Short Selling in Initial Public Offerings

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Abstract

A number of academic papers have used short sale constraints in the immediate aftermarket of IPOs to explain short-term pricing anomalies that are subsequently reversed in the long-term. Using newly available data, this paper documents that short selling is prevalent early in the aftermarket trading of IPOs. Greater short selling is observed in IPOs with positive partial adjustment, large trading volume and high initial returns. Although our results support the conjecture that large levels of underpricing may indicative of overvaluation, we find that short selling does not appear to limit *observed* underpricing. This finding is inconsistent with theoretical models that predict high initial returns, in part, by assuming constraints on short sales. Short selling does appear to predict the direction of short term price effects as the greater the short selling, the larger is the price decline in the first trading month. Even before incorporating the cost of borrowing shares, however, the marginal short selling appears to be unprofitable. Using data on failures to deliver, we test whether short sellers appear to avoid the perceived restrictions of the equity lending market by "naked" short selling. We find that the level of failures to deliver are uncorrelated with the amount of short selling and are more likely to occur in IPOs that are hypothesized to be price supported. Thus, we conclude that short selling in IPOs are neither as constrained as suggested by the literature nor the result of "naked" short sales.

Short Selling in Initial Public Offerings

1.   Introduction

One of the longstanding puzzles in finance has been the pricing of initial public offerings. Many papers assume that constraints on short selling immediately following an IPO may contribute to pricing inefficiencies in the short term (Hanley, Lee, and Seguin (1996), Derrien (2006), Ljungqvist, et al (2006), Ofek and Richardson (2003), and Houge et al (2001)) which are subsequently reversed in the long term (Miller (1977) and Ritter (1991)).

The assumption that short selling is difficult is based upon the perceived high cost of borrowing shares (Ljundqvist, Nanda and Singh (2006)), limits on underwriter lending shares during the first month of trading (Houge, et al (2001)), the lock-up of insider shares which restrict supply (Ofek and Richardson (2000)), and difficulties in locating shares prior to the closing of the offer. We test whether these potential constraints restrict short selling in the immediate aftermarket of IPOs by examining newly available data on actual short selling transactions.

Short selling occurs in 95% of the IPOs in our sample on the first trading day with most of the first day short sales occurring close to the open. The average level of short sales on the offer date exceeds 7% of the shares offered and 3% of shares outstanding and declines over the first month of trading. For the majority our IPOs that trade on the Nasdaq, the ratio of short selling to volume by the fourth trading day is only slightly lower than that documented by Diether, Lee, and Werner (2006a) for a large cross-section of stocks indicating that short sales of IPOs reach an "equilibrium" level quickly.[1]

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[1] While short selling is slightly below that documented by Diether, Lee, and Werner (2006a) by the fourth trading day, the level of short selling as a percentage of volume on the first trading day is lower than that reported for a

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The literature provides two theories why overvaluation may exist in the pricing of IPOs. First, Derrien (2006) and Ljungqvist, Nanda and Singh (2006) argue that underwriters and issuing firms take advantage of investor sentiment or irrational exuberance by pricing issues above their intrinsic value. In this case, investor sentiment leads to higher partial adjustment, greater underpricing and an aftermarket trading price that exceed the "true" value of the security. Thus, the inability to short sell the security leads to higher initial returns than would otherwise occur.

Second, underwriter price support in the aftermarket of IPOs may lead to predictable price declines after these activities cease (Aggarwal (2000) and Ellis, Michaely and O'Hara (2000)). It has been suggested that the ability of the underwriter to economically sustain any form of price stabilization in the near term is partially related to constraints on short sales (Hanley, Lee and Seguin (1996)).

We test whether short sale constraints contribute to the observed pricing in both of these cases. Our results indicate that the magnitude of short selling on the first trading day is positively and significantly related to partial adjustment, the first day return from the offer price to the open and initial trading volume but unrelated to IPOs that are hypothesized to have underwriter price support.[2] These findings partially support models of investor sentiment in that short sellers appear to be attracted to issues in which underpricing is greatest and the potential for overvaluation is highest. However, the ability of short sellers to limit *observed* underpricing is

typical stock. The difference in short selling on the first trading day in an IPO as compared to seasoned stocks may be due to the fact that the volume on the first trading day of an IPO is extremely large.

[2] We cannot tell whether this result is due to a lack of demand to sell short price supported IPOs or to greater short sale constraints. Geczy, Musto, and Reed (2003) document that "dog" or cold IPOs tend to have higher rebate rates which suggests that short sale constraints might be responsible for our low observed level of short selling.

inconsistent with models of investor sentiment that predict high initial returns, in part, by constraints on short selling.[3]

We further examine whether the assumption regarding the supposed difficulties in locating or borrowing shares is valid by testing the hypothesis that short sellers are engaging in "naked" short selling activities. According to the SEC web site, "a "naked" short sale is a short sale where the seller does not borrow or arrange to borrow the securities in time to make delivery to the buyer within the standard three-day settlement period [and, as] a result, the short seller fails to deliver securities to the buyer when settlement is due (known as a "failure to deliver")."[4] Failures to deliver, in practice, are often used as a measure for the presence "naked" short selling.[5] Using a unique database, we examine whether short sales immediately following the IPO are positively correlated with failures to deliver. To our knowledge, we are the first paper to examine the relationship between short selling and failures to deliver.

Like short selling, we find that failures to deliver are prevalent early in the aftermarket trading of IPOs. Approximately 71% of the IPOs in our sample have failures to deliver of at least 10,000 shares on *the first* standard settlement day.[6] In fact, 1/3 of IPOs have enough "fails to deliver" over the first 5 standard settlement days to qualify for the Reg SHO threshold list on the first possible date and over half appear on the list within the first 30 days of trading.

Contrary to the hypothesis that failures to deliver in IPOs are due to "naked" short selling, we find that level of failures to deliver are uncorrelated with the level of short sales. High levels of

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[3]It could obviously be the case that the level of initial return in these offers would be even higher if the demand for short selling exceeds the supply. Consistent with Geczy, Musto, and Reed (2002), we show in Section 6 that the loan fee for stock borrowing appears to be low over the first month of trading.

[4] http://www.sec.gov/spotlight/keyregshoissues.htm

[5] The Commission has stated that fails to deliver can be indicative of abusive or manipulative naked short selling and can deprive shareholders of the benefits of ownership, such as voting and lending, See page 8 of the release proposing to amend Regulation SHO (SEC Release No. 34-54154, July 14, 2006).

[6] The first settlement date refers to three days after the issue starts trading in the stock market. This is also the first day that a failure to deliver can occur.

failures to deliver are not associated with high levels of short selling and therefore, we find no indication that short sellers are systematically engaging in "naked" short selling.

We do find, however, that failures to deliver are more likely in IPOs that are hypothesized to be price supported. This suggests that failures to deliver in price supported IPOs may arise from the mechanics of the offering process. Underwriters generally allocate more shares in an IPO than are offered (e.g., Hanley, Lee and Seguin (1996) and Aggarwal (2000)). If the initial return is positive, the underwriter covers this overallocation by exercising the overallotment option. In the case of IPOs needing price support (whose initial return is close to zero), the underwriter will purchase shares in the open market to cover the overallocation. Unless all overallocated shares are purchased in the market on the first trading day, these overallocated shares could result in fails to deliver if investors sell them before the underwriter can purchase the shares. Therefore, underwriter price support activities could result in failures to deliver in the short term.[7]

Finally, we examine the ability of short sellers to predict prices in the short term. We find no evidence that the magnitude of short selling is related to the first day return from the open to the close. There is a significantly negative relation, however, between the magnitude of short selling on the initial trading day and the subsequent price decline over the first trading month. We interpret this finding as an indication that short sellers in IPOs are informed and are able to predict future price movements.

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[7] The creation of an uncovered short position by underwriters in connection with an offering is a permissible activity that facilitates an offering and is different from the delivery obligations relating to "uncovered short selling" of securities that is discussed in the Regulation SHO adopting release (SEC Release No. 34-50103, July 28, 2004 and 69 FR 48008, August 6, 2004). These are two distinctly different activities. Underwriters cover the overallocation either through the exercise of the overallotment option or through open market purchases (also known as "syndicate short covering"). Syndicate short covering, which is defined in Regulation M as "the placing of any bid or the effecting of any purchase on behalf of the sole distributor or the underwriting syndicate or group to reduce a short position created in connection with the offering," is regulated by Rule 104 of Regulation M, which governs certain aftermarket activities in connection with an offering. The Commission has proposed amendments to Rule 104 of Regulation M (see SEC Release No.33-8511, December 9, 2004).

An examination of the profitability indicates that, even before incorporating stock loan fees, the marginal short sale is unprofitable. We present evidence that the lack of profitability is not due to an excessively high cost of borrowing shares, but to the average positive increase in prices over the first few months of trading. In conjunction with Mitchell, Pulvino, and Stafford (2002), this result suggests that short selling restrictions do not result in higher observed underpricing or overvaluation, but that short sellers are not able to fully correct overvaluation because marginal short selling is not profitable, on average, before adjusting for costs.

These findings call into question interpretations on short sale constraints and costs of short selling IPOs. Recent evidence by Geczy, Musto and Reed (2002) on rebate rates suggests that IPO shares are available for borrowing as soon as the first settlement day but that access to these shares may be limited to only some investors. Even though they find that most IPOS are on special and thus, are expensive to borrow, we find that short sellers are active in IPOs. We interpret these results as evidence that short selling is not as constrained in IPOs as the literature has suggested and suggests that factors other than short sale constraints may be responsible for the observed high level of initial returns in IPOs. [8]

The paper is organized as follows: A brief literature review is presented in Section 2, section 3 describes the data and summary statistics, Section 4 examines the determinants of short selling, Section 5 investigates potential "naked" short selling, and Section 6 investigates the relation between short selling, short term price movements and profitability. Section 7 provides a summary of the results and the conclusions.

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[8] We note that our tests are unable to determine whether all demand for short selling is satisfied. However, many of the papers referenced above assume that short selling is impossible during the first few trading days and our results indicate that this claim is untrue.

2. Impact of Short Sale Constraints on IPO Pricing

Several theoretical papers suggest that divergence of opinion, coupled with short sale constraints are a potential explanation of for the well-documented underpricing and subsequent overvaluation of IPOs (Miller(1977), Derrien (2005), and Ljungqvist, Nanda, and Singh (2006)). Miller (1977) argues that if underwriters price issues according to their own assessments of the "true" value of the security, then the offer price "will be below the appraisals of the most optimistic investors who actually constitute the market for the security." Derrien (2005) and Ljungqvist, Nanda and Singh (2006) extend this argument in a theoretical framework. Both papers assume that IPOs cannot be sold short in the secondary market. By disallowing short sales, investor optimism drives the market price of IPOs far above the true value resulting in overvaluation in the secondary market.

