarterly ROA is calculated as quarterly net income over total assets. Lightly-shorted IPOs (first two quartiles) significantly improve their average accounting performance in the quarter after the IPO, while heavily-shorted IPOs do not improve their average accounting performance.

Mean analysts' recommendation for each IPO are taken from I/B/E/S U.S. Recom-

[3]I thank Professor Ritter for making these data publicly available. See http://bear.warrington.ufl.edu/ritter/ipodata.htm.

mendation database. All recommendations are between 1 (Strong Buy) and 5 (Strong Sale). Lightly-shorted IPOs have an average initial consensus recommendation of 1.60, meaning between Strong Buy and Buy, while heavily-shorted IPOs have an average initial consensus recommendation of 2.13, that is, between Buy and Hold. Initial recommendations appear on average 28 trading days after the offering. I use a probit model to investigate which IPOs are more likely to be downgraded by the analysts within the first year after the IPO. As expected, the marginal probability of downgrade is positively related to the short sale volume on the offer day. Heavily-shorted IPOs have the highest probability (32.12%) of being downgraded in the year following the IPO.

Thus far, the initial statistics are consistent with the main hypothesis of this paper, that short selling on the offer day is negatively correlated to the future performance of the IPOs.

3.3 Long-Run Stock Market Performance of IPOs Conditioned on Short Selling Activity on the Offer Day

3.3.1 Calendar Time-Series Portfolios Approach

To compare the performance of IPOs that were heavily shorted on the offer day with IPOs that were lightly shorted, I first follow a time-series portfolio approach controlling for the Fama-French four factors. I consider the zero investment strategy that goes long the lightly-shorted IPOs and goes short the heavily-shorted IPOs.

I start with this approach because it is potentially free of the joint hypothesis problem of a misspecified model. We can assume that any error in the estimated expected return is the same across the two portfolios and, by taking the difference, the error should be minimized.

I estimate return regressions by holding constant the stocks in the two portfolios for one year (252 trading days) starting on the offer day. I estimate the time-series return regressions using daily returns reported in Table 3.2 and using monthly returns reported in Table 3.3. The stocks are weighted relative to their market capitalization.

The sample of 610 IPOs is partitioned into quartiles based on three types of short selling volume on the offer day: short sale volume excluding short sales that are ex-

Table 3.2: Long-Term Performance Using Daily Returns of IPOs with Smallest Short Sales Volume vs. IPOs with Highest Short Sales Volume on the First Trading Day

The buy portfolio consists of IPOs from the lowest quartile based on first-day short volume for a 252 trading day horizon from the day of the IPO. The sell portfolio consists of IPOs from the highest quartile based on first-day short volume for a 252 trading day horizon from the day of the IPO. In the first three columns the investment strategy is based on the aggregate reported share volume of executed short sale excluding short exempt trades during the first trading day of the appropriate IPO. In the next three columns the investment strategy is based on the aggregate reported share volume of executed short sale exempt trades during the first trading day. The last three columns include both aggregate reported short volume of executed short sale and short sale exempt trades during the first trading day of the IPO. Stocks are weighted by their relative market capitalization. The Fama/French factors are constructed using 6 Fama-French value-weighted portfolios formed on size and book-to-market. SMB (Small Minus Big) is the average return on the three small portfolios minus the average return on the three big portfolios. HML (High Minus Low) is the average on the two value portfolios minus the average return on the two growth portfolios. Mkt-Rf, the excess return on the market, is the value-weighted CRSP return minus the Treasury bill rate (from Ibbotson Associates). UMD (Up Minus Down) is the average return on the two highest-performing return portfolios minus the average return on the two highest-performing return portfolios.

	Short Sale Volume Excluding Short Exempt			Short Exempt Volume			Total Short Volume		
	Quartile 1 Long	Quartile 4 Short	Difference (Long-Short)	Quartile 1 Long	Quartile 4 Short	Difference (Long-Short)	Quartile 1 Long	Quartile 4 Short	Difference (Long-Short)
Mkt-Rf	**0.0058*** **	**0.0089*** **	**-0.0031*** **	**0.0080*** **	**0.0082*** **	-0.0002	**0.0060*** **	**0.0089*** **	**-0.0028*** **
	(20.48)	(26.53)	(7.17)	(26.72)	(17.96)	(0.27)	(18.78)	(26.49)	(6.32)
SMB	**0.0041*** **	**0.0038*** **	0.0003	**0.0058*** **	**0.0046*** **	0.0012	**0.0046*** **	**0.0038*** **	0.0007
	(7.24)	(5.70)	(0.37)	(9.69)	(5.09)	(1.15)	(7.09)	(5.70)	(0.83)
HML	**-0.0034*** **	**-0.0031*** **	-0.0003	**-0.0051*** **	**-0.0031*** **	-0.0020	**-0.0052*** **	**-0.0031*** **	**-0.0022***
	(4.58)	(3.55)	(0.27)	(6.54)	(2.60)	(1.52)	(6.26)	(3.53)	(1.86)
UMD	0.0000	-0.0001	-0.0001	**-0.0013*** **	-0.0003	-0.0011	-0.0002	-0.000	-0.0002
	(0.05)	(0.09)	(0.10)	(2.80)	(0.36)	(1.32)	(0.37)	(0.05)	(0.24)
Alpha	0.0002	**-0.0007** **	**0.0009** **	-0.0001	-0.0006	0.0005	0.0001	**-0.0007** **	**0.0008***
	(0.84)	(2.16)	(2.27)	(0.35)	(1.50)	(1.12)	(0.30)	(2.16)	(1.83)
Observations	1210	1211	1210	1210	1211	1210	1210	1211	1210
R-squared	37.78%	45.97%	4.64%	51.37%	47.85%	0.44%	35.56%	45.89%	3.85%

Absolute value of t-statistics in parentheses

*significant at 10%; **significant at 5%;*** significant at 1%

Table 3.3: Long-Term Performance Using Monthly Returns of IPOs with Smallest Short Sales Volume vs. IPOs with Highest Short Sales Volume on the First Trading Day

The buy portfolio consists of IPOs from the lowest quartile based on first-day short volume for a 252 trading day horizon from the day of the IPO. The sell portfolio consists of IPOs from the highest quartile based on first-day short volume for a 252 trading day horizon from the day of the IPO. In the first three columns the investment strategy is based on the aggregate reported share volume of executed short sale excluding short exempt trades during the first trading day of the appropriate IPO. In the next three columns the investment strategy is based on the aggregate reported share volume of executed short sale exempt trades during the first trading day. The last three columns include both aggregate reported short volume of executed short sale and short sale exempt trades during the first trading day of the IPO. Stocks are weighted by their relative market capitalization. The Fama/French factors are constructed using 6 Fama-French value-weighted portfolios formed on size and book-to-market. SMB (Small Minus Big) is the average return on the three small portfolios minus the average return on the three big portfolios. HML (High Minus Low) is the average on the two value portfolios minus the average return on the two growth portfolios. Mkt-Rf, the excess return on the market, is the value-weighted CRSP return minus the Treasury bill rate (from Ibbotson Associates). UMD (Up Minus Down) is the average return on the two highest-performing return portfolios minus the average return on the two lowest-performing return portfolios.

	Short Sale Volume Excluding Short Exempt			Short Exempt Volume			Total Short Volume		
	Quartile 1 Long	Quartile 4 Short	Difference (Long-Short)	Quartile 1 Long	Quartile 4 Short	Difference (Long-Short)	Quartile 1 Long	Quartile 4 Short	Difference (Long-Short)
Mkt-Rf	**0.0069*** **	**0.0122*** **	**-0.0053***	**0.0096*** **	**0.0119*** **	-0.0023	**0.0069*** **	**0.0122*** **	**-0.0052***
	(3.44)	(5.61)	(1.98)	(5.90)	(3.69)	(0.72)	(3.25)	(5.60)	(1.91)
SMB	**0.0065** **	0.0046	0.0018	**0.0106*** **	0.0046	0.0060	**0.0084** **	0.0046	0.0037
	(2.02)	(1.34)	(0.44)	(4.10)	(0.91)	(1.18)	(2.47)	(1.33)	(0.86)
HML	-0.0028	-0.0068	-0.0040	**-0.0059***	**-0.0114***	0.0055	-0.0052	-0.0068	0.0016
	(0.70)	(1.58)	(0.77)	(1.83)	(1.78)	(0.87)	(1.23)	(1.58)	(0.30)
UMD	**0.0077*** **	-0.0027	**0.0104*** **	-0.0019	-0.0040	0.0059	**-0.0069*** **	-0.0027	**-0.0095*** **
	(3.26)	(1.06)	(3.33)	(1.00)	(1.05)	(1.58)	(2.77)	(1.04)	(2.97)
Alpha	0.0012	**-0.0160** **	**0.0172***	-0.0031	-0.0153	0.0122	-0.0024	**-0.0160** **	0.0136
	(0.18)	(2.13)	(1.87)	(0.56)	(1.37)	(1.11)	(0.33)	(2.13)	(1.43)
Observations	57	57	57	57	57	57	57	57	57
R-squared	39.89%	51.18%	28.49%	62.64%	33.96%	8.61%	41.02%	51.00%	25.48%

Absolute value of t-statistics in parentheses

*significant at 10%; **significant at 5%;*** significant at 1%

empted from short sale restrictions under the Rule 201, short sale volume that is exempted from the short sale restrictions and total short sale volume. As expected, the most informative short trades on the offer day are those that are subject to short sale restrictions, as shown in the first three columns of Table 3.2 and Table 3.3.

