AN EMPIRICAL EXAMINATION OF THE RELATIONSHIP BETWEEN NAKED SHORTING AND SHARE PRICES AROUND THE ANNOUNCEMENT OF A FIRM'S NEED FOR EXTERNAL CAPITAL

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Abstract

This research finds some empirical evidence that the sale of stock without delivering shares can contribute to pressuring down the equity prices of companies seeking to raise capital. By allowing for the delayed effects on prices of limit orders by naked shorts, a significant negative impact on equity value per share is discovered but only for naked short selling by market makers and only on stocks of firms in urgent need of external financing.

Keywords: Naked Shorting, Short Sales, New Issue, Dilution, Value

JEL classification: G10

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Selling stock short requires borrowing shares from existing equity-holders in order to make delivery on the sale. The security borrowing costs involved normally approximate the risk-free rate of interest, although those expenses have been found to be much higher in some cases (Jones and Lamont, 2002). However, many investors circumvent those costs by selling stock short without ever delivering the shares to the buyers in a process called naked shorting that has long been quite rampant because the security clearing agents generally don't enforce delivery requirements on short positions (Boni, 2006). Evans, Musto, and Reed (2009) have found that naked short sales are highest on stocks that are more difficult and costly to borrow, and such sales that minimize the costs of pressuring down market values may negatively impact capital raising activities. Naked shorting, which is recognized to be very unethical (Angel and McCabe, 2009), and which has widely come to be considered to be unprosecuted fraud (Matsumoto, 2009), has therefore prompted significant public attention that has prompted regulatory actions to inhibit such trades.[1]

Callaghan, Murphy, and Parkash (2010) have previously shown theoretically and empirically that short sales of any type can drive down the equity value per share of companies needing external capital. In particular, since short positions at least temporarily reduce the price of a stock by increasing the supply of shares available for purchase, firms must issue more new shares for the same capital need. Thus, short sales permanently lower the intrinsic equity values per share of firms requiring funding when the shorting has pushed the price down at the time of the new issue. Since a failure to borrow and deliver shares reduces the cost of shorting, naked shorting can contribute to this effect because it reduces the cost of such positions.

This research provides a direct empirical investigation of the effects of naked shorting on the stock prices of companies requiring external funding. The 2004-2009 interval, which starts with the first public SEC data on the daily number of shares of stock that haven't been delivered in sales transactions and continues through the financial crisis, is employed for the analysis. The last two years of the sample are especially significant because they were not only characterized by numerous large firms being unable to raise capital in the public markets but also by the imposition of restrictions on naked shorting that were designed to alleviate that problem. While exact information on the trading tactics of naked shorts that can originate in foreign markets with little disclosure and only indirectly impact the U.S. stock prices through arbitrage trades between the markets, the effect of naked shorting in the U.S. may be ascertained with the SEC data base that aggregate all domestic trades which end up being uncovered. A cross-sectional time-series regression is utilized that factors out the effects of any patterns caused by shorting tactics such as the use of limit orders whose effects have largely been ignored in prior research. In

particular, besides evaluating the direct impacts of daily naked short positions on returns, a special variable is created by multiplying naked short positions by the size of the funding requirements of companies with a stated capital need, thereby permitting a statistical analysis of the special dilutive effects of naked shorting on firms needing financing.

Evidence is found that naked short positions can contribute to manipulating down the stock prices of firms with a publicly stated need for external capital but only with respect to such sales by market makers. General naked shorting activity is not found to have any significant effect on stock prices. In addition, little empirical evidence of dilution is found for a much larger sample of more general stock offerings that may be more motivated by management's perception of share overpricing than a dire need for capital.

The negative impact of market maker naked shorting on equity values per share for companies with the most dire need for funding seems to largely occur by constricting price increases, as naked short positions are generally not found to be contemporaneously associated with stock price declines. The naked shorting by market makers, who tend to conduct transactions via limit orders, can result in other sales driving the price down from a lower level than would otherwise exist. While naked shorting by market makers may merely reflect normal dealer activities that react to the trades of other investors, the evidence found here indicates that such sales can result in lower stock prices for companies with extreme needs for external financing during periods when other naked shorting isn't allowed. The naked short sales of market makers may actually be hedging long positions they obtain as they absorb some of the deownward pressure caused by sophisticated shorting investors trading through derivative and foreign markets.

While short sellers, and naked shorts in particular, may not actually be aware of the impact they have on reducing the intrinsic value of firms in need of capital, this research provides some empirical evidence that naked shorting can have a negative long-term effect on share price regardless of the existence of a manipulative intent. The investigation also finds that restrictions on short sales in general can inhibit shorting down the market price of companies with a definite need for capital.[2] Although short sales may contribute to market efficiency by inhibiting securities from being overpriced (Christophe, Ferri, and Angel, 2004), such sales can have a negative impact on firms' ability to raise needed external capital (Callaghan, Murphy, and Parkash, 2010). On the other hand, naked shorting isn't found to have any effect on the stock prices of companies with a less urgent need for capital, perhaps because such firms can time their security offering to coincide with more attractive pricing opportunities.

1. Literature Review

Callaghan, Murphy, and Parkash (2010), who showed that short sellers can drive companies with insufficient cash resources into bankruptcy by pressuring their stock prices down to zero, have cited allegations that naked shorting of stock has contributed to the demise of thousands of companies and may have destroyed trillions of dollars of equity in the past decade alone. For companies needing external funding, naked short sales facilitate pushing down stock values before any issue by lowering the cost of taking short positions. Because of the additional downward pressure on equity prices caused by such shorting activities, firms are required to offer more new shares to access the same amount of funding, thereby contributing to the dilution in shareholder value and sometimes making it impossible to raise capital at all when the price is driven toward zero.

Other research indicating incentives investors have to short sell the stock of companies planning to issue new shares has been conducted by Gerard and Nanda (1993). Safieddine and Wilhelm (1996) and Kim and Shin (2004) have found confirming empirical evidence of increasing short sales at the time of a new equity offering. The problem of manipulative shorting of stock prior to new share issues has caused the Security & Exchange Commission (SEC) to impose various constraints on short sales, including some minor restrictions on delivering stock purchased in new offerings against short positions (Henry and Koski, 2010). An outright ban on short sales for some stocks was even imposed for a short time interval in 2008 (Kolasinski, Reed, and Thornock, 2010).