Several papers find evidence consistent with this argument. Houge, Loughran, Suchanek and Yan (2001) present evidence that proxies for divergence of opinion have predictive power in explaining poor long-run returns. They argue that institutional constraints on short sales lead to divergence of opinion and overoptimism by investors. When examining carve-out IPOs, Lamont and Thaler (2003) find evidence that mispricing occurs and argue that "the demand for certain shares by irrational investors is too large relative to the ability of the market to supply these shares via short sales, creating a price that is too high." They argue that "the short sale market works sluggishly." Mitchell, Pulvino, and Stafford (2002) provide additional evidence that carve-outs are overpriced due to short sale constraints, but introduce the risk of upward price movements as a significant impediment to the profitability of short sales. Finally, Ofek and Richardson (2003) argue

that short sale constraints after the IPO are responsible for the Internet bubble. They argue that only upon lockup expiration did sufficient shares become available for shorting.

More recently a number of papers question the short sale constraint argument. Dorn (2003), Ausseness, Pichler, and Stomper (2003) and Cornelli, Goldreich and Ljungqvist (2006) examine pre-IPO markets that allow short selling and still find evidence of investor overoptimism in the trading of IPOs.[9] More direct evidence on the costs of short selling by D'Avolio (2002) and Geczy, Musto and Reed (2002) indicate that while IPOs are initially more expensive to short in the first month of trading, the overall cost of shorting is fairly small at between 3% at issuance and decline to 1.5% per year.[10] Geczy, et al also conclude the cost of short selling around lock-ups does not appear to be an impediment. Their evidence is the first to suggest that short selling may be available earlier in the IPO process than previously thought which can explain the Lamont and Thaler (2003) result that there is substantial short interest in carve-outs in the first month after the IPO.

The literature remains inconclusive on the presence or impact of short selling on the pricing of IPOs because the presence of short selling immediately after the IPO must be inferred by other means such as proxies for divergence of opinion, price stabilization and rebate rates. Further, data on short interest is often not available for IPOs in the first month of trading and such data cannot shed light on how quickly short sellers enter the market. Thus, it is only recently, that we are able to ascertain whether theories regarding the pricing of IPOs are correct that IPOs are indeed short sale constrained and, by inference, whether short sale constraints are a plausible explanation for possible overvaluation.

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[9]Grey market trading involves some sort of short position (usually by an institution) that is sold to investors (usually retail). Short sales are covered by allocations in the IPO.
[10] D'Avolio defines a stock as an IPO if it went public within the last year.

3.   Data and Summary Statistics

a.   *IPO Sample*

The initial sample of 362 IPOs and their offering characteristics is from Securities Data Corp. (SDC) from January 1, 2005 through May 20, 2006. The sample period, beginning January 2005, is chosen because it begins after the implementation of Reg SHO and is associated with the public release of the Regulation SHO Pilot data which contains short selling transaction information. In order for an IPO to be included in the final sample, we require that the IPO have at least 30 consecutive days of trading on CRSP and have preliminary offer prices in SDC.[11] The final number of IPOs that met these criteria is 295.[12]

Table 1, Panel A presents initial statistics on the IPO sample. On average, the mean offer amount is $223 million. The sample has a negative partial adjustment of -3.16% indicating a relatively conservative IPO market. Partial adjustment is defined as the percent difference between the offer price and the mid-point of the original preliminary offer price filing range noted in SDC (Hanley (1993)). Approximately 64% of IPOs have offer prices above the midpoint of the preliminary offer price range and 38.85% have offer prices below the midpoint. The sample contains 15.54% or 46 closed-end fund offerings.

Panel B of Table 1 presents summary statistics on first day return and trading volume. Like Aggarwal and Conroy (2000), most of the first day return occurs at the open. The mean first day return is 9.18% and the time period covered by this study is characterized by relatively "normal"

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[11]CRSP®, Center for Research in Security Prices. Graduate School of Business, The University of Chicago. Used with permission. All rights reserved. crsp.chicago.edu

[12] Unlike most IPO studies, this study does not eliminate closed-end funds, unit offers, bank IPOs and IPOs with offer prices below $5.

levels of average first day returns. [13] Trading volume on the offer date is slightly over 50% of the shares offered (similar to that found in Ellis, et al (2000) and Corwin, et al (2004)) and is much greater than the average trading volume on a given day for an individual stock.

b. *Short Selling*

We begin our examination of the hypothesis that short selling is difficult in the immediate aftermarket in IPOs by investigating whether short selling is possible in the first few days of trading. We collect information on transactions involving short sales for the first 30 days of trading from the Reg SHO pilot data of nine markets: Amex, Arca Exchange, Boston Stock Exchange, Chicago Stock Exchange, NASD, NASDAQ, National Stock Exchange, NYSE and Philadelphia Stock Exchange. Individual short sale transactions are aggregated into daily short sales for each IPO.[14]

All but 15 IPOs in our sample have short sales on the offer day 14 of which are closed-end funds. [15] As shown in Table 1 Panel C, short sales comprise just fewer than 12% of the trading volume and over 7% of the shares offered.[16] This finding clearly indicates that short sales are both non-trivial and are an integral part of the IPO price process on the first trading day.

Figure 1 shows the time distribution of short sales on the offer day by trading market. Forty-five percent of the IPOs in the sample trade on the NYSE or Amex while 55% trade on the Nasdaq. In all markets, the largest amount of short selling occurs close to the open. On average, 35% of short sales in NYSE IPOs occur in the first hour of trading and this percentage is the

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[13] For comparison statistics, see Jay Ritter's website at http://bear.cba.ufl.edu/ritter/IPOs2005Factoids%20(2).pdf
[14] The short selling data used in this paper does not include any short selling by the underwriter (syndicate) in connection with an offering.
[15] The findings presented in this study are robust to the exclusion of closed-end funds.
[16] There is no adjustment to volume between NYSE and Nasdaq IPOs.

maximum for the day. Although Nasdaq IPOs have no short selling between 9:30 and 10:00, this

lack of short sales is due to the fact that no IPOs in the sample open before 10:00 on the offer

day. As shown in Figure 1, short selling for the full sample of Nasdaq IPOs peaks from 11:00 to

11:30. In order to determine if differences in the opening affect the pattern of short sales

throughout the day, we further classify the sample of Nasdaq IPOs by opening time. When we

partition the sample by opening time, we find a similar pattern for Nasdaq IPOs as for NYSE

IPOs. The highest level of short selling in Nasdaq IPOs occurs during the first half hour of

trading with over 40% of the day's short sales occurring in this half-hour window. Short selling

in both NYSE/Amex and Nasdaq IPOs falls after the first half hour and levels out around noon

with a slight increase at the end of the day. Overall, these results indicate that there appear to be

few impediments to short selling early in the trading process.

Figure 2 presents short selling as a percent of shares offered, trading volume and daily

returns over the first month of trading. As can be seen in the graph, the initial trading day has the

highest proportion of return, trading, and short sales. Short sales persist for the first month of

trading although the levels are quite small in relation to the first few trading days. The volume

of trading and daily returns exhibit similar time-series properties with a rapid decline after the

IPO and a leveling off for the remainder of the first trading month.

Figure 3 presents the time-series pattern of short selling as a percent of volume over the first

month of trading by exchange. Recent studies that also use the Reg SHO pilot data such as

Diether, Lee, and Werner (2006a), find that short sales constitute approximately 24% of the daily

trading volume in NYSE-listed stocks and 31% of volume in Nasdaq-listed stocks. As shown in

Figure 3, the level of short selling quickly levels off by the fifth trading day (ignoring the effect

of the large trading volume in the first few days of trading.)[17] Although the magnitude of short

sales as a percent of volume remains lower for NYSE IPOs (at around 15%) than that

documented by Diether, Lee and Werner (2006a), the level of short selling in Nasdaq IPOs is

close to the average 31% for Nasdaq-listed stocks. Thus, it appears from Figure 4 that for the

majority of the IPOs in the sample, short selling as a percent of volume approaches average

levels very quickly.

Because trading volume on the offer day for IPOs is substantially larger than the trading

volume for an individual stock, a comparison of short sales to typical short interest provides

another perspective on the relative amount of short selling on the offer day. Diether, Lee, and

Werner (2006a) estimate that short interest is more than five times normal trading volume for

NYSE stocks and more than 4 times normal trading volume for Nasdaq stocks. Using these

numbers and their estimates of short selling as a percentage of trading volume, we estimate that

short interest should be more than 22 times normal daily short selling in NYSE stocks and 14

times normal short selling in Nasdaq stocks. Therefore, if IPO short selling volume is similar to

typical short selling volume, then dividing typical short interest by IPO short selling volume

should yield a result around 14 to 22. Instead, typical short interest, which is 2.6% of shares

outstanding as reported by Boni (2005), divided by IPO short selling volume on the offer date,

which is 3.26% of shares outstanding according to Table 1, is less than one (0.80). Whereas the

examination of traded stocks suggests that short selling volume in general should be much lower

than typical short interest, we find that short selling volume in IPOs is actually higher when

[17] While Diether, et.al find a much higher level of short sales relative to volume than the average short sale on the first trading day reported in our study, the amount of trading volume on the offer day for IPOs is substantially larger than the average daily trading volume for an individual stock making a comparison difficult.

compared to the same number. Therefore, it appears as if short selling volume on the offer day is remarkably high relative to short selling in traded stocks.

4.   Determinants of Short Selling

The findings of the previous section indicate that short selling is prevalent early in the trading process. To better understand the determinants of short selling, this section examines alternate hypotheses regarding the types of IPO where short selling may be greatest. As stated above, overvaluation may occur in IPOs in two possible cases. First, investor sentiment or divergence of opinion increases the value of the IPO beyond the "true" value. In this case, over-optimism or investor sentiment leads to large initial returns because of high demand but results in overpricing. Thus, one hypothesis is that short selling will be higher in offers with the greater amount of over-optimism as proxied by positive revisions in the offer price from the preliminary file range and high initial returns.[18]

Short sellers might also be attracted to offerings that are overpriced because of underwriter price support. Numerous papers such as Aggarwal (2000), Boehmer and Fishe (2006), and Lewellen (2006) show that underwriters engage in price support activities in the aftermarket for IPOs. Although there is some debate in the literature regarding the impact of price support activities, at least some studies have found that IPOs exhibit significant price declines by the end of the first month after underwriters cease supporting the price. (See, for example, Hanley, Lee and Seguin (1996) and Hanley, Kumar and Seguin (1993)). This price decline may attract short sellers to potentially price supported IPOs, and thus, measures of underwriter price support may be correlated with the amount of short sales on the first trading day. Short sellers, knowing that

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[18] Note that this hypothesis does not directly test these theories as the theories predict that short selling constraints themselves create the overvaluation.

the underwriter stands ready to buy shares at a potentially inflated price, will attempt to take advantage of the subsequent price decline. Therefore, another hypothesis we consider is short sales will be greater in offers that are expected to have underwriter price support.