The alphas of the corresponding portfolio of heavily-shorted IPOs (quartile 4) are negative and statistically significant, averaging -7 basis points per day and -1.6% when using monthly returns. This finding suggests that short sellers are good at picking IPOs that are overvalued and that they are presumably bringing prices back to their fundamental values.

The alphas of the portfolio of lightly-shorted IPOs (quartile 1) are positive but statistically insignificant, and are small in magnitude when using both daily and monthly returns.

The alpha of a zero investment portfolio (column 3) that goes long the lightly-shorted IPOs (quartile 1) and goes short the heavily-shorted IPOs (quartile 4) is positive and statistically significant using both daily and monthly returns. This finding suggests that short sellers are good at the relative valuation of IPOs. On a risk-adjusted basis, heavily-shorted IPOs underperform lightly-shorted IPOs by an average of 9 basis points daily (22.68% annualized return) and 1.72% monthly average (20.64% annualized return).

As expected, short sale trades of IPOs that are exempted from short sale restrictions, such as the arbitrage of positions on options exchanges or foreign markets, hedging of derivatives due within a few days and the distribution by an underwriter of an IPO, are not informative about the long-run performance of IPOs.

3.3.2 Cumulative Abnormal Stock Returns

The goal of this paper is to understand the effect of short selling volume on the offer day on the subsequent performance of IPOs. I measure the performance of IPOs conditioned on short selling volume on the offer day over different windows following the IPO: one month, three months, six months and one year. I compute the cumulative abnormal returns after the IPOs using the standard market model and four-factor model.

For estimating the parameters α and β, I use an estimation window of 504 trading days (two years) before the IPO using daily returns of the most similar company in the same FF48 industry, matched based on market capitalization. The CRSP value-weighted index is used to proxy for market returns in both models. For the four-factor model, in addition to the market factor, I include three additional factors: SMB (small

minus big), HML (high minus low) and UMD (up minus down). Cumulative abnormal returns are calculated as the sum of abnormal returns for each company over the specific event window, which are then averaged cross-sectionally for both models.

I rank and split the sample of 610 IPOs into quartiles based on three types of short selling volume on the offer day: short sale volume excluding short sales that are exempted from short sale restrictions under the Rule 201, short sale volume that is exempted from short sale restrictions and total short sale volume.

Table 3.4 presents results when using the standard market model, while Table 3.5 presents results when using the four-factor model. As can be seen from Panel A of Table 3.4 and Table 3.5, the most informative short trades are those that are subject to short sale restrictions under the Alternative Uptick Rule 201.

I find negative, statistically significant, cumulative abnormal return using a six-month and one-year window for heavily-shorted IPOs (quartile 4) on the offer day using both models. This is approximately in line with the average duration of positions in the sample (100 trading days). Short sellers of IPOs, relative to short sellers of other stocks, are more long-term oriented. As shown in the previous literature, IPOs underperform in the longer run. It takes more time for the prices of IPOs to return to their fundamental values, serving as an example of long-term market inefficiencies.

Using a one-year window for the market model, heavily-shorted IPOs (quartile 4) underperform lightly-shorted IPOs (quartile 1) by an average of 15.12%. Using the four-factor model, the difference is 12.37%. Both differences are statistically significant.

On the other hand, lightly-shorted IPOs experience positive and statistically significant cumulative abnormal return for shorter windows (one and three months) using both models. In the longer run, the differences in their performances is statistically insignificant.

Thus, the stock market performance of IPOs, measured using stock return data, is lower for heavily-shorted IPOs on the offer day. This finding is in the line with the hypothesis that short sellers are sophisticated investors who anticipate subsequent underperformance of the IPOs in order to make a profit and contribute to efficient stock prices. Graphical evidence of this finding is in Figure 3.1.

Raw returns are presented in Figure 1a, while cumulative abnormal returns using the market model and the four factor model are in Figures 1b and 1c respectively. The IPOs are ranked and split into quartiles based on short selling volume on the offer day (excluding short sales exempted from Rule 201). In all three graphs, heavily-shorted IPOs (quartile 4) always underperform the remaining IPOs using a one-year window.

Table 3.4: Cumulative Abnormal Return (Market Model) to Short Sale Volume

The sample runs from March 2011 to December 2015. The event dates are the issue dates of the appropriate IPOs. In the Panel A., IPOs are ranked and split into quartiles based on short sale volume (excluding short exempt volume) on the first trading day. In the Panel B., IPOs are ranked and split into quartiles based on aggregate reported share volume of executed short sale exempt trades during the first trading day. In the Panel C., quartiles are formed based on both aggregate reported short volume of executed short sale and short sale exempt trades during the first trading day of the IPOs. Abnormal daily returns are calculated using the standard market model. The CRSP value-weighted index is used to proxy for market returns in the estimation of each firm alpha and beta. The estimation window is 504 days before the event date using daily returns of the most similar companies in the same FF48 industry to each respective IPO (matched based on market capitalization). Cumulative abnormal returns are calculated as the sum of abnormal returns over the event window. Average cumulative abnormal returns and t-statistics for event windows of 21, 63, 126 and 252 trading days are presented below.

Panel A.	Market Model CAR			
Short Sale Volume	Event Window:	Event Window:	Event Window:	Event Window:
Excluding Short Exempt	[+1,+21]	[+1,+63]	[+1,+126]	[+1,+252]
1st quartile - 153 obs.	0.0178	-0.0101	-0.0148	-0.0029
	(1.50)	(0.41)	(0.43)	(0.05)
2nd quartile - 152 obs.	**0.0656*** **	**0.0871*** **	0.0235	0.0066
	(3.92)	(3.35)	(0.62)	(0.11)
3rd quartile - 153 obs.	**0.0356*** **	**0.0422***	-0.0173	-0.0393
	(2.96)	(1.80)	(0.51)	(0.75)
4th quartile - 152 obs.	-0.0086	-0.0170	**-0.0764*** **	**-0.1542*** **
	(0.66)	(0.76)	(2.66)	(3.75)
Difference (1st-4th)	0.0263	0.0070	0.0615	**0.1512** **
	(1.50)	(0.21)	(1.38)	(2.19)
Observations	610	610	610	610

Panel B.	Market Model CAR			
Short Exempt Volume	Event Window:	Event Window:	Event Window:	Event Window:
	[+1,+21]	[+1,+63]	[+1,+126]	[+1,+252]
1st quartile - 350 obs.	**0.0366*** **	**0.0397*** **	0.0075	-0.0350
	(4.62)	(2.58)	(0.33)	(0.99)
2nd quartile - 0 obs.	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a
3rd quartile - 109 obs.	0.0134	0.0188	-0.0588	-0.0312
	(0.75)	(0.59)	(1.38)	(0.46)
4th quartile - 151 obs.	0.0169	-0.0025	**-0.0606** **	**-0.0877***
	(1.06)	(0.10)	(1.99)	(1.97)
Difference (1st-4th)	0.0197	0.0422	**0.0681***	0.0526
	(1.23)	(1.48)	(1.70)	(0.86)
Observations	610	610	610	610

Panel C.	Market Model CAR			
Total Short Sale Volume	Event Window:	Event Window:	Event Window:	Event Window:
	[+1,+21]	[+1,+63]	[+1,+126]	[+1,+252]
1st quartile - 153 obs.	**0.0217***	-0.0042	-0.0061	-0.0011
	(1.69)	(0.17)	(0.17)	(0.02)
2nd quartile - 152 obs.	**0.0616*** **	**0.0812*** **	0.0147	0.0047
	(3.84)	(3.21)	(0.40)	(0.08)
3rd quartile - 153 obs.	**0.0339*** **	**0.0434***	-0.0200	-0.0341
	(2.84)	(1.84)	(0.35)	(0.65)
4th quartile - 152 obs.	-0.0069	-0.0183	**-0.0817*** **	**-0.1594*** **
	(0.53)	(0.82)	(2.85)	(3.88)
Difference (1st-4th)	0.0286	0.0141	**0.0757***	**0.1584** **
	(1.56)	(0.42)	(1.64)	(2.29)
Observations	610	610	610	610

Absolute value of t-statistics in parentheses

*significant at 10%; **significant at 5%;*** significant at 1%

Table 3.5: Cumulative Abnormal Return (Four-Factor Model) to Short Sale Volume

The sample runs from March 2011 to December 2015. The event dates are the issue dates of the appropriate IPOs. In the Panel A., IPOs are ranked and split into quartiles based on short sale volume (excluding short exempt volume) on the first trading day. In the Panel B., IPOs are ranked and split into quartiles based on aggregate reported share volume of executed short sale exempt trades during the first trading day. In the Panel C., quartiles are formed based on both aggregate reported short volume of executed short sale and short sale exempt trades during the first trading day of the IPO. Abnormal daily returns are calculated using the four-factor model. The excess return on the market is the CRSP value-weighted index minus treasury bill rate from Ibbotson Associates. Other three factors are SMB (small minus big), HML (high minus low) and UMD (up minus down). The estimation window is 504 days before the event date using daily returns of the most similar companies in the same FF48 industry to each respective IPO (matched based on market capitalization). Cumulative abnormal returns are calculated as the sum of abnormal returns over the event window. Average cumulative abnormal returns and t-statistics for event windows of 21, 63, 126 and 252 trading days are presented below.