The SEC has found the particular problem of naked short sales to be so important that it established new regulatory rules mandating actual delivery of shares sold short in the second half of 2008. These rules, which were initially applied to just 19 stocks between July 21 and August 12 of that year, were implemented for short sales on all equities beginning on September 18, 2008, albeit with numerous loopholes for market makers (Kolasinski, Reed, and Thornock, 2010).[3] For a general set of the affected stocks, empirical tests by Boulton and Braga-Alves (2010) and Lecce, Lepone, McKenzie, and Segara (2012) have found the restrictions resulted in higher prices although the effect on liquidity and volatility is less clear.

While reduced, naked shorting activity is continuing (Schaap, 2009b). The market maker exemptions to the new naked shorting constraints enable the hedging/arbitrage between markets of those special participants to maintain a lid on the costs of investors taking effective short positions on equities via other investments such as options (Kolasinski, Reed, and Thornock, 2010). In particular, put-call parity relationships would tend to

make synthetic short positions in the option markets no more expensive than the trading cost for arbitragers to make the transactions needed to profit from deviations in put-call parity that include short spot sales of stock (Murphy, 2000). Thus, the naked short positions of market makers that continue to be allowed can still have a detrimental effect on stock values, especially for companies needing to raise capital and thus subject to dilution effects. Naked shorting in foreign markets may also pressure American stock prices downwards in this environment, as equities whose prices are reduced by naked short sales on foreign exchanges can be bought cheaply and then arbitraged by general investors with short calls and long puts in the U.S. that are in turn bought and sold by market makers to cheaply hedge their own naked short positions in the American equity markets.

Evans, Musto, and Reed (2009) provide evidence that much of naked shorting activity reflects market makers failing to deliver shares because of a difficulty in borrowing them. This finding implies that the investment orders which result in shares not being delivered to buyers may actually emanate from public purchase orders for the stock that market makers meet with naked short sales. If market makers had to satisfy such buying demand with delivered shares, they would probably have to raise their asking prices to fill those orders, and they would thereby place upward pressure on the stock prices. Such price increases might inhibit the shorting-down-value effect of needing external capital.

In particular, the capping of price increases, whether via naked short sales by market makers or otherwise, causes future share sales of any type to pressure stock prices down from a lower base. Thus, naked short sales by market makers may result in lower stock prices than otherwise at the time a security offering, thereby requiring the issue of more shares for the same amount of capital raised. The exemption of market makers from share delivery requirements can therefore indeed contribute to increased dilution of shareholder value by effectively making manipulative short positions around the time of a security issue (such as through the foreign markets or synthetically via options) less costly than otherwise.

Even when a temporary ban on all short sales by ordinary investors was imposed between September 19 and October 8 of 2008 for hundreds of financial equities, taking both covered and naked short positions on these stocks continued to be allowed for market makers (Autore, Billingsley, and Kovacs, 2009). Shorting down value was therefore still possible even then, and the cost of shorting rose by less than 1% on the nearly one thousand stocks for which direct short sales by public investors were imposed (Kolasinski, Reed, and Thornock, 2010). With empirical returns to manipulative short selling stocks of firms needing external capital being over 20% (Callaghan, Murphy and Parkash, 2010), those cost increases slightly reduce but don't eliminate the abnormal profits available to shorting down the value of companies requiring access to funding.

Although prior research has found short sales in general have no direct downward pressure on prices (Blau, Van Ness, and Van Ness, 2009), such studies didn't take into consideration the effects of trading tactics typically employed by short sellers. In particular, short sellers often conduct their trades through limit orders at higher prices for legal and tactical reasons (Murphy, 2000).[4] Such trades, which are also likely to be prevalent among market makers who continuously set limit sell orders, constrict market value increases that would otherwise occur from new purchases by other investors.[5] This tactic results in sales of stock by actual shareholders pressuring prices down from a lower level than would otherwise exist.

For instance, if a market order to buy came in after a shorting investor placed a limit order to sell just below the going ask price, and if a market order to sell from an actual shareholder followed, the second of these trades would be at the bid, thereby effectively resulting in this trading tactic taking out just as much buying power as if the shorting investor had instead placed a market order to sell. The most recent trade occurs at the bid in either case, and, despite the same number of buy and sell orders as in a case of a short sale at the bid, the short seller receives a higher price. As long as the short sellers maintain a particular limit order, they will absorb purchases without allowing for a price increase, and eventually sales by actual shareholders will take out the demand at the bid and drive the price lower. Empirical findings that short sales are associated with rising prices but negatively related to future stock returns (Diether, Lee, and Werner, 2009) are consistent with this hypothesis of shorting activity merely inhibiting price rises in a fashion that drives down stock values for companies in need of financing.

The share value can thereby be reduced by limit short sales at least as much as via market orders to short stock. This phenomenon can also be understood in the context of short sales increasing the number of shares that must be purchased, regardless of the price at which the short sales are transacted. The basic laws of supply and demand therefore require the price to fall in order to equate demand with the increased number of shares that must be bought. In particular, since short sales at any price have to be met with additional purchases to absorb the extra supply of shares, the necessary additional buying can only come from investors who don't value the shares as highly as the offered market price before the shorting, and so the market price must be pushed lower to motivate the purchase of the extra shares created by short sellers.[6]

Fotak, Raman, and Yadav (2009) have previously investigated the association between short-

term stock prices and naked short sales, but their finding of no significant relationship failed to take into consideration the impact of short selling trading practices. Boulton and Braga-Alves (2012) found that stocks with naked short positions above a threshold of 0.5% of the amount of shares outstanding that legally causes them to be subject to public disclosure and eventual covering actually earn positive returns for days prior to and after the crossing of the threshold. However, these studies didn't evaluate the impact of naked shorting on companies needing outside funding. Nor did they separately examine the effects of allowing market makers alone to have uncovered short positions. Just evaluating the simple relationship between stock prices and naked short sales without consideration of the complexities of confounding influences makes it difficult to determine if naked shorting makes new equity offerings more costly for issuers.