Table 2 presents univariate statistics on the level of short selling by classifying the sample of IPOs into two categories: IPOs with closing prices above the offer price and IPOs with closing prices equal to or below the offer price. IPOs with no change or declines in offer price relative to the first day closing price are hypothesized to be more likely to have underwriter price support. IPOs with first day closing prices above the offer price are hypothesized to be associated with offers that have greater investor sentiment.

Consistent with models of overvaluation due to investor sentiment and contrary to the hypothesis that price support attracts short sellers, we find, in Table 2, that the greatest amount of short selling as a percent of shares offered is in IPOs whose closing price is in excess of the offer price. IPOs with no change or declines in price on the first trading day have the lowest average amount of short selling relative to shares offered. This relation continues over the full 26 days of trading with underpriced IPOs having cumulative short sales equal to 28% of the shares offered and almost 12% for IPOs that experience either no change or declines in the offer price.

For context, Table 2 also reports univariate statistics on offering characteristics, returns, volume, and partial adjustment. These statistics are all consistent with findings from prior research. The vast majority of IPOs, almost two-thirds, in the sample have positive initial returns. Many closed-end funds in our sample have no change in price on the first trading day (Hanley, Lee and Seguin (1996)).[19] Partial adjustment is positively associated with initial

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[19] All of the results presented in the paper are robust to the exclusion of closed-end funds.

returns as in Hanley (1993). Trading volume and initial returns are positively associated as documented by Aggarwal (2002) and Krigman, Shaw and Womack (1999).

Because factors other than returns can influence the level of short sales on the first trading day, we next focus on testing our hypotheses in a regression setting that controls for these other factors. Research in IPOs has found that trading volume and initial return are related and highly correlated (see Aggarwal (2002) and Krigman, Shaw and Womack (1999)). Although not presented, we also find a high degree of correlation between short selling as a percent of shares offered, trading volume as a percent of shares offered and initial return. Partial adjustment is not as highly correlated with the other variables but is still significantly so. Therefore, we must be careful when including all of these variables in a regression analysis as they may capture the same economic effect.

To examine the relative effect of these and other variables on the amount of short selling, we formulate a number of regression specifications that incorporate each correlated variable independently. To examine our hypotheses, we include the first day return at the open measured from the offer price to the opening price, the partial adjustment measured as the percentage difference of the offer price from the midpoint of the preliminary offer price range, and first day trading volume as a percent of shares offered. Note that both partial adjustment and the first day return at the open should be relatively unaffected by the level of short selling because they are determined before the market opens although we concede that sell volume at the open (which may include short sales) could be informative. Under the investor sentiment hypothesis, short selling should be positively associated with the first day return from the open, partial adjustment and trading volume.

To examine whether short selling is related to price support, we include two measures of potential price support: whether the IPO is a closed end fund and a dummy variable that indicates a high probability that an IPO is price stabilized. Closed-end funds would be likely candidates for short sellers because closed-end funds almost always have some price support in the aftermarket. The dummy variable indicating the potential for underwriter price support is equal to 1 if: a) the initial return is equal to zero or b) the IPO is in the bottom quartile of the percent of the overallotment option exercised (as collected from Bloomberg) [20] or c) in the top quartile for the percent of trades, using TAQ, executed at the offer price on the first trading day. We use a combination of the three measures because a number of IPOs may have price support even if the initial return is not zero. [21] Aggarwal (2000), Ellis et al (2000), and Lewellen (2006) find that underwriters exercise less of the overallotment option when they engage in price support activities in the market and we expect that IPOs with more trades at the offer price, regardless of initial return, are more likely to have underwriter price support.

Because our hypotheses are related to the ability to short sell, we also include two variables that control for short sale constraints. The percentage float has been used in previous literature as a measure of borrowing constraints (Ofek and Richardson (2003) and Cook, Kieschnick, and VanNess (2006)). Thus, the smaller is the public float as measured by the ratio of shares offered to shares outstanding from CRSP, the greater are the supposed short sale constraints. In addition, the Uptick Rule and Nasdaq Bid Test Rule could also affect the level of short selling by

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[20] Underwriters typically have an option to purchase additional shares from the issuer following the IPO. This option is called the overallotment option or the "green shoe" option.
[21] While each of these measures are correlated, they are not perfect substitutes.

restricting the ability to trade (Pilot Report by the Office of Economic Analysis of the U.S. Securities and Exchange Commission).[22]

Finally, we include a dummy variable equal to one for IPOs that trade on the NYSE or Amex to control for differences in market structure. Indeed, several recent studies note a difference between the level of short selling on the NYSE or Amex and on NASDAQ (Alexander and Peterson (2006), Diether, Lee, and Werner (2006a), Diether, Lee, and Werner (2006b), and the Pilot Report by the Office of Economic Analysis of the U.S. Securities and Exchange Commission) that may be due to market structure, regulation, or selection bias.

The results of the various regression models are presented in Table 3 and support the investor sentiment hypothesis but not the price support hypothesis. Both the first day return at the open and partial adjustment is positively and significantly related to short sales. These findings indicate that short selling is more prevalent in IPOs that are expected to experience significant price increases rather than price declines.

Trading volume as a percent of shares offered is also positively and significantly related to the short sales as a percent of shares offered.[23] If volume is measuring the degree of investor sentiment, this result provides additional support for that hypothesis. However, greater trading volume could signal that it is easier to locate shares for lending. According to this interpretation, more short sales occur when the ability to borrow shares is greater. Finally, short sales are included in the measure of volume. Thus, the greater are the short sales, the greater may be the

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[22] For the Nasdaq Bid Test, this measures the percentage of the trading day when the rule allows short sales to execute against the bid price. For the Uptick Rule, we add to this the percentage of trades on upticks during periods when the rule does not allow short sales to execute against the bid price. "Economic analysis of the short sale price restrictions under the Regulation SHO Pilot," by the Office of Economic Analysis is available at http://www.sec.gov/news/studies/2007/regshopilot020607.pdf.

[23] This result may be driven by the denominator or shares offered. A regression of unscaled short sales on unscaled volume finds that the coefficient on volume is a statistically significant 0.118. Therefore, this result is not entirely due to the scaling.

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trading volume. However, adjusting volume for the level of short selling has no effect on the regression.

We find mixed results on both the price supported IPO and closed-end fund dummy variables. Price support is significant and negative only in the regression that includes trading volume. The dummy variable on closed-end funds is always statistically significant but the sign changes. In order to examine the effect of these two independent variables on short selling, Model 4 includes only the control variables in addition to the price support variables. In this case, both measures of potential price support are negatively and significantly related to short selling. Collectively, our results for IPOs that are price stabilized are mixed but generally indicate that short selling may be lower in IPOs that have underwriter price support.

The coefficients on the variables that capture potential constraints on short selling, i.e. the percentage float and the ability to execute short sales, are insignificant. Short sales appear to be unaffected by our measures of constraints. If short selling really is affected by the supply of shares, then our results question the use of float as a measure of short sale constraints. The result on the ability to execute short sales suggests that price test restrictions are not a significant deterrent to short selling.

Consistent with the recent literature (Alexander and Peterson (2006), Diether, Lee, and Werner (2006a), and Diether, Lee, and Werner (2006b)), the coefficient on the NYSE/Amex dummy is highly significant and negative. This finding indicates that IPOs on non-specialist markets have higher short selling than IPOs on specialist markets, but it is not clear whether this is related to the structure and regulation of the market or the types of companies that choose to go public on the NYSE/Amex or NASDAQ.[24]

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[24] Corwin and Harris (2001) examine the listing decision of IPOs.

Collectively, our findings suggest that it is IPOs that are more underpriced (more likely to have investor sentiment) but not those with price support that have more short selling than other IPOs. The factors that proxy for investor sentiment on the first trading day, such as high positive first day returns at the open and positive partial adjustment, have higher levels of short sales. Although Miller (1977), Derrien (2006), and Ljungqvist, Nanda and Singh (2006) argue that informed investors are precluded from taking advantage of the over-optimism of sentiment traders because of short sale constraints, our results indicate that at least some investors are able to engage in short selling.

Although we find that short selling is low in price supported IPOs, we cannot directly determine the reason for this finding. Geczy, Musto, and Reed (2002) show that both hot and cold IPOs have higher lending fees than warm IPOs. Our results suggest that the lending fees for hot IPOs are not a significant impediment to short selling. On the other hand, cold IPOs have high fees despite little observed short selling. Therefore, we conjecture that while demand may exist to short those shares the lack of short selling implies a limited supply. Thus, our results may indicate that shares to short are not in high demand in price supported IPOs or there may be other impediments to the supply of lendable shares such as low institutional holdings that may restrict the ability to short.