Panel A.	Four-Factor Model CAR			
Short Sale Volume	Event Window:	Event Window:	Event Window:	Event Window:
Excluding Short Exempt	[+1,+21]	[+1,+63]	[+1,+126]	[+1,+252]
1st quartile - 153 obs.	0.0139	-0.0143	-0.0278	-0.0252
	(1.23)	(0.59)	(0.81)	(0.45)
2nd quartile - 152 obs.	**0.0684*** **	**0.0906*** **	0.0331	0.0246
	(4.00)	(3.46)	(0.87)	(0.44)
3rd quartile - 153 obs.	**0.0331*** **	**0.0410***	-0.0223	-0.0494
	(2.85)	(1.89)	(0.74)	(1.08)
4th quartile - 152 obs.	-0.0067	-0.0187	**-0.0754*** **	**-0.1489*** **
	(0.52)	(0.82)	(2.63)	(3.67)
Difference (1st-4th)	0.0206	0.0044	0.0476	**0.1237***
	(1.21)	(0.13)	(1.07)	(1.78)
Observations	610	610	610	610

Panel B.	Four-Factor Model CAR			
Short Exempt Volume	Event Window:	Event Window:	Event Window:	Event Window:
	[+1,+21]	[+1,+63]	[+1,+126]	[+1,+252]
1st quartile - 350 obs.	**0.0342*** **	**0.0380** **	0.0046	-0.0302
	(4.35)	(2.50)	(0.20)	(0.85)
2nd quartile - 0 obs.	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a
3rd quartile - 109 obs.	0.0189	0.0254	-0.0521	-0.0358
	(1.04)	(0.82)	(1.32)	(0.57)
4th quartile - 151 obs.	0.0167	-0.0071	**-0.0664** **	**-0.1048*** **
	(1.06)	(0.29)	(2.30)	(2.68)
Difference (1st-4th)	0.0175	**0.0451***	**0.0710***	0.0745
	(1.11)	(1.60)	(1.79)	(1.25)
Observations	610	610	610	610

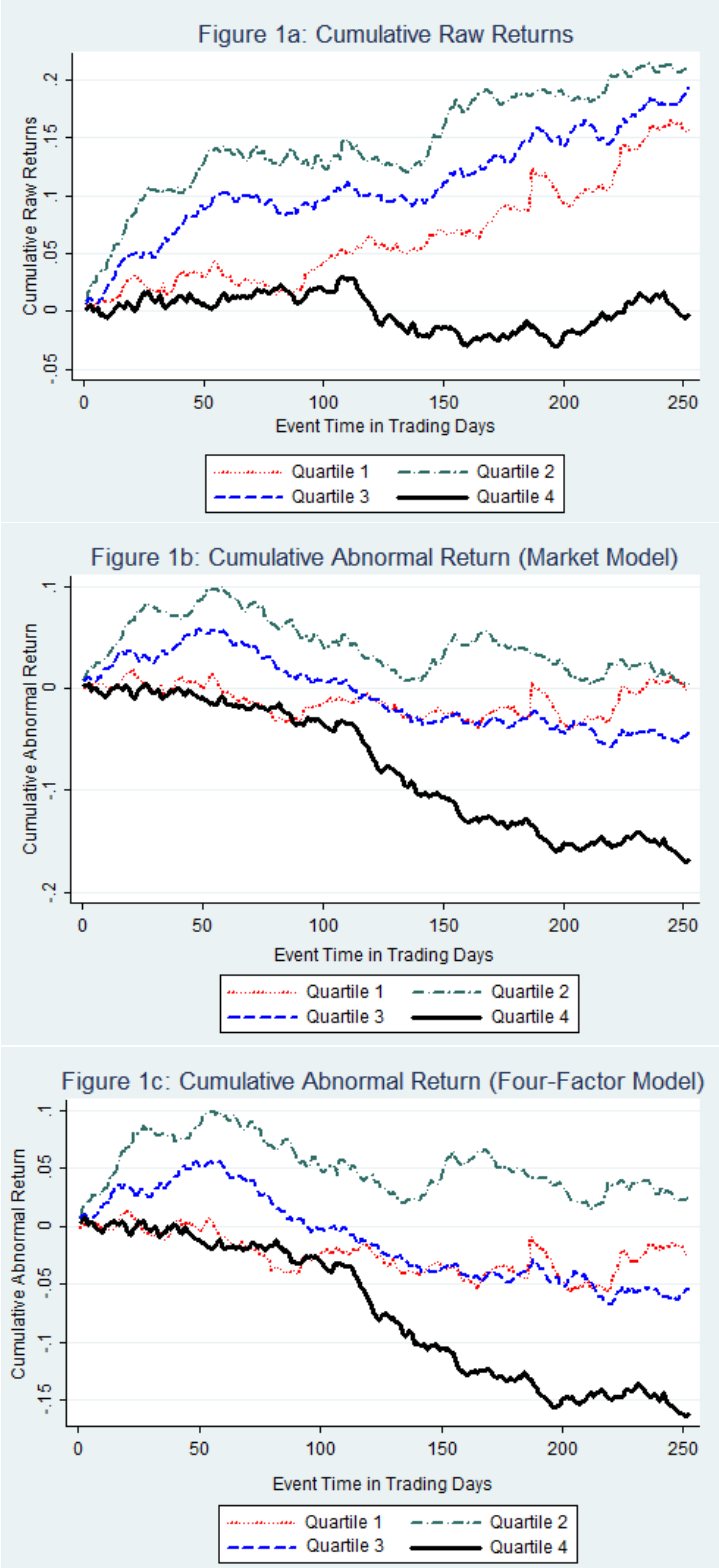
Panel C.	Four-Factor Model CAR			
Total Short Sale Volume	Event Window:	Event Window:	Event Window:	Event Window:
	[+1,+21]	[+1,+63]	[+1,+126]	[+1,+252]
1st quartile - 153 obs.	0.0179	-0.0083	-0.0189	-0.0228
	(1.44)	(0.33)	(0.52)	(0.40)
2nd quartile - 152 obs.	**0.0644*** **	**0.0845*** **	0.0243	0.0223
	(3.93)	(3.32)	(0.67)	(0.40)
3rd quartile - 153 obs.	**0.0314*** **	**0.0421***	-0.0163	-0.0432
	(2.72)	(1.94)	(0.54)	(0.94)
4th quartile - 152 obs.	-0.0050	-0.0199	**-0.0815*** **	**-0.1551*** **
	(0.39)	(0.87)	(2.85)	(3.84)
Difference (1st-4th)	0.0229	0.0116	0.0625	**0.1323***
	(1.28)	(0.34)	(1.36)	(1.90)
Observations	610	610	610	610

Absolute value of t-statistics in parentheses

*significant at 10%; **significant at 5%;*** significant at 1%

Figure 3.1: Stock Market Performance

The sample of 610 IPOs is partitioned into quartiles based on short sale volume on the offer day that is subject to short sale restrictions under the Alternative Uptick Rule 201.



3.3.3 Buy-and-Hold Abnormal Returns (BHAR)

There is no consensus in the literature about which method is better: use of cumulative abnormal returns (CARs) or buy-and-hold returns (BHAR). Some of the works, for example Fama (1998), justify the use of cumulative abnormal returns (CARs). However, Barber and Lyon (1997) emphasize the advantage of BHARs for measuring an investor's experience, because the use of mean calendar-time returns or their sum (cumulative returns) does not adequately measure the returns obtained by an investor who holds a stock for a long period of time. According to these authors, the returns obtained by an investor in the long run are better approximated by compounding short-run simple returns. Given this lack of consensus, in order to give robustness to the results, I use both CAR and BHAR approaches. Again, IPOs are ranked according to restricted, unrestricted, and total short selling volume on the offer day.

I calculate long-run returns for each quartile by compounding daily and monthly returns over, respectively, 252 trading days and 12 months, starting on the offer day. I adjust them by the normal return approximated by the CRSP value-weighted index:

$$BHAR = \sum_{i=1}^{N} w_i \left[\prod_{t=t_i}^{T_i} (1 + R_{it}) - 1 \right] - \sum_{i=1}^{N} \left[\prod_{t=t_i}^{T_i} (1 + E(R_{it})) - 1 \right] ,$$

where R_{it} is the return of security i on day or month t, N is the number of securities, T is the number of days (252 trading days) or months (12 months), t_i is the first day of trading and $E(R_{it})$ is the expected or normal return (CRSP value-weighted index). Weights (w_i) are defined as the ratio of issuer i's common stock market value and sum of the market values of all stocks. Table 3.6 and Table 3.7 report the results computed using daily and monthly returns respectively.

I find negative and statistically significant buy-and-hold returns for all three types of short sale volume only for heavily-shorted IPOs on the offer day (quartile 4) using both daily and monthly returns. Thus, firm performance, measured using buy-and-hold compounded stock return data, is lower for IPOs that were heavily shorted on the offer day of the IPO. If an investor buys and holds a security that was heavily shorted on the offer day, he will lose on average 7.74% in one year.

The difference between heavily-shorted IPOs (quartile 4) and lightly-shorted IPOs (quartile 1) on the offer day is always positive and statistically significant, with the highest magnitude for short sales that are subject to short sale restrictions (the first columns in both Table 3.6 and Table 3.7).