2. Testing Procedure and Data

Since driving share prices lower prior to an equity issue results in more dilution in shareholder value for firms requiring more external funding, naked shorting activity around the announcement of a capital need would be expected to drive share values downward more for companies with a relatively greater financing requirement. However, it is necessary to separate out the effects of the trading tactics of shorting from the dilutive impact on shareholder value in order to ascertain the contribution of naked shorting to making external financing more difficult or costly to obtain. To do so, the regression framework for the test includes different variables for naked shorting and naked shorting weighted by the amount of the capital needed. In addition, while concentrating on naked shorting effects, the impact of other potentially contaminating influences, such as the restrictions against naked shorting for ordinary investors at various times in 2008 and the imposition of the temporary ban on all short sales for all but market makers in late 2008 must be factored out.

The test involves regressing abnormal returns on stocks needing external capital on numerous variables that might be expected to impact stock prices around the time of a security offering. Some of these independent variables relate directly to naked short positions while others are included in order to control for additional factors that drive stock values, thereby minimizing the problems of missing variables through their inclusion.

A couple of variables are formed by dividing actual daily naked short positions by the daily trading volume of the stock. The first, *nakedshort*, is this ratio only in the sample time periods before an announced need to obtain external financing (and 0 otherwise), while another, *shortannounce*, is specified to be that value only in sample time periods after a public announcement of a capital need (and 0 otherwise). The former variable permits an evaluation of whether naked short sales tend to take place more when stock prices are rising or falling, while the latter can provide some evidence on the impact of an actual announcement on the association between naked short sales and stock prices.

Another variable, *nakedxcapneed*, is constructed by multiplying the daily ratio of naked short positions to total trading volume by the announced amount of capital being raised divided into the market capitalization of the announcing company. This variable permits evaluating whether naked short positions have an impact that differs depending upon the relative size of the external capital requirement.

A need for a larger amount of capital as a percentage of market capitalization may result in any given price drop caused by naked shorting to dilute shareholder value more when new shares have to be issued at the lower price. In particular, because *nakedxcapneed* weights short positions cross-sectionally by the percent of potential dilution caused by the capital need, it enables detecting the pressure on market prices resulting from dilution induced via naked shorting alone. The construction of this variable therefore allows an evaluation of the purely dilutive impact that is separate from any positive association between stock prices and naked short positions emanating from naked short sellers' trading tactics of using limit orders. In particular, since the latter relationship is picked up by the independent variables *nakedshort* and/or *shortannounce*, the parameter estimate for *nakedxcapneed* enables evaluation of the differential impact of short sales for cross-sectionally varying levels of capital needs that can affect the extent of shareholder value which can be shorted down.

In order to determine if stock prices are affected by the actual failure to deliver shares in the mandatory 3 days after a short sale that actually makes it naked, an independent variable *fails* is constructed via lagging by 3 days daily naked short positions divided into the number of shares outstanding. The failure to deliver shares against short positions could have an informational impact since the resulting naked positions theoretically imply a requirement for delivery later that mightraise the cost of borrowing shares in the future associated with taking or holding short positions, possibly even creating a risk of the rapidly rising prices associated with a short squeeze. In fact, the SHO regulations that were created by the SEC in 2004, that went into effect on Jan. 3, 2005, and that require disclose of information on extensive failures to deliver shares on stock sales within the mandatory 3 days were designed for that purpose (Boni, 2006).

Several dummy variables are also included in the regression to enable factoring out the separate impacts that specific events may have had on stock returns. To pick up any effects associated with an announcement of a new stock issue that can signal

management believes its stock is overpriced (Myers and Majluf, 1984), a dummy variable *announce* is constructed that has a value of 1 on the day before and day of the published report of a capital need and 0 otherwise, as a subsequent equity issue would likely be anticipated by investors at that time. To factor out the impact of the more general ban on short selling that existed for 3 weeks on hundreds of stocks in late 2008, as well as the subsequent removal of the ban, two other dummy variables are included, with *BANSHORT* having a value of 1 during the ban for those equities and 0 otherwise, and with *POSTBAN* having a value of 1 in the two trading days after the ban and 0 otherwise. To incorporate the impact of prior announcements by a firm of a capital need that might have a cumulatively negative announcement effect if not resolved, another variable *EarlierNeed* is constructed that has a value equal to one divided by the number of days since the firm's most recent announcement of a capital need and zero if there has been no such prior announcement over the entire sample interval.

In addition, another independent variable is included for control purposes that most greatly varies cross-sectionally in the panel of regressions to be run. In particular, to separate out any particular return effects relating to the illiquidity of smaller firms (Stoll and Whaley, 1983), an independent variable *vol* will also be included in the regression that has a value equal to the log of the daily dollar trading volume in the stock.

Finally, to pick up any dilutive effects on stock values caused by other factors, the independent variable *CapNeed* is computed as the announced size of the capital requirement divided by the market capitalization for each stock. This variable serves partially as a proxy for the extent of stock value that is reduced by investor sales of a company's shares because of the firm's need to raise new equity capital. As previously explained, such value destruction can be caused by short sales that result in the actual delivery of borrowed shares as well as from naked shorting. Since the n*akedxcapneed* variable permits an evaluation of the shorting down effects of naked shorts, the C*apNeed* variable picks up the impact of other sales of shares that are delivered and that drive down the stock value by an amount related to the size of the capital need. In addition, to allow for cases when the announcement of a capital need isn't specific as to the amount, a dummy variable *unspecneed* with a value of 1 when the amount of capital needed isn't announced and 0 otherwise is included in the regressions.

In order to permit an evaluation of a change in the impact of these factors caused by regulatory restrictions imposed on naked short sales, most of the foregoing variables are decomposed into two separate components. Those denoted by strictly CAPITALIZED letters have nonzero values only for observations in time periods after 2007 when general investors were restricted from naked short sales of a stock, while the variables with strictly uncapitalized letters have nonzero values only for all other dates. This division of variables into two sets is especially useful for analyzing the impact restrictions on naked shorting have on the various possible determinants of stock returns.

Some of the independent variables are specified to have just one form, as is indicated by mixed Capital Letters. In particular, the *CapNeed* variable that is designed to pick up the dilution effects unrelated to naked shorting isn't divided into two components. In addition, there is no reason to expect the time since a prior announced capital requirement to be impacted by restrictions on naked short sales, and so only one form of that independent variable will be included in the regressions. Moreover, since there were always restrictions on naked short sales during the time of the general ban on short sales, only one form of *BANSHORT* and *POSTBAN* can exist.