5.   Are Short Sellers in IPOs Engaged In Naked Short Selling?

The observed high level of short selling coupled with the presumed difficulty in borrowing shares and the potentially high cost of lending (Geczy, Musto and Reed (2002)), begs the question of whether short sellers are able to avoid those constraints by engaging in naked short selling. According to the SEC web site, "a "naked" short sale is a short sale where the seller

does not borrow or arrange to borrow the securities in time to make delivery to the buyer within the standard three-day settlement period [and, as] a result, the short seller fails to deliver securities to the buyer when settlement is due (known as a "failure to deliver")."[25] Thus, failures to deliver are often used as a proxy for "naked" short selling.[26]

In this section, we analyze whether IPOs with large short selling have subsequent failures to deliver. We examine failures to deliver both on the daily aggregate level and by whether the IPO has persistent delivery failures. We use data on failures to deliver (fails to deliver) sent to the SEC from the National Securities Clearing Corporation's (NSCC) Continuous Net Settlement (CNS). The NSCC reports the level of failures to deliver to the SEC and several SROs daily for stocks that have aggregate failures of at least 10,000 shares. The data contains the balance of fails to deliver as of a given day.[27]

When a stock has a fail to deliver level of at least 10,000 shares and 0.5% of the shares outstanding for five consecutive settlement days, the trading venue listing the stock is required to

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[25] Regulation SHO or Reg SHO, for short, was adopted in 2004 and provides regulations, among others, that govern locating shares prior to a short sale as well as the delivery of shares. Under Rule 203 of Reg SHO, the broker facilitating a short sale must "locate" the stock prior to the trade.[25] "Locate" refers to the requirement under Regulation SHO that a broker-dealer have reasonable grounds to believe that the security can be borrowed for delivery on the T+3 settlement date. Note that the locate requirement is not the same as actually borrowing the security. The broker may locate these shares in its own inventory, from a prime broker, or large institutional investors through a custodial bank. The broker-dealer can rely on "easy to borrow" lists for a locate if they satisfy the "reasonable grounds" standards of Regulation SHO Rule 203. Brokers may satisfy the reasonable grounds requirement if they rely on easy to borrow lists so long as those lists are less than 24 hours old, and the securities on the list are readily available such that it would be unlikely that a failure to deliver would occur. These standards are described in Section V.A. of release number 34-50103. See http://www.sec.gov/spotlight/keyregshoissues.htm for more information.
[26] See, for example, Angel (2006) and plus press articles such as "Games Short Sellers Play," by Bob Drummond, Bloomberg Markets, September 2006, and "Failed Trades" by Liz Moyer, Forbes, August 18, 2006. The media has referred to the Reg SHO threshold list as the "naked short selling" list.
[27] Note that the CNS data is a net failure to deliver. Therefore, the balance is not related to any individual transaction but to the net position of the clearing member. Our data is not as comprehensive as the data studied by Boni (2005) as it does not also include failures to receive, but our data does contain a much longer time series

place it on a list known as the Regulation SHO threshold list.[28] The earliest an IPO can be on the

list is eight days after the issue date (T+7) in order to allow three days for the first settlement and

five additional days of high fails to deliver. Threshold list information is collected from daily

Regulation SHO lists on the NYSE, Amex, and Nasdaq. Any IPO that is on the threshold list

can be considered to have long-lived fails and thus, we examine the determinants of qualification

for the threshold list in addition to the determinants of the daily level of failures to deliver to

account for both transitory and persistent fails.

a.   *Level of Failures to Deliver*

Figure 3 presents daily fails to deliver as a percent of the shares offered in addition to daily

short selling. Fails to deliver are shown on the graph three days earlier (N-3) than short sales to

account for the standard settlement process. Note that fails to deliver, unlike short sales,

represent a balance outstanding rather than new transactions. Consistent with the pattern of short

sales, the initial settlement day has the highest proportion of fails to deliver with a decline over

time. While some fails to deliver are resolved after the first settlement date, many appear to

persist beyond the first few days.[29]

Table 4 presents statistics on aggregate fails to deliver in excess of 10,000 shares on the first

settlement day (T+3). If an IPO is not in the data on the first settlement day, the number of fails

to deliver is set to zero although technically the IPO may not be in the data because the level of

fails is less than 10,000 shares. The average fails to deliver relative to shares offered is 4.22%

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[28] Once a stock is placed on the threshold list, Regulation SHO includes additional delivery requirements. For more information on Regulation SHO and the requirements described in this section, see the rules (17 CFR 242.203) and adopting release for Regulation SHO (SEC Release No. 34-50103, July 28, 2004).
[29] The average IPO takes four days for its fails to deliver to fall below 0.5% of shares outstanding (not shown), which is the cutoff for the threshold list.

which is lower than the average level of short sales documented in Table 1. As a percentage of short sales, fails to deliver, on average, are over 10 times greater. This average, however, may be misleading because of skewness in the ratio due to some IPOs with small short sales but large fails. However, it is interesting to note that some IPOs have fails on T+3 that far exceed their short selling. (IPOs without short sales are not included.) We find that the median fails to deliver to short sales on the first trading day is approximately 62%.

In Table 4, we further split the sample of IPOs with failures to deliver between those that have fails on the first settlement day (Panel B) and those that have fails anytime between T+4 and T+29 (Panel C). The vast majority of IPOs in our sample have failures to deliver sometime during the first 30 trading days. Two hundred and ten IPOs have fails to deliver on T+3, 77 have fails to deliver between T+4 and T+29 and only nine IPOs are not in the data.[30]

There is a noticeable difference between the two samples with IPOs with fails to deliver on the first settlement day having a lower mean initial return and a higher average fails to deliver as a percent of either the shares offered or short sales. When fails to deliver do not occur on T+3, most IPOs have fails not long after T+3 as the sample has a median fail date of T+5.

As in Panel A, both subsamples show that, on average, fails to deliver in an IPO exceed short sales. Although not shown, more than half of the IPOs with fails on T+3 have fails that exceed short sales on the offer date. The fact that fails to deliver exceed short sales for such a large portion of the sample, casts doubt on the notion that the level of fails to deliver are caused by naked short selling.

Slightly less than half of the IPOs in the sample are never on the threshold list at any point during the first 30 trading days which indicates that many IPOs do not have long-lived fails to

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[30] These nine IPOs may not show up either because they had no fails to deliver or any fails to deliver were below 10,000 shares.

deliver. Of the remaining 156 IPOs, 107 or 36% of the full sample are on the threshold list on the first possible day. This seems particularly high when considering that only about 2% of NYSE, Amex, and NASDAQ stocks qualified for the threshold list per day in May 2006.[31] The remaining 49 IPOs are on the threshold list sometime during the first 30 trading days. When an IPO is on the threshold list on day T+7, it remains on the threshold list for a median of 12 settlement days.[32] Twenty-one of the 46 sample closed-end funds qualify for the threshold list on T+7 and 17 more qualify within 30 days.

b.   *Determinants of Failures to Deliver*

In this section, we further examine the relation between short selling and both transitory and persistent fails to deliver. In Panel A of Table 5, we regress the level of fails to deliver on short sales and include the same independent variables as in the previous short selling regressions. As before, we include variables to measure first day return, partial adjustment, trading volume, price support and short sale constraints. We hypothesize that if short selling at the time of the IPO is due to the failure to locate the shares or naked short selling, regressing failures to deliver on the same variables as in the short selling regressions in Table 3 should result in the same relationships.

Our results indicate that the factors that influence short selling are *not* related to fails to deliver and the coefficient on the level of shorts sales is insignificant in every regression. This suggests that short sales on the offer date are not related to fails to deliver. Further, the

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[31] See "Fails to Deliver Pre- and Post-Regulation SHO,": http://www.sec.gov/spotlight/failstodeliver082106.pdf.

[32] A security will remain a threshold security unless it no longer meets the criteria for threshold securities for five consecutive settlement days. Thus, the minimum number of days on the threshold list is five consecutive settlement days. Of the IPOs on the threshold list on day T+7, 38 of them are on the threshold list for 5 to 9 consecutive days, 33 are on the threshold list for 10 to 14 consecutive days, 13 are on the threshold list for 15 to 19 consecutive days, and 23 are on the threshold list for more than 20 days.

coefficients on initial return, partial adjustment, and volume are also insignificant. Lastly, fails

to deliver are not related to short selling constraints as measured by the percentage float and

ability to execute at T+0.[33]

In Panel B of Table 5, we test whether persistent fails to deliver are related to the level of

short selling or factors influencing short selling by conducting a probit analysis using a dummy

variable for whether the IPO is on the threshold list on T+7. The independent variables used in

the probit analysis are similar to those used in Panel A. In general, the results in Panel B are

consistent with the results in Panel A. We find no evidence that the first trading day level of

short sales is related to persistent failures to deliver.[34] We do have evidence that potentially

price supported IPOs are more likely to be on the threshold list. Contrary to conjectures that

stocks with low float have short sale constraints and thus, may have greater naked short selling,

we find that IPOs with higher float are more likely to be on the threshold list. Overall, these

findings provide additional support that fails to deliver in IPOs are not necessarily due to short

selling, in general, or naked short selling, in particular.

c.   *Could Failures to Deliver Be Due to Underwriter Price Support?*

The results in Table 5 indicate that the coefficient on stabilized IPOs is significantly positive

indicating that IPOs that may have underwriter price support are more likely to have failures to

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[33] An alternative explanation for fails to deliver in IPOs is the possibility that some investors, for whom brokers are unable to locate shares or who would otherwise be unable to short sell because of regulatory restrictions, cause their brokers to mark the short trades as long. There is evidence that such marking of long sales as short have occurred in follow-on equity offers. (See "SEC and NYSE settle enforcement actions against Goldman Sachs unit for role in customers' illegal trading scheme" Release 2007-41). However, absent actual evidence of such conduct, our data cannot confirm this explanation. Indirectly, our evidence suggests that mismarking is not systematically related to failures to deliver in IPOs because the failures are unrelated to measures of short sale constraints. It is a violation of Regulation SHO Rules 200 and 203 (17 CFR 242.200 and 242.203) for a broker to mark a short sale as a long sale, or to lend securities for delivery on a long sale or fail to deliver on a long sale unless the broker had been reasonably informed by the seller that it owns the securities and could deliver them in time for settlement.
[34] Using cumulative short sales over the first 5 days of trading does not alter the results.

deliver. In this section, we give a possible explanation of how the mechanics of underwriter price support may result in failures to deliver.

Underwriters typically oversell the number of shares in the IPO (Aggarwal (2000) and Jenkinson and Jones (2006)) and must cover this overallocation either with the exercise of the overallotment option or by purchases in the open market. Generally, the underwriter will cover its shares in the open market when the market trading price is near or less than the offer price in order to provide price support. Aggarwal (2000) finds that underwriter purchases in the open market to cover its overallocation occur for 10 to 15 days after the IPO. Therefore, any shares that are overallocated in the offer but not covered either through the immediate exercise of the overallotment option or underwriter market purchases on T+0 cannot settle on T+3.[35]   For the purposes of this discussion, we will term the shares oversold and allocated by the underwriter but not yet delivered as "uncovered" until the underwriter transfers shares to the investor either through the exercise of the overallotment option or by buying in the open market.

There may be investors, however, unaware that they were allocated uncovered shares who may wish to sell. The sale of these uncovered shares will then result in a fail to deliver until such time that the underwriter either purchases the shares in the open market or exercises the overallotment option and transfers the shares to the investor.