Table 3.6: Buy-and-Hold Returns Using Value-Weighted Daily Returns

The sample runs from March 2011 to December 2015. The event dates are the issue dates of the appropriate IPOs. In the first column IPOs are ranked and split into quartiles based on short sale volume (excluding short exempt volume) on the first trading day. In the second column IPOs are ranked and split into quartiles based on aggregate reported share volume of executed short sale exempt trades during the first trading day. In the third column quartiles are formed based on both aggregate reported short volume of executed short sale and short sale exempt trades during the first trading day of the IPOs. Buy-and-hold abnormal returns and t-statistics are presented below.

Buy-and-hold returns are defined as:

$$BHAR = \sum_{i=1}^{N} w_i \left[\prod_{t=t_i}^{T_i} (1 + R_{it}) - 1\right] - \sum_{i=1}^{N} \left[\prod_{t=t_i}^{T_i} (1 + E(R_{it})) - 1\right].$$

Weights are defined as the ratio of issuer's common stock market value to the sum of the market values of all stocks. R_{it} is the daily return of each individual stock, while $E(R_{it})$ is the CRSP daily value-weighted index, which is used as a proxy for expected or normal returns.

	BHAR (value-weighted daily returns)		
	Event Window: [+1,+252]		
	Short Sale Volume Excluding Short Exempt	Short Exempt Volume	Total Short Volume
1st quartile -153 obs.	-0.0039	**-0.0223*** **	-0.0054
	(0.76)	(4.48)	(1.00)
2nd quartile - 152 obs.	**0.0641*** **	n/a	**0.0608*** **
	(8.22)	n/a	(8.67)
3rd quartile - 153 obs.	**0.0190*** **	**0.0320*** **	**0.0193*** **
	(2.61)	(4.74)	(2.65)
4th quartile -152 obs.	**-0.0774*** **	**-0.0421*** **	**-0.0778*** **
	(10.76)	(6.24)	(10.82)
Difference (1st-4th)	**0.0736*** **	**0.0197** **	**0.0723*** **
	(8.36)	(2.24)	(8.04)

Absolute value of t-statistics in parentheses

*significant at 10%; **significant at 5%;*** significant at 1%

Table 3.7: Buy-and-Hold Returns Using Value-Weighted Monthly Returns

The sample runs from March 2011 to December 2015. The event dates are the issue dates of the appropriate IPOs. In the first column IPOs are ranked and split into quartiles based on short sale volume (excluding short exempt volume) on the first trading day. In the second column IPOs are ranked and split into quartiles based on aggregate reported share volume of executed short sale exempt trades during the first trading day. In the third column quartiles are formed based on both aggregate reported short volume of executed short sale and short sale exempt trades during the first trading day of the IPOs. Buy-and-hold abnormal returns and t-statistics are presented below.

Buy-and-hold returns are defined as:

$$BHAR = \sum_{i=1}^{N} w_i \left[\prod_{t=t_i}^{T_i} (1 + R_{it}) - 1\right] - \sum_{i=1}^{N} \left[\prod_{t=t_i}^{T_i} (1 + E(R_{it})) - 1\right].$$

Weights are defined as the ratio of issuer's common stock market value to the sum of the market values of all stocks. R_{it} is the daily return of each individual stock, while $E(R_{it})$ is the CRSP monthly value-weighted index, which is used as a proxy for expected or normal returns.

	BHAR (value-weighted monthly returns)		
	Event Window: [+1,+12]		
	Short Sale Volume Excluding Short Exempt	Short Exempt Volume	Total Short Volume
1st quartile -153 obs.	-0.0069	**-0.0189*** **	**-0.0137** **
	(1.20)	(4.19)	(2.36)
2nd quartile - 152 obs.	**0.0423*** **	n/a	**0.0425*** **
	(5.22)	n/a	(5.76)
3rd quartile - 153 obs.	**0.0119***	**0.0228*** **	**0.0124***
	(1.82)	(3.62)	(1.90)
4th quartile -152 obs.	**-0.0601*** **	**-0.0413*** **	**-0.0606*** **
	(10.82)	(6.78)	(10.93)
Difference (1st-4th)	**0.0532*** **	**0.0224*** **	**0.0469*** **
	(6.62)	(2.82)	(5.85)

Absolute value of t-statistics in parentheses

*significant at 10%; **significant at 5%;*** significant at 1%

I conclude that the finding that heavily-shorted IPOs perform worse than lightly-shorted IPOs is robust to different estimation approaches (calendar time-series, CAR and BHAR). The results are always in line with the main hypotheses that heavily-shorted IPOs on the offer day underperform both relative to the overall market and relative to a sample of IPOs that were lightly shorted on the offer day, as short sellers subject to Rule 201 are more informed about future IPO performance.

3.3.3.1 Cross-section of Abnormal Returns on Short Sale Volume

To address whether short selling volume on the offer day can explain cross-sectional differences in future abnormal returns of IPOs, I regress one-year post-issue buy-and-hold abnormal return of each IPO on the three types of short sale volume on the offer day: short sale volume that is subject to short sale restrictions, short sale volume that is exempted from restrictions and total short sale volume. I control for the size of each company on the offer day, measuring size as natural logarithm of the subject company's market value.

The results are presented in Table 3.8. In first three columns, the dependent variable is one-year BHAR compounded using daily returns, while in the last three columns BHAR is compounded using monthly returns.

The results show that short sale volume that is subject to Rule 201 significantly and negatively predicts BHAR. This result indicates that higher short selling volume on the offer day predicts a future decline in abnormal returns. In terms of economic significance, a 100,000 increase in shares shorted on the offer day predicts 0.17% decline in one-year abnormal return when using daily returns, or a 0.12% decline when using monthly returns.

3.4 Accounting Performance of IPOs Conditioned on Short Selling Activity on the Offer Day

Next, I consider whether there is a similar decline in performance following the IPO for companies that were heavily shorted on the offer day by using accounting data (instead of stock returns). Specifically, I consider whether net income, earnings per share and return on asset (ROA) decline in the quarter following the IPO. Measuring the effect using accounting data should capture only the decline in real performance, mitigating the joint hypothesis problem.

Table 3.8: Cross-section of Abnormal Returns on Short Sale Volume

The sample runs from March 2011 to December 2015. In the first three columns the dependent variable is the average one-year buy-and-hold abnormal return as a percentage using daily returns, while in the next three columns the dependent variable is the average one-year buy-and-hold abnormal return as a percentage using monthly returns. Short sale volume excluding short exempt volume is the aggregate reported share volume of executed short sale excluding short exempt trades scaled by 100,000 shares. Short exempt volume is the aggregate reported share volume of executed short exempt trades scaled by 100,000 shares. Total Sort Sale Volume is the aggregate reported share volume of executed short sales and short sales exempt trades scaled by 100,000 shares. Size is defined as the natural logarithm of the market value of the company on the day of the IPO.

	Dependent variable: 1 year Abnormal Return					
	BHAR (daily returns)			**BHAR (monthly returns)**		
Short Sale Volume						
Excluding Short Exempt	**-0.1731*** **			**-0.1203*** **		
	(5.27)			(4.03)		
Short Exempt Volume		-4.0285			-2.4769	
		(1.15)			(1.47)	
Total Short Sale Volume			**-0.1726*** **			**-0.1199*** **
			(5.28)			(4.04)
Size (lnMV)	**-0.8180** **	**-1.4808*** **	**-0.8164** **	**-0.7298** **	**-1.1971*** **	**-0.7291** **
	(2.28)	(4.37)	(2.27)	(2.24)	(3.92)	(2.24)
Constant	**5.8920*** **	**9.1507*** **	**5.8873*** **	**-4.7131** **	**7.0040*** **	**4.7119** **
	(2.75)	(4.42)	(2.75)	(2.43)	(3.75)	(2.43)
Observations	610	610	610	610	610	610
Adjusted R-squared	7.32%	3.82%	7.35%	4.93%	2.73%	4.94%

Absolute value of t-statistics in parentheses

*significant at 10%; **significant at 5%;*** significant at 1%

I use an autoregressive (AR) regression framework using windows of four quarters (one year) for each accounting variable and each partition of the sample (quartiles). Quartiles are formed based on short sale volume on the offer day that are subject to short sale restrictions under the Alternative Uptick Rule 201. I focus only on these type of trades because results from the previous analysis using stock market returns showed them to be more informative about the long-run underperformance of the IPO. The results are presented in Table 3.9.

Table 3.9 shows results from a regression of quarterly accounting variables (net income, earnings per share and ROA) on their lagged values over a period of four quarters (one year) starting from the IPO date. A dummy variable, which is set to one for the quarter following the IPO and zero otherwise, allows me to identify the change in accounting performance in the quarter following the IPO. Year and 48 Fama and French industry fixed effects are included in all regressions. Standard errors are clustered by firm and the accounting variables are winsorized at 1% in order to avoid extreme values driving the results.

In Panel A of Table 3.9 I regress quarterly net income on its lagged values for four quarters and for each quartile formed based on restricted short sale volume on the offer day. The dummy variable for the quarter following the IPO is negative and statistically significant for heavily-shorted IPOs (quartile 4), indicating that there is a significant decline in the profitability of these stocks in the quarter after the IPO. The effect is decreasing in magnitude along with the short sale volume on the offer day (quartile 2 and quartile 3), showing a positive coefficient or increased profitability for lightly-shorted IPOs (quartile 1).