While the latter two variables may pick up the effects of allowing short sales that actually deliver shares to the buyers, no independent variable for the size of overall short sales is included in the regression. Any sale of shares, whether by an existing stockholder, by a short seller who borrows stock, or by naked short affects stock prices, but the focus of this research is on the effects of not enforcing share delivery requirements. As a result, to avoid masking the effects of naked short sales, no other specific form of stock sales is directly included as an independent variable. Since naked short sales tend to be strongly associated with high levels of overall short interest (Evans, Musto, and Reed, (2009), including a separate variable for overall shorting volume would create especially strong disturbances in the parameter estimates for the naked short sales variables due to multicollinearity. Nevertheless, the effects of all sales of stock, including by existing stockholders and delivering shorts, are incorporated indirectly into several variables such as *vol* and *VOL* as well as *CapNeed*, which picks up the dilution impact of share sales that are separate from those caused by naked shorts directly incorporated into the regression with *nakedxcapneed* and *NAKEDxCAPNEED* .

For the dependent variable *LniVar*, company-specific stock returns will be adjusted for any industry-wide effects by subtracting out the value-weighted returns on an industry index before taking the log of one plus that abnormal return. This industry adjustment to compute abnormal returns is especially important for the financial service firms that were systematically affected more negatively during the financial crisis of 2008 the regression takes the form

$$LniVar = a_1 nakedshort + a_2 NAKEDSHORT + a_3 nakedxcapneed + a_4 NAKEDxCAPNEED + a_5 CapNeed + a_6 unspecneed + a_7 UNSPECNEED + a_8 shortannounce + a_9 SHORTANNOUNCE + a_{10} BANSHORT + a_{11} POSTBAN + a_{12} Vol + a_{13} VOL + a_{14} Announce + a_{15} ANNOUNCE + a_{16} Fails + a_{17} FAILS + a_{18} EarlierNeed + a_0 + e \quad (1)$$

Because naked short sellers might anticipate the need to issue new equity well before it is announced (Callaghan, Murphy, and Parkash, 2010) by simply applying a basic cash budgeting analysis to existing financial statements (Murphy, 2000), the relationship between the industry-adjusted returns and the independent variables will be examined during the 59 trading days prior to an announcement of an intention to raise external capital, besides examining the effect on the day of the announcement and the subsequent 5 trading days. This 65-day event window permits an examination of the effects of investment analysts using the most recent public financial reports and news to evaluate the probability of a company requiring external funding as well as the few days after the public announcement of the capital need. Utilization of a longer time interval would likely create excessive noise in the regression data that might mask the actual financial effects. For instance, while extending the sample period to three months or more before the announcement might pick up some shorting activity related to more speculative predictions on a capital need, the existence of additional financial statement reports existing during that time might yield conflicting forecasts and trading that would reduce the statistical significance of the intrinsic relationships between the variables that truly exist.

The empirical sample consists of all companies cited as needing or planning to raise external capital in a search of the online edition of the *Wall Street Journal*. The empirical sample of firms in need of capital is hand-collected by searching the online edition of the *Wall Street Journal* from 2004 to 2009 for companies that announced needing or planning to raise external capital. Announcements in this financial news source ensure sufficiently widespread publicity to motivate any strategic shorting down of the price.

The date of the publication of the *Wall Street Journal* news report is used as the announcement date. All but 18 of the firms in need of capital also announced the amount they planned to raise in the paper's report. Daily total returns on the stocks of these companies around the announcement date are obtained from the Center for Research in Security Prices (CRSP), as are total index returns for the other stocks with the same 4-digit SIC industry code.

Data on naked short sales are procured from the SEC website, which indicates the daily number of shares in each stock that haven't been delivered to the buyers. This public data base begins in 2004, and so the sample is restricted to the interval 2004-2009. This sample consists of 127 separate announcements of a capital need for 55 different firms.[7] Information from the Thomson Financial Security Data (SDC) indicated that only 34 of these sample companies were actually able to conduct a public offering of new equity, as some of the firms in the sample, such as Lehman Brothers, were unable to actually raise the needed capital and either failed or had to be bailed out with government support.

Three of the announcements (on 2 firms) took place when naked short sales were banned on their stock during the interval between 07/21/08 and 08/12/08, and 17 of the announcements (on 13 firms) took place after the more general ban on naked shorts that began on 09/18/08. Since many of the pre-announcement observations for these firms occurred in periods when there were no restrictions on naked shorting, the division of most of the variables into two forms enables an integrated evaluation of the effect of those restrictions.

To avoid contamination of this sample of firms having a verified recognition of a funding need published in the financial press with companies that more opportunistically raise capital because of a perceived market overpricing of their shares, equity issue filings and offerings reported in SDC are only subsequently examined in separate regressions. If the Myers and Majluf (1984) hypothesis of an announcement effect for new issues due to overpricing is generally valid for such stocks, naked short sales shouldn't be observed to adversely affect stock prices prior to the announcement because shorting a stock can generally only drive down shareholder value for companies with a more desperate need for capital.

A panel set of Feasible Generalized Least Squares (FGLS) regressions is employed in all cases that adjusts for heteroscedasticity and first-order autocorrelation in each (Wooldridge, 2002). This regression framework enables estimating the mean effect across all stocks while also permitting deviations from the average.

3. Empirical Results

Tables 1 supplies summary characteristics of the data in the sample, including means and standard deviations. Many of the variables have zero median values because they are dummies or because days on which there were failures to deliver shares were in the minority in the aggregate sample. The average value of 0.043 for *nakedshort* is lower than the 0.01 for *NAKEDSHORT*, thus implying a reduction in naked short sales when ordinary investors were restricted from engaging in such activities, but it was still as high as .383 on some days of the latter intervals. Values as high as 1.321 for *NAKEDxCAPNEED* are

reflective of the very large capital needs (relative to market capitalization) and significant naked shorting activity by market makers (relative to trading volume) on at least a few days for some of the sample companies. The average of -0.30% for the *LniVar* variable, which represents the industry-adjusted geometric mean daily return for the sample stocks, provides an indication of the poor stock performance of firms with external funding requirements.