Although Hanley, Lee and Seguin (1996) documents that closed-end funds are likely to have underwriter price support, the results in Table 5 show a negative relation between whether or not the IPO is a closed-end fund and the level of fails to deliver. One potential explanation for this relation is that closed-end funds have very little volume on the first trading day (2% of the offer

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[35] T+3 is almost always the closing day for the IPO and we find that if the overallotment option is to be exercised, it is often exercised upon closing of the IPO. Our data does not directly measure the number of allocation shares that do not settle.

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amount as compared to 61% for other IPOs.) Thus, it is unlikely that an investor who has been

allocated an uncovered share in a closed-end fund will sell in the secondary market and

consequently, failures to deliver will be low.

Finally, Table 5 also documents that an IPO has higher fails to deliver day T+3 if it is traded

on the NYSE or Amex. This finding may be related to price support in that underwriters may

find it more difficult to provide price support through open market purchases on a specialist

market. Ellis, et al (2000) documents that the lead underwriter is always a market maker for

Nasdaq listed IPOs. In contrast, for NYSE/Amex IPOs, it is unlikely that the specialist and the

underwriter will be affiliated (Corwin, Harris and Lipson (2004)). The underwriters' ability to

act as market makers improves their ability to directly cover their overallocated position. In the

case of a specialist market, there may be frictions for underwriters to directly purchase shares in

the open market to cover the overallocation which may result in more fails to deliver in specialist

markets.

6.   **Short Term Price Effects and Profitability**

We have demonstrated that short selling is common in IPO aftermarkets, particularly for

IPOs with high underpricing, despite perceived short selling constraints. In this section, we

analyze the argument that short selling constraints result in overvaluation in the IPO aftermarkets

((Miller (1977), Loughran, Suchanek, and Yan (2001), Derrien (2005), and Ljungqvist, Nanda,

and Singh (2006)) by examining whether short selling is able to mitigate or reverse high initial

returns. In addition, we test whether the marginal short sale is profitable over the first month of

trading. We use a buy-and-hold return over the first month rather than a market adjusted return

because we are interested in whether short selling can predict and profit from possible price declines.

Table 6 presents a regression analysis of the short term returns using measures of short selling, fails to deliver and other independent variables used previously. We find no effect of short selling on the first day return from the open to the close indicating that although short sellers are attracted to IPOs that open at a high return, the level of short selling is not related to the price after trading begins. The only independent variable that is related to the intraday return is the price stabilization dummy variable which is negative as expected, indicating that price stabilized IPOs have lower first day returns.

Panel B provides regression results for returns over a longer time horizon of one month, which tests whether short selling is related to subsequent price declines. We find that first day short sales have a stronger relation than cumulative short sales.[36] As expected, price stabilized IPOs have larger price declines. Otherwise, no other variable including fails to deliver has predictive power. This result indicates that short sellers can predict returns, consistent with other studies, but that contemporaneous short selling does not appear to correct for supposed overvaluation.

Because first day short selling appears to predict subsequent returns, we next examine whether the marginal short sale is profitable. We estimate profits based solely on returns and also on returns adjusted for short selling costs. We obtain information on short selling costs from a dataset of rebate rates provided by an anonymous data source. Our data are not as complete or as large as that studied by Geczy, Musto and Reed (2002) so a probit analysis in

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[36] We also examine the second and third month price effects and find that the only relation is in the first trading month. Therefore, extending the time period examined to three months instead of one does not change the results. Longer run returns than three months are unavailable for much of the sample and would be contaminated by lock-up expirations.

Panel A Table 7 is presented to indicate any biases in the stocks covered by our data. The differences between the 153 IPOs that are covered by our data source and the 143 IPOs that are not appear to be fairly minor. We are less likely to observe rebate rates for closed-end fund IPOs (probably due to the low level of short selling in that type of security) and more likely to observe rebate rates for NYSE/Amex companies.

To estimate profits for the 143 IPOs without loan fee observations we need to estimate the loan fees. We estimate a regression on the determinants of the loan fee over the first month of trading (T+3 to T+26) using the variables defined previously and use the estimated coefficients to get predicted loan rates. We calculated the daily loan rate (if available) as the annualized federal funds rate minus the rebate rate. We then calculate the average weighted average loan fee using the quantity or number of shares lent provided by the data vendor. Panel B presents the regression results. No variable except the level of short selling is related to the stock loan fee. The greater is the short selling, the greater is the weighted average loan fee over the first month of trading. Our short selling result provides more insight into the Geczy, Musto, and Reed (2002) result that loan fees are greatest for IPOs with high initial returns. It is likely that these stocks are considered easy to borrow on the first day, but the higher fees are actually driven by the demand for shares resulting from high short selling. Unlike Geczy, Musto and Reed (2002), we find no evidence that potential price stabilization is related to the loan fee. Consistent with the results on naked short selling, we find no relation between failures to deliver and loan fees indicating that failures to deliver do not appear to be used to circumvent constraints on borrowing stock.

Table 8 examines whether short sellers are able to profit over the first month of trading. We present results for the sample as a whole as well as quartiles of IPOs based on the first day short

selling relative to shares offered. The first part of the table confirms previous results in that initial returns are increasing in the level of short selling.

We present results on the average weighted loan fee from the actual transactions from our data source as well as a predicted loan fee from Model 3 in Table 7 for IPOs that have no rebate rate data. The average level of the loan fee is slightly lower than Geczy, Musto and Reed (2002) but this is expected as our measure of loan fees is a weighted average of the loan fees over the first trading month.

The level of the actual average loan fee is highest when short selling is both high and low. Consistent with Geczy, Musto, and Reed (2002), the monthly loan fee on IPOs is actually quite small at only 0.20%, which is far lower than the average return over the first month of trading. Predicted loan fees are substantially higher than actual loan fees though the discrepancy is most pronounced in IPOs with low short selling.

As can be seen in the Table, the one month first day return is not significantly different from zero for the sample as a whole or for any quartile. Incorporating loan fees into the analysis results in an average negative return but this is primarily driven by short sales in the second quartile. The highest two quartiles do not have returns that are significantly different from zero. Thus, these findings indicate that short sellers, at best, break even on their trades over the first month of trading. Even though the level of short selling appears to be related to or limit subsequent returns, we find no evidence that marginal short sales are unprofitable before fees and therefore are unlikely candidates to mitigate any overvaluation.

7. Summary and Conclusions

Using short sale trade data recently made publicly available in conjunction with the Regulation SHO Pilot, we explore the nature of short selling in initial public offerings. Many academic papers have assumed that short selling is constrained early in the IPO process and that such constraints contribute to the high level of underpricing of some IPOs. In contrast, we find that short selling is prevalent on the initial trading day and many short sales occur close to the open.

Tests of whether short selling is related to price support (Hanley, Kumar, Seguin (1993), Aggarwal (2002), Lewellen (2006) or to investor sentiment (Miller (1977), Derrien (2006), Cornelli, Goldreich and Ljungqvist (2006) and Ljungqvist, Nanda and Singh (2006)) indicate that short selling is clustered in IPOs that have positive partial adjustment and high initial returns. This result is consistent with models of investor sentiment or overoptimism that suggest that short sellers should take advantage of sentiment investors in overpriced IPOs but inconsistent with the assumption that they cannot due to binding short sale constraints.

The perceived inability of short sellers to borrow securities for settlement is one of the primary reasons cited by others for constraints on short selling in IPOs. We test whether short sellers are avoiding regulatory constraints on locating and borrowing shares for shorting (i.e. engaging in "naked" short selling) by examining whether IPOs with greater short selling are also more likely to have failures to deliver. While we document that most IPOs have failures to deliver on the first settlement date and approximately 36% of IPOs in the sample qualify for the Regulation SHO threshold list on the first possible date, our findings do not indicate that the level of short selling on the offer date is related to fails to deliver or to the qualification for the threshold list. In fact, the factors that are correlated with increased short selling are uncorrelated

with fails to deliver. We argue that fails to deliver are potentially related to underwriter price support activities and present evidence that the level of failures are related to a variable indicating a high probability of underwriter price support. Thus, we conclude that the observed short selling is not due to "naked" short sales.

Finally, we present evidence that short sellers are informed as to subsequent price declines. The greater is the short selling on the first trading day, the lower is the one month buy-and-hold return. However, even before incorporating loan fees, we find evidence that the marginal short sale is unprofitable. Therefore, short sellers are unlikely to further mitigate the magnitude of the underpricing.

Collectively, these results allow us to conclude that short selling constraints are not as onerous in the IPO aftermarket as assumed in the IPO literature. This leaves open the interpretation of theories of underpricing and overvaluation that suggests that overoptimism results in greater underpricing because of short sale constraints.

Our results also complement Schultz (2006) who find no evidence that the loosening of short sale constraints around lock-ups lead to an increase in the supply of shares causing the collapse of internet stocks. Like this study, our results also have implications for the argument that an increase in the supply of shares from lock-up expirations lead to the collapse of the internet stock bubble (e.g., Ofek and Richardson (2003)). Our results suggest that such expirations may not affect short sale constraints as much as previously thought, because short selling is prevalent in early IPO aftermarkets long before such lock-ups expire.

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Table 1
Summary Statistics on IPOs

The sample includes 295 IPOs issued between January 1, 2005 and June 22, 2006. Short sales are from Reg SHO Pilot data downloaded from nine markets: Amex, Arcaex, Boston, Chicago, NASD, NASDAQ, National, NYSE and Phlx.   Offer amounts and offer prices are from SDC and exclude the exercise of the overallotment option. Percent float is the ratio of shares offered from SDC to shares outstanding from CRSP. The first day return is from the offer price from SDC to the first trading day closing price on CRSP. Partial adjustment is the percent difference between the final offer price and the midpoint of the preliminary offer price range in the prospectus. The percent positive (negative) partial adjustment is the percent of IPOs whose final offer price exceeds (is less than) the midpoint of the offer price in the preliminary price range.