Panel B of Table 3.9 shows results from a regression of quarterly earnings per share on its lagged values for four quarters starting from the IPO date. More specifically, I use quarterly diluted earnings per share including extraordinary items.[4] Similarly to when using net income, the coefficient on the dummy variable for the quarter after the IPO is negative and statistically significant for heavily-shorted and medium-shorted IPOs while for lightly-shorted IPOs the coefficient is turning into positive but statistically insignificant. To conclude, short sale volume on the IPO offer day has a negative impact on the earnings per share in the quarter after the IPO. Heavily-shorted IPOs show a significant decrease in accounting performance in the quarter following the IPO.

Panel C of Table 3.9 reports results from an autoregressive (AR) model of quar-

[4]The results are robust also when using basic earnings per share both including or excluding extraordinary items.

Table 3.9: Accounting Performance

The table below shows results from autoregressive panel regressions for a a one-year window (4 quarters) after the IPO. The dependent variables are: quarterly net income (Panel A.), quarterly diluted earnings per share (Panel B.) and quarterly return on assets (Panel C.) defined as net income over the total assets. Size is defined as the natural logarithm of total assets at the beginning of each quarter. The dependent variables are winsorized at 1%. The dummy variable is set to 1 for the quarter after the IPO, and 0 otherwise. Year and 48 Fama and French industry fixed effects are included in all regressions. Standard errors are clustered by firms. The sample is partitioned into quartiles based on short sale trades on the offer day that are subject to short sale restrictions under the Alternative Uptick Rule 201.

Panel A.	*Dependent Variable: Quarterly Net Income (t)*			
	Quartile 4	Quartile 3	Quartile 2	Quartile 1
	Heavily-Shorted	Medium-Shorted	Medium-Shorted	Lightly-Shorted
Quarterly Net Income (t-1)	**0.2570*** **	**0.4055*** **	**0.4665*** **	**0.3012*** **
	(12.02)	(11.75)	(16.14)	(7.57)
Dummy (Quarter after the IPO)	**-12.3040*** **	**-5.7545*** **	**-3.8505*** **	**1.5925***
	(3.04)	(2.82)	(3.11)	(1.91)
Size	**5.4754*** **	**2.9408*** **	-0.0489	0.3139
	(3.94)	(3.46)	(0.10)	(1.10)
Year Fixed Effects	YES	YES	YES	YES
Industry FF48 Fixed Effects	YES	YES	YES	YES
Observations	549	555	546	408
Adjusted R-squared	38.35%	37.22%	63.48%	39.71%

Panel B.	*Dependent Variable: Quarterly Earnings per Share (t)*			
	Quartile 4	Quartile 3	Quartile 2	Quartile 1
	Heavily-Shorted	Medium-Shorted	Medium-Shorted	Lightly-Shorted
Quarterly Earnings per Share (t-1)	**-0.0028***	**0.1369*** **	**0.1721*** **	**0.0401*** **
	(1.96)	(7.29)	(4.27)	(3.54)
Dummy (Quarter after the IPO)	**-0.1282*** **	**-0.1285*** **	**-0.1091*** **	0.0279
	(3.51)	(4.17)	(2.94)	(0.65)
Size	**0.0204***	**0.0486*** **	-0.0012	**0.0311** **
	(1.66)	(3.78)	(0.08)	(2.11)
Year Fixed Effects	YES	YES	YES	YES
Industry FF48 Fixed Effects	YES	YES	YES	YES
Observations	540	555	548	408
Adjusted R-squared	21.23%	40.77%	31.28%	38.54%

Panel C.	*Dependent Variable: Quartarly ROA (t)*			
	Quartile 4	Quartile 3	Quartile 2	Quartile 1
	Heavily-Shorted	Medium-Shorted	Medium-Shorted	Lightly-Shorted
Quarterly ROA (t-1)	**0.2697*** **	**0.4456*** **	**0.1008*** **	**0.1084*** **
	(9.90)	(18.26)	(4.88)	(8.14)
Dummy (Quarter after the IPO)	**-0.0089** **	0.0055	**0.0300*** **	**0.0414*** **
	(2.19)	(1.25)	(3.66)	(3.99)
Size	**0.0031** **	**0.0060*** **	**0.0154*** **	**0.0125*** **
	(2.21)	(3.12)	(3.83)	(3.27)
Year Fixed Effects	YES	YES	YES	YES
Industry FF48 Fixed Effects	YES	YES	YES	YES
Observations	545	554	544	406
Adjusted R-squared	44.56%	63.43%	40.37%	50.64%

Absolute value of t-statistics in parentheses

*significant at 10%; **significant at 5%;*** significant at 1%

terly ROA, calculated as quarterly net income over total assets. Heavily-shorted IPOs (quartile 4) show a decline in ROA of 0.89% in the quarter following the IPO, while lightly-shorted IPOs (quartile 1) show an increase in ROA of 4.14% in the quarter after the IPO. Both results are statistically significant, indicating that short sellers are good both at picking stocks that will underperform in the future and avoiding stocks that will outperform in the future.

After using accounting data instead of stock market data, I conclude that, in terms of profitability and accounting returns, heavily-shorted IPOs on the offer day always underperform relative to the sample of IPOs that were lightly shorted on the offer day. Accounting performance is declining in the increased short sale volume on the offer day, indicating that short sellers are sophisticated investors who anticipate future underperformance in order to make profits. Presumably, these investors are bringing prices back to their fundamental values.

3.5 Consensus Analysts' Recommendations and Short Selling Activity of IPOs

The semi-strong form of market efficiency theory states that investors should not be able to trade profitably on the basis of publicly available information, such as analysts' recommendations. However, research departments of brokerage houses spend large sums of money on security analysis, presumably because these firms and their clients believe that it can generate superior returns. The possibility that profitable investment strategies based on publicly available information could exist is suggested by the early findings of Stickel (1995) and Womack (1996). Furthermore, Barber (2001) documents that selling short stocks with the least favorable consensus recommendations and buying stocks with the most favorable recommendations yields abnormal returns. All these findings suggest that investors can profit from publicly available analysts' recommendations and that these recommendations possess additional information about the true value of securities.

In the case of IPOs, there is a so-called "quiet period" for a period of 25 trading days following the IPO, when the issuing firm and the members of the underwriting syndicate are not allowed to issue opinions concerning valuation, including research recommendations. In my sample of IPOs the first initiation of recommendations on average appears 42 calendar days after the offer day. This corresponds to 28 trading

days, similar to the quiet period.

In order to show that short sellers are well-informed, as much as analysts, I hypothesize that there should be a relationship between short sale volume on the first trading day and the analysts' initiation of recommendations that occur after the quiet period or on average after 28 trading days in my sample. The goal is to show that heavily-shorted IPOs on the offer day afterwards receive the least favorable consensus recommendations.

To test this hypothesis I regress the first mean analysts' recommendation of a company that went public on the short sale volume on the offer day. Mean analysts' recommendations are retrieved from the I/B/E/S U.S. Recommendation database. All recommendations are between 1 - Strong Buy and 5 - Strong Sale. After merging with the recommendations database my sample decreases to 529 IPOs that are present in I/B/E/S database.

In the table for summary statistics (Table 1), it was shown that heavily-shorted IPOs on the offer day have an average initiation of consensus recommendation of 2.13, that is, between Buy and Hold, while lightly-shorted IPOs on the offer day have an average initiation of 1.60, that is, between Strong Buy and Buy. This provides initial evidence that short sellers are good at picking overvalued IPOs relative to undervalued ones.

This evidence is also robust to more rigorous regression framework reported in Table 3.10.

Table 3.10 show results from a cross-sectional regression in which the dependent variable is the first consensus (mean) analysts' recommendation for each IPO. The variable of interest is the short sale volume on the offer day scaled by 100,000 shares, after controlling for different IPO characteristics and time and industry fixed effects.

IPO characteristics that I control for include: first-day return (defined as percentage difference between first-day closing market price and the offer price), gross proceeds in million of dollars, shares offered scaled by 100,000 shares, size (defined as the natural logarithm of the market value on the day of the IPO), issue price range (dummy variable equal to 0 if the offer price is set within the initial price range, 1 if the offer price is set above the initial price range and -1 if it is below the price range), over-allotment shares sold scaled by 100,000 shares and over-allotment amount in million of dollars. Negative price revision is a dummy variable equal to 1 if the offer price was revised downwards and 0 otherwise. The Nasdaq dummy is set to 1 if the company was initially listed on the Nasdaq stock exchange and 0 otherwise. The internet IPO dummy is equal to 1 if

Table 3.10: Cross-section of Mean Analysts Recommendation on Short Sale Volume

The table shows results from regression in which the dependent variables is mean (consensus) analysts recommendation for each IPO taken from I/B/E/S Recommendation database. All recommendations are between 1 (Strong Buy) and 5 (Strong Sale). The first column shows results for the full sample, while in the next four columns the sample is partitioned into quartiles based on short sale trades on the offer day that are subject to short sale restrictions under the Alternative Uptick Rule 201. Short sale volume is scaled by 100,000 shares. First-day return is defined as the percentage difference between first-day closing market price and the offer price. Gross proceeds are in millions of dollars. Shares offered are scaled by 100,000 shares. Size is defined as the natural logarithm of the market value of the company at the day of the IPO. Issue price range is a dummy variable taking 0 if the offer price is set within the initial price range, 1 if the offer price is set above the initial price range and -1 if it is below the price range. Over-allotment shares sold are scaled by 100,000 shares and over-allotment amount is in millions of dollars. Negative price revision is a dummy variable taking value 1 if the offer price was revised downwards and 0 otherwise. Nasdaq dummy is set to 1 if the company was initially listed on the Nasdaq stock exchange and 0 otherwise. Internet IPO dummy is taking value of 1 if the IPO is categorized as an internet firm on Jay Ritter's webpage and 0 otherwise. Year of the IPO and 48 Fama and French industry fixed effects are included in all regressions.