Figure 1 provides a chart of the average cross-sectional stock returns to the sample firms around the announcement dates of their need for capital. The returns, both raw and industry-adjusted, are very negative upon the announcement, but they are positive on some subsequent days, possibly because some companies in the sample succeeded in raising the required funds in some fashion. The rather negative returns that cumulate to approximately -30% over the sample horizon of -59 to +5 days around an announcement of a need for capital is consistent with the hypothesis that many investors recognize a funding shortage before it is publicly announced. While at least a portion of these negative returns may result from deteriorating operating fundamentals for a company over that time interval, some or all of the share price declines may stem from dilutive shorting down value in increasing anticipation of a needed stock offering that can exasperate any direct impact of a deteriorating fundamental outlook.

Figure 2 graphs the average cross-sectional returns over the sample time horizon only for those announcements that were preceded by no other reported financing requirements. With the average cumulative returns being approximately the same as for the full sample reported in Figure 1 (albeit more volatile), there is support for a hypothesis that the possibility of a need for capital was anticipated by at least some investors in the market (albeit with somewhat less certainty) even when there wasn't a previous public announcement.

The cross-sectional correlation between the variables are supplied in two separate matrixes of Table 2 to illustrate the bivariate relationship between the variables when there were RESTRICTIONS on naked short sales and when there weren't. The positive significant correlation (over .10) between *announce/ANNOUNCE* and *shortannounce/SHORTANNOUNCE* indicates that naked short positions do rise at the announcement of any need for capital in periods of both unrestricted and restricted naked shorting activity, as is consistent with a hypothesis that naked shorting increases when there is greater certainty of an intent to issue new shares. The high positive correlation (over .30) between the actual formal failure to deliver shares on short positions (*fails/FAILS*) and the actual trading that led to those uncovered short positions 3 days later (*nakedshort/NAKEDSHORT* as well as *shortannounce/SHORTANNOUNCE*) shows that naked short positions seem to be persistent and aren't a mere random, transient oversight. The significantly positive correlation (over .10) between volume (*vol*) and naked short positions (*nakedshort* and *shortannounce*) indicates that naked short positions may have been inhibited on less liquid stocks, perhaps out of fear of a short squeeze arising from an inability to ever obtain shares to deliver against them. However, the relationships between abnormal returns (*lnivar*) and all the variables measuring strictly naked short positions (i.e., *nakedshort*/*NAKEDSHORT* and *shortannounce*/*SHORTANNOUNCE*) are reported in Table 2 to be statistically insignificant.[8]

A. The Empirical Effect of Naked Shorting on Stocks of Firms Needing Capital

Table 3 presents the FGLS regression results. The findings are consistent with the hypothesis that naked shorting contributes to the dilution of stockholders' value associated with firms seeking to raise new equity capital having to sell shares at a lower price when naked shorts positions were restricted to only market makers. In particular, downward pressure on stock values exerted by naked shorting positions is indicated by the negative significance of the parameter estimate for the *NAKEDxCAPNEED* variable at the .01 level.[9] These findings are consistent with a hypothesis that naked short positions do negatively affect the capacity of firms to raise external capital, with the extent of the adverse impact being related to the size of the funding need.

The insignificance of the parameter estimate for the *nakedxcapneed* variable implies no adverse effects of naked short sales before delivery requirements were enforced for general investors. Such a finding is consistent with noise in the naked short positions caused by uninformed traders prior to mid-2008. In addition, the fact that naked shorts held by the general public have to be covered in a matter of days after they rise above 0.5% of shares outstanding, thereby causing positive returns upon crossing that threshold (Boulton and Braga-Alives, 2012), could be a major cause of the insignificant parameter estimate for *nakedxcapneed* insofar as this positive impact relating to naked shorting by general investors offsets the negative effects of naked shorting on stock prices of companies needing to issue new shares. However, once naked short positions were restricted to market makers in the U.S. markets in the second half of 2008, naked shorting of stocks of companies in need of more capital may have been redirected to foreign or derivative markets to drive prices downward there, and arbitrage combined with hedging activities by market makers that include naked short positions would exert similar pressure on per-share equity values in the U.S. stock market by the laws of supply and demand.

For instance, after the general public was barred from naked shorting, sophisticated investors could

still short the stock in foreign markets to drive the prices down there, and arbitragers would be motivated to buy the foreign claims on shares cheaply, while they simultaneously took offsetting synthetic short positions at higher prices in the U.S. option markets to profit on the difference without risk. The additional synthetic short positions might often be offered by option market makers, who could then offset their own risk of the assumed long synthetic positions with allowed naked short positions on the shares in the U.S. stock market. Boulton and Braga-Alves (2012) have cited evidence from an SEC report indicating that option market makers seeking to reduce the cost of their hedges involving short stock positions tend to be very important players in naked shorting activities. It's also possible that sophisticated investors might simply take effective short positions via the U.S. options markets that the option market makers might often buy and offset with the allowed naked shorting in the U.S. stock market in a more direct process of driving down stocks of firms needing external capital. Thus, the combined results of a negative insignificant parameter estimate for *nakedxcapneed* but a negative significant parameter estimate for *NAKEDxCAPNEED* are consistent with a hypothesis of informed and skillful naked short trading being swamped prior to mid-2008 by the noise of naked shorting by uninformed ordinary investors in the U.S., but dominating naked shorting after that point when the new rules mandating share delivery by the general public were implemented.

The parameter estimates for the *nakedshort/NAKEDSHORT* variables are statistically insignificant, implying that many of the actual naked short sales may have been made at times of slightly higher prices for tactical trading reasons. As explained in the introduction, naked short sales can be effectively conducted to merely limit price rises, as opposed to directly pressure stock values downward.

These findings are consistent with the empirical findings of Fotak, Raman, and Yadav (2009) indicating that naked shorting activity has no immediate downward price pressure impact. In particular, naked short sales only indirectly pressure stock prices lower by inhibiting price rises. Regardless of the trading tactics employed by short sellers, more shares have to be sold at the resulting lower price to meet the requirement to raise external funds when the stock price is less, and so the intrinsic stock value per share is lowered in either event. As indicated by the parameter estimate for the *NAKEDxCAPNEED* variable, the negative effect is larger on the stocks of firms with greater external funding requirements when only market makers were allowed to have naked short positions, and this result is consistent with the naked short positions by market makers contributing to the shorting down of value relating to those financing needs.