Panel A: Offering Statistics		
Variable	Mean	Median
Offer Price	$15.63	$16.00
Offer Amount (in mils)	$222.74	$131.75
Percent Float	53.18%	40.89%
Partial Adjustment	-3.16%	0.00%
Percent Positive Partial Adjustment	63.73%	-
Percent Negative Partial Adjustment	25.76%	-
Percent Closed-End Funds	15.54%	-
Panel B: Offer Day Trading Statistics		
Variable	Mean	Median
First Day Return from Offer Price to Open	8.40%	1.33%
First Day Return from Open to Close	0.12%	0.00%
First Day Return	9.18%	1.25%
Trading Volume	5,500,568	3,657,484
Trading Volume/Shares Offered	51.74%	47.92%
Panel C: Offer Day Short Selling		
Variable	Mean	Median
Short Sales (in shares)	669,806	435,658
Short Sales$_{T+0}$/ Trading Volume $_{T+0}$	11.80%	10.68%
Short Sales$_{T+0}$ /Shares Offered	7.16%	4.81%
Short Sales$_{T+0}$/Shares Outstanding	3.26%	1.71%

Table 2

Comparison of First Day Trading and Short Selling by Relation of Offer Price to First Day Closing Price

The sample includes 295 IPOs issued between January 1, 2005 and June 22, 2006 from SDC. Short sales are from Reg SHO Pilot data downloaded from nine markets: Amex, Arcaex, Boston, Chicago, NASD, NASDAQ, National, NYSE and Phlx. Offer amount and shares offered are from SDC and excludes the exercise of the overallotment option. Percent float is the ratio of shares offered to shares outstanding from CRSP. Volume is the daily number of shares traded from CRSP. The initial day return is from the offer price from SDC to the first trading day closing price on CRSP. Partial adjustment is the percent difference of the final offer price from the midpoint of the preliminary offer price range in the prospectus. The percent positive (negative) partial adjustment is the percent of IPOs whose final offer price exceeds the midpoint of the offer price in the preliminary price range. Daily returns are from CRSP. T-statistics are for difference in means. ***,**,* donates significance at the 1%, 5% or 10% levels.

Variable	First Day Closing Price > Offer Price		First Day Closing Price <= Offer Price		T-Statistic
	Mean	Median	Mean	Median	
Number of IPOs	186	186	109	109	
Offer Amount (in mils)	$221	$131	$228	$142	0.22
Percent Float	48.91%	37.02%	60.47%	53.04%	-3.06***
Percent of Closed-End Funds	10.22%		24.77%		-3.09***
Percent of Price Supported IPOs	23.66%		89.91%		-15.55***
First Day Return from Offer Price to Open	14.25%	6.78%	-1.57%	0.00%	5.48***
First Day Return from Open to Close	1.44%	0.20%	-2.15%	-0.46%	5.14***
Initial Day Return	15.74%	9.33%	-1.98%	0.00%	8.04***
Partial Adjustment	1.30%	3.46%	-10.25%	-5.26%	6.14***
Percent with Positive Partial Adjustment	30.11%		0.09%		
Percent with Negative Partial Adjustment	19.35%		36.70%		
Volume $_{T+0}$/Shares Offered	59.78%	56.50%	38.46%	36.61%	4.50***
Short Sales$_{T+0}$/Shares Offered	8.69%	5.93%	4.63%	2.36%	4.58***
Short Sales$_{T+0}$/Shares Outstanding	3.93%	2.12%	2.15%	0.99%	2.70***
Short Sales$_{T+0}$/Trading Volume $_{T+0}$	12.85%	11.39%	10.13%	8.32%	2.57**
Cumulative Short Sales$_{T+0 \text{ to } T+26}$/Shares Offered	28.41%	15.02%	11.65%	8.03%	3.47***

Table 3
Regression Analysis on Offer Day Short Sales

The sample includes 295 IPOs issued between January 1, 2005 and June 22, 2006 from SDC. The dependent variable is the offer day short sales as a percent of the offer amount. Short sales are from Reg SHO Pilot data downloaded from nine markets: Amex, ArcaEx, Boston, Chicago, NASD, NASDAQ, National, NYSE and Phlx, aggregated and then scaled by offer amount (excluding the exercise of the overallotment option). The initial return is from the offer price from SDC to the first trading day closing price on CRSP. Partial adjustment is the percent difference of the final offer price from the midpoint of the preliminary offer price range in the prospectus. Volume is the daily number of shares traded from CRSP. Stabilized IPO is a dummy variable equal to 1 if the initial return is equal to zero or the IPO is in the bottom quartile of the percent of the overallotment option exercised collected from Bloomberg or top quartile for the percent of trades, using TAQ, executed at the offer price on the first trading day. Percent float is the ratio of shares offered from SDC to shares outstanding from CRSP. The ability to execute is estimated using TAQ and measures the extent to which the uptick rule or Nasdaq Bid Test Rule allows short sales to execute. NYSE/Amex is a dummy variable equal to 1 if the IPO trades on either the NYSE or the Amex.   t-values are in parentheses. ***, **, * indicates significance at the 1%, 5% or 10% levels.

Variable	Model 1	Model 2	Model 3	Model 4
Intercept	0.085	0.102	-0.002	0.092
	(5.61)***	(5.72)***	(-0.15)	(4.57)***
First Day Return from Offer Price to Open	0.181			
	(14.91)***			
Partial Adjustment		0.002		
		(9.00)***		
Volume $_{T+0}$/Shares Offered			0.170	
			(30.45)***	
Closed-End Fund	-0.031	-0.058	0.048	-0.045
	(-2.23)**	(-3.61)***	(5.18)***	(-2.45)**
Price Supported IPO	-0.005	-0.0007	-0.009	-0.035
	(-0.58)	(-0.07)	(-1.87)**	(-3.43)***
Float	-0.0004	0.013	-0.001	0.031
	(-0.03)	(0.73)	(-0.10)	(1.59)
Ability to Execute $_{T+0}$	0.004	0.017	0.005	0.030
	(0.17)	(0.62)	(0.34)	(0.93)
NYSE/Amex	-0.051	-0.064	-0.043	-0.059
	(-6.42)***	(-6.82)***	(-8.31)***	(-5.56)***
Adj. R^2	0.56	0.39	0.81	0.22

Table 4
Summary Statistics on Fails to Deliver

The sample includes 295 IPOs issued between January 1, 2005 and June 22, 2006 from SDC. Shares offered is from SDC and excludes the exercise of the overallotment option. Volume is the daily number of shares traded from CRSP. Daily fails to deliver for IPOs is from NSCC's Continuous Net Settlement which includes stocks with aggregate fails to deliver of at least 10,000 shares.

Panel A: All IPOs First Settlement Day (T+3)		
Variable	Mean	Median
Fails to Deliver	509,173	156,339
Fails to Deliver/Shares Offered	4.22%	1.56%
Fails to Deliver/Short Sales$_{T+0}$	1,035.63%	61.79%
Panel B: 210 IPOs with First Fail on First Settlement Day (T+3)		
Variable	Mean	Median
Initial Return	7.18%	0.40%
Fails to Deliver	717,692	372,325
Fails to Deliver/Shares Offered	5.95%	4.61%
Fails to Deliver/Short Sales$_{T+0}$	1,492.37%	157.31%
Panel C: 77 IPOs with First Fail Later Than First Settlement Day (T+4 to T+29)		
Variable	Mean	Median
Initial Return	14.96%	5.29%
First Fails to Deliver	68,731	37,978
First Fails to Deliver/Shares Offered	1.01%	0.45%
First Fails to Deliver/Short Sales$_{T+0}$	250.52%	67.64%
Day of First Fails to Deliver	6.65	5.00

Table 5
Regression Analysis on Fails To Deliver and Probability of Being on Threshold List on T+7

The sample includes 295 IPOs issued between January 1, 2005 and June 22, 2006 from SDC. Dependent variables are first settlement day fails as a percent of shares offered and a dummy variable if an IPO is on the threshold list on day T+7. Daily fails to deliver for IPOs is from NSCC's Continuous Net Settlement which includes stocks with aggregate fails to deliver of at least 10,000 shares. Information is collected from daily threshold lists on the NYSE, Amex, and Nasdaq. Short sales are from Reg SHO Pilot data downloaded from nine markets: Amex, ArcaEx, Boston, Chicago, NASD, NASDAQ, National, NYSE and Phlx, aggregated and then scaled by offer amount (excluding the exercise of the overallotment option). The initial return is from the offer price from SDC to the first trading day closing price on CRSP. Partial adjustment is the percent difference of the final offer price from the midpoint of the preliminary offer price range in the prospectus. Volume is the daily number of shares traded from CRSP. Stabilized IPO is a dummy variable equal to 1 if the initial return is equal to zero or the IPO is in the bottom quartile of the percent of the overallotment option exercised collected from Bloomberg or top quartile for the percent of trades, using TAQ, executed at the offer price on the first trading day. Percent float is the ratio of shares offered from SDC to shares outstanding from CRSP. The ability to execute is estimated using TAQ and measures the extent to which the uptick rule or Nasdaq Bid Test Rule allow short sales to execute. NYSE/Amex is a dummy variable equal to 1 if the IPO trades on either the NYSE or the Amex. t-values are in parentheses for OLS regressions and Chi-squares for Probit analysis. ***, **, * indicates significance at the 1%, 5% or 10% levels.

Variable	Panel A OLS Regression Dependent Variable: Level of Fails				Panel B Probit Analysis Class Variable: On Threshold List at T+7			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Intercept	0.039	0.038	0.037	0.037	-1.16	-1.193	-1.310	-1.0244
	(2.89)***	(2.93)***	(2.89)***	(2.74)***	(10.39)***	(11.68)***	(14.26)***	(7.34)***
Short Sales$_{T+0}$/Shares Offered	-0.014				-1.052			
	(-0.36)				(0.87)			
Initial Return		-0.007				-0.774		
		(-0.53)				(1.76)		
Partial Adjustment			-0.00001				-0.904	
			(-0.05)				(3.28)*	
Volume $_{T+0}$/Shares Offered				0.0006				-0.409
				(0.08)				(2.25)
Closed-End Fund	-0.075	-0.075	-0.074	-0.074	-0.066	-0.643	-0.572	-0.836
	(-6.39)***	(-6.43)***	(-6.37)***	(-6.03)***	(4.74)**	(4.55)**	(3.59)*	(6.33)**
Price Supported IPO	0.022	0.021	0.0224	0.022	0.433	0.354	0.339	0.414
	(3.32)***	(3.13)***	(3.16)***	(3.42)**	(6.04)**	(3.49)*	(3.32)*	(5.56)**
Float	0.011	0.011	0.011	-011	1.010	1.025	1.064	1.032
	(0.88)	(0.91)	(0.85)	(0.84)	(9.26)***	(9.53)***	(10.15)***	(9.64)***
Ability to Execute $_{T+0}$	-0.0245	-0.023	-0.024	-0.024	0.014	0.205	0.153	0.144
	(-1.16)	(-1.13)	(-1.18)	(-1.19)	(0.07)	(0.15)	(0.08)	(0.07)
NYSE/Amex	0.023	0.024	0.024	0.024	0.316	0.355	0.401	0.350
	(3.32)***	(3.54)***	(3.61)***	(3.60)***	(2.77)*	(3.88)**	(4.94)**	(3.76)*
Adj. R^2	0.14	0.14	0.14	0.14				

Table 6
Short Term Price Effects

The dependent variables are the first day return from the open to the close and the buy and hold return over the first month of trading excluding the initial return. The sample includes 295 IPOs issued between January 1, 2005 and June 22, 2006 from SDC. Daily fails to deliver for IPOs is from NSCC's Continuous Net Settlement which includes stocks with aggregate fails to deliver of at least 10,000 shares. Short sales are from Reg SHO Pilot data downloaded from nine markets: Amex, ArcaEx, Boston, Chicago, NASD, NASDAQ, National, NYSE and Phlx, aggregated and then scaled by offer amount (excluding the exercise of the overallotment option). Stabilized IPO is a dummy variable equal to 1 if the initial return is equal to zero or the IPO is in the bottom quartile of the percent of the overallotment option exercised collected from Bloomberg or top quartile for the percent of trades, using TAQ, executed at the offer price on the first trading day. Percent float is the ratio of shares offered from SDC to shares outstanding from CRSP. The ability to execute is estimated using TAQ and measures the extent to which the uptick rule or Nasdaq Bid Test Rule allows short sales to execute. NYSE/Amex is a dummy variable equal to 1 if the IPO trades on either the NYSE or the Amex. t-values are in parentheses for OLS regressions. ***, **, * indicates significance at the 1%, 5% or 10% levels.