	Dependent Variable: Mean Analysts' Recommendations				
	Full Sample	Quartile 4	Quartile 3	Quartile 2	Quartile 1
Short Sale Volume					
Excluding Short Exempt	**0.0170*** **	**0.0140*** **	0.0523	0.0299	0.4773
	(6.18)	(3.82)	(0.98)	(0.30)	(1.61)
First-Day Return	**0.0232*** **	**0.0028***	**0.0037** **	0.0012	-0.0013
	(2.71)	(1.86)	(2.42)	(0.48)	(0.19)
Gross Proceeds	-0.0003	0.0008	0.0043	0.0058	0.0003
	(0.29)	(0.47)	(1.50)	(1.32)	(0.09)
Shares Offered	0.0003	0.0007	**0.0050*** **	0.0003	-0.0025
	(0.74)	(1.21)	(2.85)	(0.17)	(0.80)
Size (lnMV)	0.0099	-0.0682	**0.1813** **	-0.0256	-0.1343
	(0.37)	(1.20)	(2.59)	(0.41)	(1.51)
Issue Priced Range	0.0767	0.0645	-0.0445	0.1434	-0.0402
	(1.23)	(0.60)	(0.44)	(0.57)	(0.35)
Over-allotment Sold Shares	0.0016	-0.0024	**-0.0264*** **	-0.0073	0.0115
	(0.70)	(0.54)	(2.99)	(0.92)	(0.88)
Over-allotment Amount	-0.0006	-0.0078	**-0.0383***	-0.0446	0.0011
	(0.09)	(0.67)	(1.79)	(1.34)	(0.07)
Negative Price Revision	-0.0005	-0.2212	-0.2723	0.1022	0.0000
	(0.01)	(0.97)	(1.65)	(0.39)	(0.00)
Nasdaq Dummy	-0.0029	-0.0421	0.0308	0.0945	-0.1155
	(0.06)	(0.41)	(0.32)	(0.80)	(0.69)
Internet IPOs Dummy	0.0101	-0.1252	-0.1421	-0.2312	-0.1780
	(0.12)	(0.80)	(0.93)	(1.07)	(0.61)
Intercept	**2.4059*** **	**3.9835*** **	-0.9834	**1.7524*** **	**3.1778*** **
	(4.86)	(5.57)	(1.24)	(3.22)	(4.39)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Industry (FF48) Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	529	142	145	136	106
Adj. R-squared	24.44%	29.96%	18.53%	17.53%	0.05%

Absolute value of t-statistics in parentheses

*significant at 10%; **significant at 5%;*** significant at 1%

the IPO is categorized as an internet firm on Jay Ritter's webpage and 0 otherwise.

The first column of Table 3.10 considers the full sample, while in the next four columns the sample is partitioned into quartiles based on short sale volume on the offer day that is subject to short sale restrictions under the Rule 201 (considered as the most informative short sale trades).

I find a positive statistically significant relationship between the value of the first analyst recommendation after the IPO and the short sale volume on the offer day in the full sample. This result is mainly driven by the heavily-shorted IPOs (quartile 4), which are the only IPOs to have a positive statistically significant relationship with mean analysts recommendations.[5] The positive relationship means that heavily-shorted IPOs on the offer day afterwards receive less favorable analysis recommendations.

For each 100,000 increase in shares shorted on the offer day, the first consensus recommendation is higher (meaning less favorable) by 0.017.

This finding indicates that short sellers are sophisticated investors that possess information about the respective IPOs, and are at least as informed as analysts. Since the first initiation of recommendations after the IPO starts after the quiet period, I assume that most of the analysts that initiate the recommendations of IPOs in my sample are affiliated analysts that were part of the underwriting syndicate. These analysts are considered to have superior information over unaffiliated analysts and the rest of the market.

It is important to note that in this section I do not claim causality between short selling volume on the offer day and the initiations of analysts' recommendations because it is likey that both of them are driven by the deviations of the security prices from their fundamental values on the offer day. Undervaluations or overvaluations of IPOs on the offer day are discussed in more detail in the next section where I analyze the first-day return.

I have shown that heavily-shorted IPOs on the offer day receive less favorable initial recommendations by analysts relative to lightly-shorted IPOs. A further goal is to show that heavily-shorted IPOs are also bad investments in the longer run of one year. I hypothesize that, if short sellers are good at picking overvalued IPOs on the offer day and if they contribute to bringing prices back to their fundamental values, consequently

[5]The consensus analysts' recommendation is bounded dependent variable taking continuous values from 1 to 5. For simplicity I use and present the ordinary least squares (OLS) model because the predicted values are always in the range from 1 to 5. However, the results are robust also when using a tobit model or an ordered logit model.

these stocks should be downgraded by analysts. For this purpose I use a probit model in which the dependent variable is equal to 1 if the IPO firm was downgraded with respect to its lagged recommendation within one year. Results from the probit model are reported in Table 3.11.

A stock is considered as downgraded and the dummy is set to 1 if the difference between the respective mean recommendation and the previous mean recommendation is positive. For example, if the current recommendation is Strong Sale (5) and the previous mean recommendation was Strong Buy (1), the difference is positive and equal to 4 (5-1), and the stock is considered as downgraded.

The explanatory variable is a factor variable that takes categorical values from 1 to 4 depending on the quartile in which the IPO is classified based on the short sale volume on the offer day. The reference group of the factor variable are lightly-shorted IPOs on the offer day (quartile 1).

Being sorted as heavily-shorted IPOs (quartile 4) on the offer day versus lightly-shorted IPOs (quartile 1) increases the z-score for downgrade by 0.4193. This effect is statistically significant and decreases in magnitude for medium-shorted IPOs (quartile 2 and quartile 3). The effect decreases as short sale volume on the offer day decreases.

In order to better understand the effect of short selling on the offer day on the probability of being downgraded, I also compute predicted probabilities, which are reported in the second column of Table 3.11. The predicted probability of an IPO to be downgraded by analysts within one year is the highest for the heavily-shorted IPOs (32.12%). The predicted probabilities of being downgraded decrease with the short sale volume, so lightly-shorted IPOs on the offer day have the smallest predicted probability of being downgraded (18.84%) within one year after the IPO.

This evidence supports the main finding of the paper, that short sellers are well-informed investors, are good at picking overvalued stocks anticipating future underperformance, and they are important contributors to efficient stock prices.

3.6 Short Selling Volume on the Offer Day and IPO Characteristics

The previous sections have shown that short sellers are good at picking IPOs that underperform in the longer run, both relative to the market and relative to other IPOs. However, thus far little has been said regarding the basis upon which short seller choose

Table 3.11: Probit Model of Analysts' Downgrades on Short Sale Volume Quartiles

The table reports results from a probit model in which the dependent variable is equal to 1 if the IPO firm was downgraded with respect to the previous month's mean analysts recommendation in time period of one year. All recommendations are between 1 (Strong Buy) and 5 (Strong Sale) taken from the I/B/E/S Recommendation database. The stock is considered as downgraded and the dummy is set to 1 if the difference between the respective mean recommendation and previous mean recommendation is positive (example: Strong Sale (5) in current month - Strong Buy(1) in previous month gives a positive result of 4). The explanatory variable takes categorical values from 1 to 4 depending on in which quartile the stock is classified based on short sale volume on the offer day that is subject to short sale restrictions under the Alternative Uptick Rule 201. I report both coefficient estimates and marginal effects. Since explanatory variables takes categorical values (from 1 to 4), the marginal effect gives the discreet change in the dependent variable as it changes from 1 to 4.

	Dependent Variable: Downgraded=1, Otherwise=0	
	Coefficients	Marginal Effects
Quartile 1 (lightly-shorted IPOs)		**0.1884*** **
		(15.66)
Quartile 2 (medium-shorted IPOs)	**0.1016***	**0.2171*** **
	(1.76)	(20.06)
Quartile 3 (medium-shorted IPOs)	**0.1701*** **	**0.2378*** **
	(3.00)	(22.00)
Quartile 4 (heavily-shorted IPOs)	**0.4193*** **	**0.3212*** **
	(7.54)	(27.00)
Intercept	**-0.8836*** **	
	(19.82)	
Observations	5600	
Pseudo R-Squared	1.15%	
Chi-Squared	**71.57*** **	

Absolute value of z-statistics in parentheses

*significant at 10%; **significant at 5%;*** significant at 1%

these IPOs on the offer day and why and how they know to anticipate long-run underperformance of these issues. In other words, in this section I explore which types of IPOs are subject to more short selling on the offer day. To analyze this issue in more detail, I use a cross-sectional regression framework in which I regress the short sale volume on the offer day on different IPO characteristics. The dependent variables are three types of short selling volumes on the offer day: short sale volume excluding short sales that are exempted from short sale restrictions under Rule 201, short sale volume that is exempted from short sale restrictions, and total short sale volume. All the volumes are scaled by 100,000 shares.