The empirical results are thus consistent with a hypothesis that the share delivery requirements imposed on general investors beginning in 2008 merely redirected sophisticated naked short sellers into the option and foreign markets but didn't materially impact their shorting down of equity values per share because of the continued ability of market makers to make naked short sales. In particular, naked short sales in foreign markets and synthetic short positions on stocks via options transferred the downward price pressure on the respective stock prices in the U.S. as the market makers engaged in normal hedging activities that minimized price discrepancies between the different markets. The insignificance of the effect of naked shorting before the imposition of restriction on such sales for general investors may stem from uninformed traders carried out by unsophisticated investors, whose bets against companies were inhibited by the naked shorting constraints that caused only informed or sophisticated investors to redirect their shorting down of stock prices into the option and foreign markets.

The significantly negative parameter estimate for the *CapNeed* variable implies that there is also a dilution impact relating to stock sales for which shares are delivered. In particular, share value may be driven down via covered short sales, as well as via stock liquidations by actual shareholders. The significance of the parameter estimate for the *unspecneed* variable indicates that a failure to specify the exact capital need doesn't preclude short sales from driving the price down when there are no restrictions on naked shorting.[10] The downward impact of such sales on stock prices is in addition to the adverse effects of naked shorting indicated by the negative parameter estimate for the *NAKEDxCAPNEED* variable.

The insignificance of the variables *fails*/*FAILS* shows that the formal existence of a failure to deliver shares has no material effect on stock prices whether there are some restrictions on naked shorting or not. This finding implies that the SHO regulations requiring disclosure of naked short positions are ineffective in significantly inhibiting any shorting down the share value of equities of firms needing capital.[11] Much of the relevant information made available by SHO may very well have previously been ascertained by astute investors from the cost of borrowing shares.

The positive significance of the parameter estimate for the *BANSHORT* variable indicates that restrictions on short sales in general do enhance firms' ability to raise new capital. The insignificance of the *POSTBAN* variable implies that there is no significant offsetting effect once the ban is lifted. One reason for the lack of a material change afterwards may be successful offerings of stock during the period of the ban for those firms in most need of

funding, and investor fears of future bans might also inhibit shorting activity on other stocks as well.

The insignificance of the parameter estimate for the *announce* dummy variable represents an important tertiary empirical finding of this research. The lack of a significant relationship between stock returns and a capital issue announcement in a regression which factors out the value-diluting effects of a capital need relating to share sales of any type implies that there were no announcement effects relating to a perceived signal of underpricing caused by such a report prior to late 2008. The significantly negative parameter estimate for *ANNOUNCE*, however, indicates that it is possible that a special announcement effect did occur after the imposition of the restrictions on naked shorts because that official policy change made in 2008 may have added credibility to the theory of companies needing cash have their stock values shorted down, thereby creating an announcement effect of a different type.

B. An Empirical Examination of the Market-to-Book Effect

The negative return upon the announcement effect of a new equity issue has traditionally been attributed to the signaling involved in the theory that managers would generally sell shares only when they perceived the market to be overvaluing their stock (Myers and Majluf, 1984). Because market-to-book ratios have been widely employed as a measure of stock overvaluation in studies of short selling strategies (DeChow et al., 2001), an additional test for evidence of an overvaluation effect was conducted on the sample of this study by including the company's market-to-book ratio *Mb* as an additional independent variable in the regression. Another independent variable, *MbxNaked*, specified as the product of *Mb* and naked short positions divided into trading volume, is also added to pick up any effect of naked shorting down the potentially overpriced stocks. Observations for stocks with negative book values are purged from the sample for this regression because of the undefined fundamental meaning of the negative ratios that would result.

The results for this new regression

$$LniVar = a_1 nakedshort + a_2 NAKEDSHORT + a_3 nakedxcapneed + a_4 NAKEDxCAPNEED + a_5 CapNeed + a_6 unspecneed + a_7 UNSPECNEED + a_8 shortannounce + a_9 SHORTANNOUNCE + a_{10} BANSHORT + a_{11} POSTBAN + a_{12} Vol + a_{13} VOL + a_{14} Announce + a_{15} ANNOUNCE + a_{16} Fails + a_{17} FAILS + a_{18} EarlierNeed + a_{19} Mb + a_{20} MbxNaked + a_0 + e \quad (2)$$

are shown in Table 4.[12] They indicate no significant relationship between abnormal returns and the *MbxNaked* variable. Thus, there isn't any evidence that naked shorting exerts any downward pressure on stocks with higher market-to-book ratios. In contrast, the still negative significant parameter estimate for *NAKEDxCAPNEED* in this regression implies downward pressure on the stocks of firms needing more capital when naked shorting was restricted to market makers and their hedging activities.[13] The positive significant coefficient for *NAKEDSHORT* is consistent with the hypothesis that market maker naked short sales tend to occur on price upticks that restrict price increases and contribute more to reducing share values for companies with greater funding needs.

The parameter coefficient for *Mb* is positive and significant, indicating returns are actually higher on companies with higher market-to-book ratios for the sample of firms needing capital.[14] It is possible that companies with higher market-to-book ratios are ones that are perceived by the consensus of investors to be less likely to have an urgent and existence-threatening need for external funding. Callaghan, Murphy, and Parkash (2010) have previously shown theoretically and empirically that it isn't possible to short down as much the stock values of firms needing capital for growth compared to those requiring external funding for survival.[15] The stocks with higher market-to-book ratios may therefore be expected to outperform others in the face of any manipulative short selling relating to a capital need because they are less likely to be as greatly impacted by such pressure.[16] The negative relationship between returns and *NAKEDxCAPNEED* (shown in both Tables 3 and 4) and the insignificance of the parameter estimate for *MbxNaked* as well as the positive association between returns and *Mb* (indicated in Table 4) are broadly consistent with all the other evidence indicating that naked short sales don't drive down the value of overpriced equities but do negatively impact the stock values of companies in need of capital.[17]

The significantly negative parameter estimate for *announce* in the results reported in Table 4 is also consistent with this hypothesis. In particular, the significant announcement effect during periods without any restrictions on naked short sales found in this regression that picks up the higher returns to firms with higher market-to-book ratios could result from those higher returns dissipating when the certainty of an actual capital requirement is announced. The drop in the stock price found at that time might even reflect a special negative surprise effect with respect to finding that companies with higher market-to-book ratios actually need external funding.