Variable	Panel A First Day Return from Open to Close	Panel B One Month Return From First Day Close			
	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	0.009	0.073	0.056	0.050	0.055
	(0.49)	(2.398)**	(1.88)*	(1.65)*	(1.72)*
Short Sales$_{T+0}$/Shares Offered	-0.0598	-0.246			
	(-1.12)	(-2.86)***			
Cumulative Short Sales$_{T+0 \text{ to } T+26}$ /Shares Offered			-0.0003		
			(-1.87)*		
Fails to Deliver $_{T+3}$/Shares Offered				0.0001	
				(0.05)	
Fails to Deliver $_{T+3}$/Short Sales$_{T+0}$					0.000
					(0.25)
Closed-End Fund	0.027	-0.030	-0.022	-0.018	-0.025
	(1.64)	(-1.11)	(-0.83)	(-0.63)	(-0.78)
Price Supported IPO	-0.025	-0.060	-0.056	-0.052	-0.053
	(-2.70)***	(-3.95)***	(-3.67)***	(-3.35)***	(-3.39)***
Float	-0.023	0.029	0.030	0.021	0.021
	(-1.31)	(1.01)	(0.093)	(0.74)	(0.72)
Ability to Execute $_{T+0}$	0.040	-0.046	-0.050	-0.053	-0.060
	(1.41)	(-0.99)	(-1.05)	(-1.12)	(-1.20)
NYSE/Amex	-0.004	-0.019	-0.009	-0.004	-0.004
	(-0.45)	(-1.15)	(-0.60)	(-0.27)	(-0.27)
Adj. R^2	0.03	0.05	0.04	0.02	0.02

Table 7
Cost of Short Selling

The dependent variables are for 1) the probit model the probability the IPO will have a rebate rate from the anonymous data source during the first 26 days of trading and 2) for the regression model the weighted average loan fee (the daily rebate rate minus the daily fed funds rate) over the first 26 days of trading. The sample includes 295 IPOs issued between January 1, 2005 and June 22, 2006 from SDC. Short sales are from Reg SHO Pilot data downloaded from nine markets: Amex, ArcaEx, Boston, Chicago, NASD, NASDAQ, National, NYSE and Phlx, aggregated and then scaled by offer amount (excluding the exercise of the overallotment option). Daily fails to deliver for IPOs is from NSCC's Continuous Net Settlement which includes stocks with aggregate fails to deliver of at least 10,000 shares. Stabilized IPO is a dummy variable equal to 1 if the initial return is equal to zero or the IPO is in the bottom quartile of the percent of the overallotment option exercised collected from Bloomberg or top quartile for the percent of trades, using TAQ, executed at the offer price on the first trading day. Percent float is the ratio of shares offered from SDC to shares outstanding from CRSP. The ability to execute is estimated using TAQ and measures the extent to which the uptick rule or Nasdaq Bid Test Rule allows short sales to execute. NYSE/Amex is a dummy variable equal to 1 if the IPO trades on either the NYSE or the Amex. t-values are in parentheses for OLS regressions and Chi-squares for Probit analysis. ***, **, * indicates significance at the 1%, 5% or 10% levels.

| Variable	Panel A Probit Dependent Variable: Probability of Observing IPO in Rebate Rate Data		Panel B Regression Dependent Variable: Average Weighted Loan Fee From T+3 to T+26		
	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	0.131 (0.11)	0.238 (0.36)	1.590 (1.98)**	1.354 (2.01)**	2.522 (2.99)***
Short Sales$_{T+0}$/Shares Offered	0.219 (1.54)		11.119 (4.86)***		
Cumulative Short Sales$_{T+0 \text{ to } T+26}$ /Shares Offered		0.025 (0.03)		3.855 (9.40)***	
Fails to Deliver $_{T+3}$/Shares Offered					1.542 (0.44)
Closed-End Fund	-2.512 (26.01)***	-2.630 (29.78)***	2.851 (1.43)	2.564 (1.51)	2.785 (1.29)
Price Supported IPO	-0.291 (2.50)	-0.321 (3.06)*	0.195 (0.52)	0.343 (1.08)	-0.120 (-0.30)
Float	0.063 (0.03)	0.114 (0.12)	-0.476 (-0.80)	-0.090 (-0.18)	-0.578 (-0.90)
Ability to Execute $_{T+0}$	-0.151 (0.05)	-0.116 (0.03)	-1.471 (-1.08)	-1.521 (-1.32)	-0.605 (-0.42)
NYSE/Amex	0.566 (9.73)***	0.546 (8.91)***	0.156 (0.45)	0.143 (0.50)	-0.500 (-1.40)
Adj. R^2			0.13	0.37	0.01
N	295	295	153	153	153

Table 8
Profitability of Short Selling

The sample includes 295 IPOs issued between January 1, 2005 and June 22, 2006 from SDC. The weighted average loan fee (the daily rebate rate minus the daily fed funds rate) is over the first 26 days of trading is from an anonymous data source. Loan fees are 1) estimated from Model 3 in Table 7 for IPOs that have no observations in the rebate rate data and 2) are average weighted (by loan amount) loan fees from T+3 to T=26. . Short sales are from Reg SHO Pilot data downloaded from nine markets: Amex, ArcaEx, Boston, Chicago, NASD, NASDAQ, National, NYSE and Phlx, aggregated and then scaled by offer amount (excluding the exercise of the overallotment option). First Month Profits are (-1)*buy-and-hold returns minus the loan fee. Stabilized IPO is a dummy variable equal to 1 if the initial return is equal to zero or the IPO is in the bottom quartile of the percent of the overallotment option exercised collected from Bloomberg or top quartile for the percent of trades, using TAQ, executed at the offer price on the first trading day. Closed-end fund is a dummy equal to 1 if the IPO is a closed-end fund. NYSE/Amex is a dummy variable equal to 1 if the IPO trades on either the NYSE or the Amex. Information is collected from daily threshold lists on the NYSE, Amex, and Nasdaq. Medians are in parentheses. ***, **, * indicates returns/profits are significantly different from zero at the 1%, 5% or 10% levels.

| Variable	Short Sales$_{T+0}$/Shares Offered				
	All	Quartile 1	Quartile 2	Quartile 3	Quartile 4
Number of IPOs	295	73	74	74	74
Short Sales$_{T+0}$/Shares Offered	7.19%	0.36%	3.04%	7.16%	18.11%
	(4.91%)	(0.12%)	(3.14%)	(7.07%)	(14.17%)
Cumulative Short Sales$_{T+0 \text{ to } T+26}$ /Shares Offered	22.21%	2.84%	9.90%	17.26%	58.60%
	(13.26%)	(1.26%)	(8.43%)	(16.41%)	(37.09%)
Initial Return	9.19%***	1.45%	4.77%***	8.06%***	22.40%***
	(1.25%)	(0.00%)	(1.48%)	(6.23%)	(11.18%)
Number of IPOs with Rebate Rates	153	17	40	40	56
Annual Actual Weighted Loan Fee From T+3 to T+26 (N=153)	1.79%	1.99%	1.34%	1.43%	2.50%
	(1.22%)	(0.50%)	(0.89%)	(1.17%)	(1.66%)
Monthly Actual Weighted Loan Fee From T+3 to T+26 (N=153)	0.15%	0.16%	0.11%	0.12%	0.20%
	(0.10%)	0.04%)	(0.07%)	(0.10%)	(0.14%)
Annual Predicted Loan Fee From T+3 to T+26 (N=142)	2.39%	3.14%	1.16%	1.61%	2.85%
	1.98%)	(3.78%)	(1.15%)	(1.58%)	(2.43%)
Monthly Predicted Loan Fee From T+3 to T+26 (N=142)	0.20%	0.26%	0.10%	0.13%	0.23%
	(0.16%)	(0.31%)	(0.10%)	(0.13%)	(0.20%)
One Month Return From First Day Close	0.80%	-0.34%	2.30%	0.12%	1.11%
	(0.00%)	(0.00%)	(-0.07%)	(-0.04%)	(-0.65%)
First Trading Month Short Selling Profit for IPOs with Actual Loan Fees (N=153)	-2.46%**	-1.38%	-4.97%**	0.13%	-3.05%
	(-0.86%)	(-2.23%)	(0.95%)	(-0.23%)	(0.17%)
First Trading Month Short Selling Profit for IPOs with Predicted Loan Fees (N=142)	0.64%	0.42%	1.37%	-0.94%	1.87%
	(-0.26%)	(-0.29%)	(0.39%)	(0.19%)	(4.72%)
First Trading Month Short Selling Profit for All IPOs (N=295)	-0.97%	0.10%	-2.40%	-0.24%	-1.32%
	(-0.27%)	(-0.30%)	(-0.01%)	(-0.07%)	(0.49%)
Percent Closed-End Funds	15.59%	63.01%	0.00%	0.00%	0.00%
Percent Stabilized	48.14%	73.97%	47.30%	36.49%	35.14%
Percent NYSE/Amex	45.42%	86.30%	51.35%	33.78%	10.81%
Percent on the Threshold List on T+7	35.93%	43.84%	41.89%	31.08%	27.03%