The IPO characteristics that I examine are variables that were used as controls in the previous analysis in Section 5: first-day return, gross proceeds, number of shares offered, size, issue price range, over-allotment shares sold, over-allotment amount, negative price revision, Nasdaq dummy and the internet IPO dummy. I control for year and industry fixed effects. The results are reported in Table 3.12.

As shown in the first column of Table 3.12, again the most informative short trades on the offer day are those that are subject to short sale restrictions under the Rule 201. There is no statistically significant relationship between short trades that are exempted from Rule 201 and any of the IPO characteristics that I examine. The only significant coefficient (at a 10% confidence level) is the number of shares offered at the IPO.

On the other hand, the first column of Table 3.12 shows that short sale volume that is subject to short sale restrictions is correlated to almost all IPO characteristics. In terms of statistical significance, the most relevant IPO characteristics that influence the short sale volume on the offer day are: first-day return, number of shares offered, issue price range, over-allotment amount and the internet IPO dummy. Short sale volume on the offer day increases with the number of shares offered. Bigger issues are more likely to be shorted on the offer day. Issue price range has a positive and significant coefficient, meaning that, for IPOs with offer prices set above the initial price range, short sale volume on the offer day is higher. My interpretation of this result is that short sellers go against the rest of the market for IPOs that exhibit strong demand prior to going public (their price is usually set above the initial price range).[6] Over-allotment amount also has a positive and statistically significant coefficient. Underwriters have an option to purchase additional shares from the issuer following the IPO (over-allotment or "green shoe" option). They may cover the overallocation through the exercise of the

[6]See Hanley (1993) for reference.

Table 3.12: Cross-section of Short Sale Volume on IPO Characteristics

The table below shows results from regressions in which the dependent variables are: short sale volume excluding short exempt volume (aggregate reported share volume of executed short sale excluding short exempt trades), short exempt volume (aggregate reported share volume of executed short exempt trades) and total short sale volume (aggregate reported share volume of executed short sales and short sales exempt trades). Only trades on the first trading day of the IPO are included, and are scaled by 100,000 shares. First-day return is defined as the percentage difference between the first-day closing market price and the offer price. Gross proceeds are in millions of dollars. Shares offered are scaled by 100,000 shares. Size is defined as the natural logarithm of the market value of the company at the day of the IPO. Issue price range is a dummy variable equal to 0 if the offer price is set within the initial price range, 1 if the offer price is set above the initial price range and -1 if it is below the price range. Over-allotment shares sold are scaled by 100,000 shares and over-allotment amount is in millions of dollars. Negative price revision is a dummy variable equal to 1 if the offer price was revised downwards and 0 otherwise. Nasdaq dummy is set to 1 if the company was initially listed on the Nasdaq stock exchange and 0 otherwise. Internet IPO dummy is equal to 1 if the IPO is categorized as an internet firm on Jay Ritter's webpage and 0 otherwise. Year of the IPO and 48 Fama and French industry fixed effects are included in all regressions.

	Short Sale Volume Excluding Short Exempt	Short Exempt Volume	Total Short Volume
First-Day Return	**0.0602*** **	0.0005	**0.0608*** **
	(4.63)	(1.50)	(4.63)
Gross Proceeds	-0.0064	0.0001	-0.0063
	(1.22)	(0.16)	(1.20)
Shares Offered	**0.0213*** **	**0.0003***	**0.0216*** **
	(3.72)	(1.81)	(3.73)
Size (lnMV)	-0.4706	-0.0096	-0.4803
	(1.20)	(0.87)	(1.21)
Issue Price Range	**2.5223*** **	0.0414	**2.5637*** **
	(2.66)	(1.56)	(2.67)
Over-allotment Sold Shares	**-0.0469** **	0.0005	**-0.0463** **
	(2.35)	(0.94)	(2.30)
Over-allotment Amount	**0.0936*** **	-0.0006	**0.0929*** **
	(2.89)	(0.70)	(2.84)
Negative Price Revision	**2.6034** **	0.0374	**2.6407** **
	(1.98)	(1.01)	(1.99)
Nasdaq Dummy	**1.3160***	-0.0174	**1.2986***
	(1.69)	(0.80)	(1.65)
Internet IPOs Dummy	**4.6663*** **	0.0345	**4.7008*** **
	(3.56)	(0.94)	(3.55)
Intercept	1.7649	0.0999	1.8649
	(0.23)	(0.46)	(0.24)
Year Fixed Effects	Yes	Yes	Yes
Industry (FF48) Fixed Effects	Yes	Yes	Yes
Observations	610	610	610
Adj. R-squared	68.76%	10.17%	68.46%

Absolute value of t-statistics in parentheses

*significant at 10%; **significant at 5%;*** significant at 1%

over-allotment option. Higher over-allocation also means a higher demand for the IPO. This implies that short sellers go against the other market participants for IPOs with strong demand. The internet IPO dummy is also positive and statistically significant. Internet IPOs are considered to be hot issues with high demand. Short sellers are more likely to short these types of IPOs.

One striking result is that the first-day return is positively related to the short sale volume on the offer day. IPOs with the highest first-day return are the ones that are the most shorted on the offer day. This finding is also confirmed by Edwards and Hanley (2010). My interpretation of this result is that IPOs with the highest first-day return are hot issues with high demand. These IPOs are overpriced by the market at the end of the first trading day. Short sellers are more sophisticated than other types of investors, and they go against the behavioral biases, such as overoptimism, that surrounds hot issues in order to profit in the longer run. In the longer run, IPOs with the highest first-day return underperform relative to the market and other IPOs, as shown by Ritter (1991). I can conclude that, in the case of IPOs, short sellers are contributing to efficient stock prices in the longer run and presumbly are bringing prices to their fundamental value. I examine the connection between the first-day return and the short sale volume on the offer day in more detail in the next sub-section, in order to support my interpretation of the result.

3.6.1 First-Day Return and Short Selling Volume

Following the literature, I define the first-day return as the percentage difference between the first-day secondary market closing price and the offer price.

$$First\ Day\ Return = \frac{First\ Day\ Closing\ Price - Offer\ Price}{Offer\ Price} * 100$$

A positive first-day return is a result of the following possibilities: either the offer price is set too low, the first-day closing market price is too high or both. In order to be able to see which part is driving the first-day return and how it is connected to short sale volume on the offer day, I decompose the first-day return into two parts.
The first step is to find a measure of a "fair" price of the offering. I compute the intrinsic (fair) price of each IPO by finding the most similar industry peer (in terms of market capitalization) that did not go public in the respective year. I am restricted to useing

only price-to-sales ratios (P/S) because only sales figures are available for all companies. For each matching firm I compute the P/S ratio as follows:

$$(\frac{P}{S})_{Match} = \frac{Market\ Price * Shares\ Outstanding}{Prior\ Fiscal\ Year\ Sales} \ ,$$

where the market price is the CRSP stock price for the matching firm at the close of the respective IPO offer date of the company.

The intrinsic (fair) value of each IPO is computed by multiplying the P/S ratio of the industry peer with the prior year fiscal sales of the appropriate IPO:

$$Intrinsic\ Value = (\frac{P}{S})_{Match} * Sales_{(t-1)} \ ,$$

while intrinsic price of the IPO is:

$$Intrinsic\ Price = \frac{Intrinsic\ Value}{Shares\ Outstanding} \ .$$

I use the intrinsic (fair) price as a benchmark to compare the offer price and the first-day market price. I decompose the first-day return into its two drivers: offer price undervaluation (coming from a low offer price) and market overpricing (coming from a overoptimistic first-day closing market price):

$$Offer\ Price\ Undervaluation = \frac{Intrinsic\ Price - Offer\ Price}{Offer\ Price} * 100 \ ,$$

$$Market\ Overpricing = \frac{First\ Day\ Closing\ Price - Intrinsic\ Price}{Offer\ Price} * 100 \ .$$

Table 3.13 reports the average first-day return (row 1) and its two components (rows 2 and 3) for the full sample (column 1) and for the quartiles formed based on the short sale volume on the offer day that is subject to short sale restrictions (from column 2 to column 5). All variables are winsorized at 1% in order to make sure that extreme values of the distribution are not driving the results.[7] Differences in the first-day return and its two components between the heavily-shorted IPOs (quartile 4) and lightly-shorted IPOs (quartile 1) are in column 6, while column 7 reports the t-statistics of these differences.

[7]Due to winsorizing the sum of offer price undervaluation and market overpricing does not give exactly the first-day return.

Table 3.13: Decomposition of the First-Day Return

Row 1 shows results for the first-day return defined as the percentage difference between the first-day closing market price and the offer price of the full sample that runs from March 2011 to December 2015. Row 2 shows results for the offer price undervaluation defined as the percentage difference between the intrinsic price and the offer price, while in row 3 is the market price overpricing defined as the percentage difference between the first-day closing market price and the intrinsic price. Intrinsic price is computed as the value of the price-to-sales ratio of the most similar industry peer (matched by market capitalization) at the IPO date multiplied by the sales of the respective IPO. Column 1 reports the means of the variables of interest for the full sample. The sample is partitioned into quartiles from column 2 to column 5 based on short sale volume excluding short exempt volume, defined as the aggregate reported share volume of executed short sale excluding short exempt trades at the IPO date. Column 6 reports the differences between the most heavily-shorted IPOs (quartile 4) and lightly-shorted IPOs (quartile 1), while column 7 reports the t-statistics of these differences.