Evidence on the more direct relationship between market-to-book ratios, naked shorting, capital needs, and returns is provided by the simple correlation matrix in Table 2. In particular, the very high positive correlation (over .75) between *MbxNaked* and *nakedshort* that is significantly higher than between *nakedxcapneed/NAKEDxCAPNEED* and *nakedshort/NAKEDSHORT* is consistent with investors normally focusing naked shorting activity on stocks with high market-to-book ratios. However, the significantly positive correlation between *LniVar* and *Mb* indicates that the stocks with higher market-to-book ratios had higher returns for the sample of firms urgently needing capital, and this relationship contrasts sharply with the significantly negative relationship between *LniVar* and *CapNeed*. The significant negative correlation between *CapNeed* and *Mb* implies that sample companies with higher market-to-book ratios actually tended to have proportionately lower funding requirements.

The finding that the parameter coefficients for the *vol*/*VOL* variables are negative and significant in regression (1) but statistically insignificant in the regression (2) results reported in Table 4 may be related to a special announcement effect. In particular, the significantly positive direct correlation between trading volume (*vol/VOL*) and the announcement date price effect (*announce/ANNOUNCE*) and between *Mb* and *vol* (both shown in Table 2) implies that the special effect of a capital need announcement on firms with higher market-to-book ratios may be proxied by the *vol* variable when the *Mb* variable is missing from the regression.

C. *An Empirical Investigation of Other New Stock Issues*

A further investigation was conducted to determine whether the foregoing findings apply more generally to all new issues of stock, or only to companies with a need for external funding that is clearly recognized. Data were therefore gathered on all equity shelf filings and new stock issues over the interval 2004-2009 from the SDC data base. Industry-adjusted returns on this new sample, which includes 1088 shelf and 450 other offerings,[18] are plotted in Figure 3. Cumulative average abnormal returns for this sample actually exceed 5% for all four groups before the event date (and remain positive even afterwards). This finding is consistent with a hypothesis that the filings and offerings were usually related to firms issuing stock because of a run-up in market prices that exceeded the intrinsic values perceived by managers who therefore sought to exploit the situation by selling overpriced shares. The positive returns contrast sharply with the Figure 1 and 2 returns from the original sample of firms that tended to have a more urgent need for capital relating to financial distress.

Regression (2) was run on these four new samples of filing and offering dates. The results shown in Tables 5-8 provide only very limited evidence of a significant relationship between naked short positions and equity returns for these companies. For instance, the negative significant parameter estimate for *shortannounce* that is reported in Table 8 for shelf offerings implies that naked shorting does adversely affect stock prices on or after such issues, but the parameter estimates for *nakedxcapneed* and *NAKEDxCAPNEED* are statistically insignificant in all cases.

The significantly negative coefficient estimate for the *NAKEDSHORT* variable in shelf filings that are reported in Table 7 implies that there is a tendency of market makers to take naked short positions prior to a shelf filing that helps drive down the stock prices of the filing firms. This naked selling may reflect market makers hedging activities that take advantage of downward price pressure caused by other investors placing anticipatory bets in option and foreign markets against the stocks of companies that subsequently indicate an intention to raise new capital over the next two years.

On the other hand, the positive significant coefficient estimate for *FAILS* in the Table 5 results for non-shelf filings implies that there is a tendency of prices to rise once the naked short positions of market makers become known. The cause of the latter result may be that the market makers raise their bids to buy shares for purposes of making delivery against their uncovered shorts in these cases. Any initial adverse impact may therefore only be transitory.

The negative significant parameter estimate for *CapNeed* in the Table 6 regression provides evidence of non-shelf offerings typically being from companies in greater financial distress that are subject to larger negative impacts associated with more dilution resulting from any type of share sales by investors around a new issue. It is possible that most non-shelf equity issues tend to be from firms with a more desperate need for capital whereas those with either a less urgent need or seeking to sell shares at prices the firms' managers perceive as exceeding intrinsic value typically undertake shelf filings.[19] The positive significant parameter estimate for *vol*/*VOL* in Tables 5-8 indicates that equities with higher trading volume have higher returns than less liquid stocks, perhaps because their managers are more likely and able to exploit price strength with an opportunistic issue.

The negatively significant returns associated with the ban on all short sales by general investors for shelf filings and for non-shelf issues is the opposite of what is found for stocks of companies announcing a need for capital. These different results may stem from a perception of an increasing likelihood of such firms without a dire need for financing trying to take advantage of the restrictions on short sales by offering shares at prices above value that result in stock sales by shareholders. This hypothesis is

consistent with the strongly negative announcement effect that exists with all the equity filings and issues. In particular, for the original sample of firms that have a clearly stated need of external funding, the Table 4 results implied that short sale restrictions enhanced their ability to raise the new capital that has been stated to be clearly required. On the other hand, the well-established announcement effect relating to an issue indicating overpriced stock (Myers and Majulif, 1984) may be statistically more potent for the larger samples reported in Tables 5-8 because they have a less pressing need for funds and may possibly be just seeking to exploit a market mispricing. For the latter sample, the impediments on short sales may have increased the perceived probability of stock investors that those companies would take advantage of the situation to the detriment of existing shareholders.

The positive significance for the parameter estimate for *Mb* for the non-shelf filings and issues (reported in Tables 5-6) provides some support for the hypothesis of managers seeking to sell overpriced shares if higher market-to-book ratios combined with rising stock prices (as indicated by the positive coefficient for *Mb*) represent proxies for overpricing. However, the insignificance of the parameter estimates for the *Mb*x*NakedShort* variable in Tables 5-8 implies that naked shorting activity doesn't negatively impact the ability of the firms with high market-to-book ratios to exploit any overpricing with a new equity issue.