Figure 1
Intraday Short Selling

The sample includes 295 IPOs issued between January 1, 2005 and June 22, 2006 from SDC. Shares offered is from SDC and excludes the exercise of the overallotment option. Short sales are from Reg SHO Pilot data downloaded from nine markets: Amex, Arcaex, Boston, Chicago, NASD, NASDAQ, National, NYSE and Phlx. Exchange listing information is from CRSP. The Nasdaq sample is partitioned into sub samples by opening time. The 10:00 opening time refers to IPOs that opened between 10:00 and 10:29:59. The 10:30 opening time refers to IPOs that opened between 10:30 and 10:59:59.
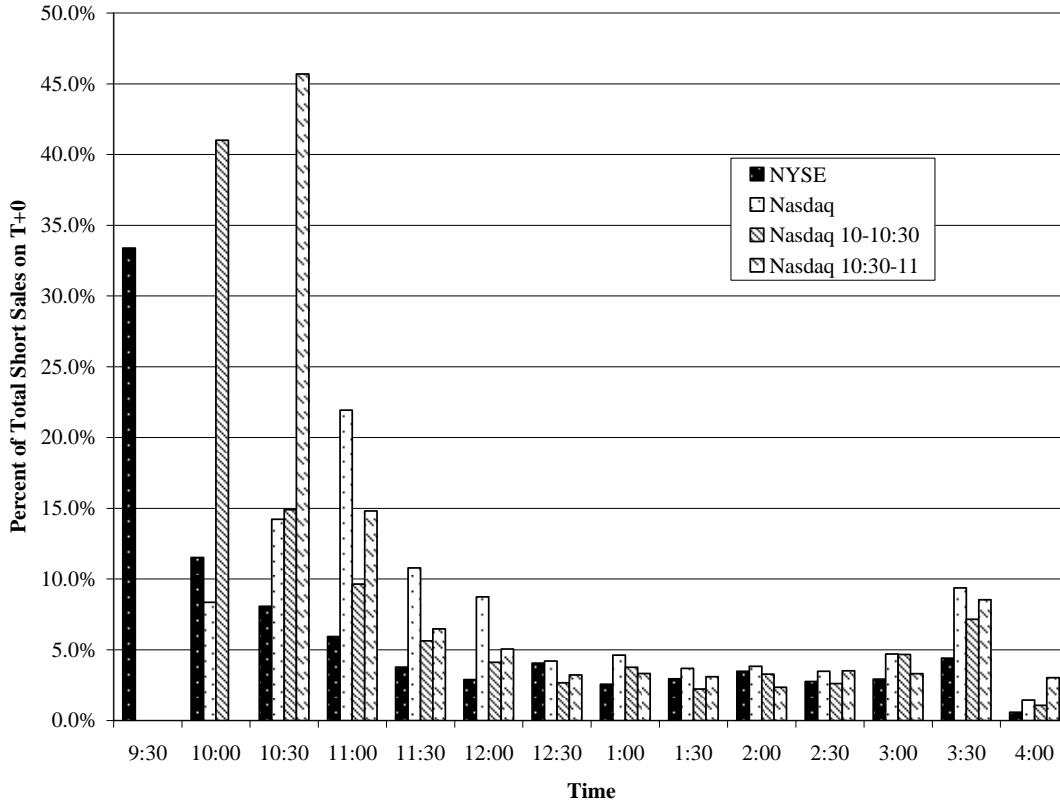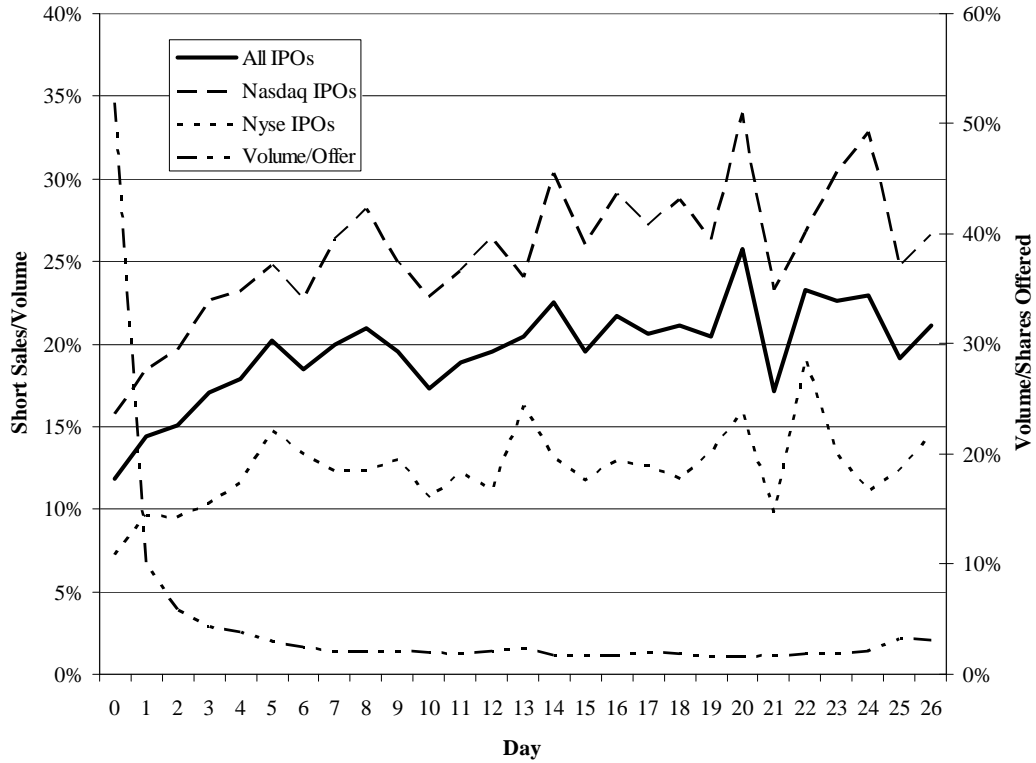
Figure 2
Short Selling, Returns and Trading Volume

The sample includes 295 IPOs issued between January 1, 2005 and June 22, 2006 from SDC. Short selling is a percent of shares offered. Shares offered are from SDC and excludes the exercise of the overallotment option. The first day return is from the offer price from SDC to the first trading day closing price on CRSP. Daily returns after the offer date are from CRSP. Volume is the daily number of shares traded from CRSP. Short sales are from Reg SHO Pilot data downloaded from nine markets: Amex, Arcaex, Boston, Chicago, NASD, NASDAQ, National, NYSE and Phlx; Daily fails to deliver for IPOs is from NSCC's Continuous Net Settlement which includes stocks with aggregate fails to deliver of at least 10,000 shares. Fails to deliver on T+N are shown three trading days prior (N-3).
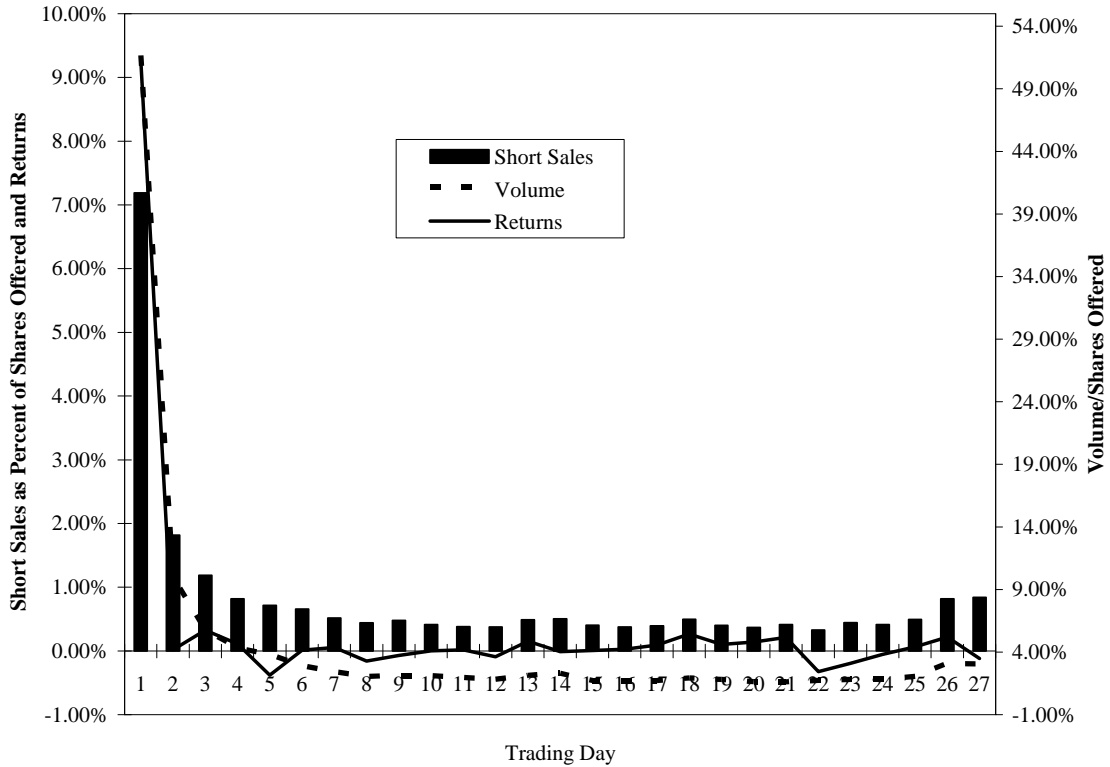
Figure 3
Short Selling as a Percent of Volume

The sample includes 295 IPOs issued between January 1, 2005 and June 22, 2006 from SDC. Short sales
are from Reg SHO Pilot data downloaded from nine markets: Amex, Arcaex, Boston, Chicago, NASD,
NASDAQ, National, NYSE and Phlx. Exchange listing and daily volume (in shares) are from CRSP...

Figure 4
Short Selling and Failures to Deliver

The sample includes 295 IPOs issued between January 1, 2005 and June 22, 2006 from SDC. Short sales and fails to deliver are a percent of shares offered. Shares offered are from SDC and excludes the exercise of the overallotment option. Short sales are from Reg SHO Pilot data downloaded from nine markets: Amex, Arcaex, Boston, Chicago, NASD, NASDAQ, National, NYSE and Phlx; Daily fails to deliver for IPOs is from NSCC's Continuous Net Settlement which includes stocks with aggregate fails to deliver of at least 10,000 shares. Fails to deliver on T+N are shown three trading days prior (N-3).