	Full Sample	Quartile 4	Quartile 3	Quartile 2	Quartile 1	Difference Q4-Q1	t-statistics
(1) First-Day Return (%)	15.71%	30.85%	22.25%	8.62%	1.19%	**29.66%*** **	(9.9114)
(2) Offer Price Undervaluation (%)	-6.34%	-4.29%	-4.80%	-5.61%	-10.65%	**6.34%** **	(2.0931)
(3) Market Overpricing (%)	21.87%	34.79%	25.99%	14.59%	12.15%	**22.64%*** **	(5.7322)
Observations	610	152	153	152	153	152	

Asterisks denote significant differences between the two quartiles based on t-statistics

*significant at 10%; **significant at 5%;*** significant at 1%

$$First\ Day\ Return = \frac{First\ Day\ Closing\ Price - offer\ Price}{Offer\ Price} * 100$$

$$Offer\ Price\ Undervaluation = \frac{Intrinsic\ Price - Offer\ Price}{Offer\ Price} * 100$$

$$Market\ Overpricing = \frac{First\ Day\ Closing\ Price - Intrinsic\ Price}{Offer\ Price} * 100$$

The average first-day return increases with the short sale volume on the offer day. Heavily-shorted IPOs have the highest first-day return (averaging 30.84%), while lightly-shorted IPOs are the ones with the lowest first-day return (only 1.19%).

The offer prices of the IPOs in my sample are set on average 6.34% higher than their industry peers, which is in line with the finding of Purnanandam and Swaminathan (2004) that the median IPO was significantly overvalued relative to industry peers. Heavily-shorted IPOs have offer prices that are set more closely to their industry peers, deviating by only 4.29%.

The close price on the first trading day deviates significantly from the industry peers (on average by 21.87% for the entire sample), and is likely the driving force behind the magnitude of the first-day return. This finding indicates that investors are overoptimistic about new issues and exhibit a high demand for them. Heavily-shorted IPOs have the highest overpricing relative to their industry peers (averaging 34.79%), while lightly-shorted IPOs have the lowest deviation of the closing price on the first trading day relative to their industry peers (average 12.15%). The differences between the heavily-shorted IPOs and lightly-shorted IPOs are always statistically significant.

First Ritter and Welch (2002) and then Cornelli and Ljungqvist (2006) argue that overoptimism among retail investors may explain the much-documented price jumps once trading in newly listed stocks begins, as well as the subsequent low returns over the longer run.

Since IPOs with the highest first-day returns are considered to be hot issues with the highest demand, they are consequently overpriced by the market at the end of the first trading day. As short sellers are more sophisticated than other retail investors, they note the overpricing and go against the behavioral biases such as overoptimism that surround hot issues in order to make profits on the longer run.

This finding is robust to the regression framework reported in Table 3.14. I regress the short sale volume on the offer day separately on the two components of the fist day return: deviation of the offer price relative to the industry peers (offer price undervaluation) and deviation of the closing first-day price relative to the industry peers (market overpricing).

Short selling on the offer day increases with the deviation of the closing first-day trading price relative to the industry peers (market overpricing). The market overpricing variable has a positive and statistically significant coefficient, as reported in the second column of Table 14. The deviation of the offer price relative to the industry peers (offer price undervaluation) does not seem to influence short selling volume on

Table 3.14: Cross-section of Short Sale Volume on Decomposed First-Day Return

The table shows results from a regression in which the dependent variables is short sale volume subject to short sale restrictions on the offer date scaled by 100,000 shares. In the first column the variable of interest is the offer price undervaluation defined as the percentage difference between the intrinsic price and the offer price, while in the second column the variable of interest is the market overpricing defined as the percentage difference between the first-day closing market price and the intrinsic price. Intrinsic price is computed as the value of the price-to-sales ratio of the most similar industry peer (matched by market capitalization) on the IPO date multiplied by the sales of the respective IPO. Controlling variables are different IPO characteristics defined the same as in Table 12. Year of the IPO and 48 Fama and French industry fixed effects are included in all regressions.

	Dependent Variable:	*Short Sale Volume*
Offer Price Undervaluation	0.0235	
	(0.21)	
Market Overpricing		**0.0292*** **
		(3.13)
Gross Proceeds	-0.0054	-0.0068
	(1.01)	(1.28)
Shares Offered	**0.0176*** **	**0.0190*** **
	(3.05)	(3.31)
Size (lnMV)	-0.2554	-0.4059
	(0.64)	(1.02)
Issue Priced Range	**4.1578*** **	**3.5007*** **
	(4.63)	(3.82)
Over-allotment Sold Shares	**-0.0393***	**-0.0365***
	(1.92)	(1.81)
Overallotment Amount	**0.0924*** **	**0.0999*** **
	(2.79)	(3.05)
Negative Price Revision	**3.7294*** **	**3.2726*** **
	(2.83)	(2.49)
Nasdaq Dummy	**1.6410** **	**1.3757***
	(2.07)	(1.75)
Internet IPOs Dummy	**4.8039*** **	**4.7802*** **
	(3.60)	(3.61)
Intercept	1.5971	-0.6551
	(0.20)	(0.08)
Year Fixed Effects	Yes	Yes
Industry (FF48) Fixed Effects	Yes	Yes
Observations	610	610
Adj. R-squared	67.56%	68.12%

Absolute value of t-statistics in parentheses

*significant at 10%; **significant at 5%;*** significant at 1%

the offer day. Its regression coefficient is statistically insignificant, as reported in the first column of Table 14.

To conclude, the results show that short sellers go against the sentiment of individual investors, whose overoptimism about hot issues on the first trading day leads to overpriced securities. This is an indication that short sellers are more sophisticated than individual investors, picking overpriced IPOs on the offer day and presumbly bringing prices back to their fundamental values in the longer run.

3.7 Conclusion

In this paper I examine short sale volume on the offer day of initial public offerings (IPOs) and the IPOs' subsequent performance. IPOs are major corporate events surrounded by much noise and pricing inefficiencies. It is therefore of interest to know whether short sellers possess superior information about the fundamentals of IPOs relative to other investors. To my best knowledge this paper is a first attempt to measure the long-run performance of IPOs conditioned on short selling activity on the first trading day. Edwards and Hanley (2010) explore the short selling activity on the offer day, but their main focus is on the first-day return.

I find that short sellers of IPOs have a longer length of time between opening and unwinding their positions relative to short sellers of other securities reported in the previous literature. The approximate duration of the position in this sample of IPOs is 100 trading days. IPO prices need more time to stabilize and return to the fundamentals after the initial boost. The first-day return might not be a good measure of IPO performances, so I focus more on the long-run performance of IPOs.

I find that short sale trades on the offer day that are subject to short sale restrictions under the Alternative Uptick Rule 201 are the most informative about subsequent performance. Transactions that are exempted from the restrictions of this rule (such as arbitrage of positions on option exchanges or foreign markets, hedging of derivatives due within a few days and the syndicate short covering of IPOs) are not informative about future long-run performance, because they are more short-term oriented and do not necessarily anticipate future underperformance.

The main finding is that short sellers are well-informed about the fundamental value of IPOs. Heavily-shorted IPOs on the offer day underperform both relative to lightly-shorted IPOs and relative to the overall market over a one-year window. On

a risk-adjusted basis, when using the calendar time-series portfolio approach, heavily-shorted IPOs on the offer day underperform lightly-shorted IPOs by an average of nine basis points daily (22.68% annualized return) and 1.72% monthly (20.64% annualized return). These returns are also robust to alternative specifications of abnormal returns (CARs and BHARs).

When using accounting measures such as net income, earnings per share and ROA I find that accounting performance declines significantly in the quarter after the IPO for companies that were the most shorted on the first trading day.

To support the main finding of this paper, I show that short sellers are sophisticated investors that possess information about the fundamentals of IPOs and are at least informed as analysts. Heavily-shorted IPOs receive the least favorable initiation of analysts' recommendations, which occur on average 28 trading days after the offer day in my sample. I further show that heavily-shorted IPOs have the highest predicted probability of being downgraded by analysts within the first year after the IPO.

I explore which types of IPOs are subject to more short selling on the offer day. I provide evidence that short sellers are picking hot issues with high demand and high first-day returns. Heavily-shorted IPOs are overpriced at the end of the first trading day on average by 35% relative to their industry peers. Short sellers go against the sentiment of individual investors for hot issues. This result indicates that short sellers are more sophisticated than other investors and go against behavioral biases such as overoptimism that surrounds hot issues in order to make profits in the longer run.

Overall, the results indicate that, on average, short sellers are sophisticated investors who are well-informed regarding the fundamental value of IPOs and important contributors to efficient stock prices. At the same time I also detect the existence of sizable and persistent limits to arbitrage because price corrections of initial public offerings generally require six months to one year. A natural follow-up to this paper would be to study the cost at which short sellers are applying their trading strategies on the offer day and constraints that they are facing in order to explain better the detected limits to arbitrage.

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