The Table 5-8 results are generally consistent with the hypothesis of new stock offerings usually being motivated by a perceived market overpricing of the shares that management with its inside knowledge of the company exploits. In these cases, a dire need for external financing may not exist, although there is some evidence of a dilutive effect at least for non-shelf issues. While these tentative hypotheses are far from conclusively proven, the evidence uncovered in this research does provide a fertile field for future study of these phenomena that haven't been thoroughly explored in the literature.

4. Conclusion

This research empirically investigates the effect that stock sales without share delivery has on the stock prices of companies needing external capital. The findings provide evidence that naked short positions by market makers can negatively impact the share prices of companies with an urgent need for capital. The empirical results of this study are therefore consistent with a hypothesis that enforcing delivery requirements on short sales for market makers would enhance the ability of firms to raise external capital. Although market makers failing to deliver shares may only be engaging in normal hedging activities when they take naked short positions, their sales without actual delivery of shares may be passing on price pressure from other markets by traders shorting down the value of companies with external capital needs.

Naked short sales, which lower the expenses of shorting activities whether the uncovered positions are taken by market makers or other investors, can appear to facilitate manipulative shorting and therefore magnify their effects. Raw naked short positions aren't associated with negative daily stock returns, as is consistent with such shorting activity tending to absorb buying demand that would otherwise cause price increases, thereby enabling future stock sales to drive prices down from a lower base than otherwise.

Since any shorting activity in general can push down the intrinsic value of firms needing outside funds, short sales that result in delivery also contribute to the value dilution problem associated with issuing new stock at lower prices. Evidence supporting this theory is provided by the price effects of the partial ban on all short sales, as well as by a significant negative relationship found between returns and capital needs even when the value-destroying effects of naked shorting are factored out. The announcement effect of a new issue may therefore be at least partially related to the value dilution caused by short sales as opposed to a market overpricing.

An examination of a much larger sample of actual stock issues found only limited evidence of downward price pressure relating to naked shorting or any dilutive effect caused by selling associated with a dire capital need. Instead, the findings for these issuers are consistent with managers of selling companies exploiting a perceived market overpricing of their shares with a stock offering. On the other hand, there is some limited evidence of naked short sales negatively impacting the stock prices for the few issues unaccompanied by a public announcement of a need for a capital infusion that may be undertaken by companies with an urgent external funding requirement.

While the prohibition of all naked shorting is justifiable for ethical reasons alone (Angel and McCabe, 2009), this research provides the first actual empirical evidence of tangible economic benefits for doing so. Even though requiring delivery of shares by market makers on their short sales might lead to reductions in market liquidity and efficiency, the ability of firms to raise capital would be enhanced by such regulation of unethical behavior. It is conceivable that a ban on all naked short sales might enable at least some companies which are economically viable long-term but in desperate need of cash short-term to survive when they would otherwise be forced into bankruptcy because they were unable to issue new shares. Based on allegations of such purportedly victimized corporations, the number of such firms might actually be quite large. In addition, prohibition of naked short sales could very well lead to all operating entities being able to exist

safely with smaller cash cushions and lower costs of capital, thereby permitting an increase in the financial efficiency of corporations in general.

The evidence provided in this research of a convoluted relationship between naked short sales, stock returns, capital needs, and new issues provides implications that represent a very fertile field for future research. In particular, while the focus of this paper has been on illegal naked shorting, a similar analysis could be conducted with respect to legal short sales covered by delivery of shares. In addition, since naked short sales are higher on stocks with greater shorting costs (Evans, Musto, and Reed, 2009) that in turn tend to be the most heavily shorted ones (Jones and Lamont, 2002), the findings here of lower returns to stocks of companies with a more dire need for larger amounts of external capital may have useful indirect implications for the research on returns to short sellers. In particular, the large negative abnormal returns to heavily shorted stocks found in prior studies (Asquity, Pathak, and Ritter, 2005) may be at least partially related to a need for external funding that enables short sales to drive their share values down, as Callaghan, Murphy, and Parkash (2010) have previously hypothesized. The empirical finding that the momentum effect in security returns is largely related to continued subpar stock returns for financially distressed companies (Agarwal and Taffler, 2010) may also at least partially relate to a shorting down of equity values over time for companies in need of external capital. A direct investigation into the extent that the negative returns to both heavily shorted and financially distressed stocks found in much prior research are related to naked and other shorting stocks of companies in need of capital is certainly warranted.[20] In addition, future research could evaluate whether the benefits from enforcing delivery requirements for market makers, at least around the time of announced new issues, would more than offset the reduced liquidity and market integration that would result.

Footnotes

1. For instance, there has been a flurry of publicity about naked short sales in the last two years (Fotak, Raman, and Yadav, 2009), including new movies about naked shorting and the 2008 financial crisis (Schaap, 2009a). More recently, the German government has placed a temporary ban on the naked short sales of bank and insurance stocks, as well as of euro-area bonds (Crawford, 2010).
2. Prior research by Autore, Billingsley, and Kovacs (2009) on the imposition of the temporary 2008 ban on short sales for ordinary investors found positive abnormal returns on the stocks subject to the restrictions. Those investigators also discovered that fully offsetting negative returns did not materialize after the short selling ban was ended. These results are consistent with some benefits accruing at least to firms using the window of opportunity to issue new shares without having them subjected downward shorting pressure. On the other hand, Boehmer, Jones, and Zhang (2010) have found empirical evidence indicating only a temporary significant rise in the prices of stocks on which short selling was banned. Since the Callaghan, Murphy, and Parkash (2010) model would imply that only the small fraction of companies with a need for outside funding would benefit long-term from temporary restrictions placed on short sales, findings of only a temporary rise could stem from actual financial effects on the few positively affected equities being swamped by the noise in a larger sample of all stocks subject to the ban.
3. As a result of these regulations, the number of shares for which there was a failure to deliver had fallen over 50% by March 2009, while the number of stocks for which there was an extensive delay in share delivery was reduced by nearly 90% to 58 companies, which had an excess of 13 consecutive days of delivery failures on over 0.5% of the number of shares outstanding (Savery, 2009). The newest constraints on naked short sales for general investors had an especially negative impact on hedge funds (Birkner, 2008), but the first regulatory enforcement actions relating to the new rules didn't occur until the summer of 2009 (Schaap, 2009b). SHO regulations enacted in January 2005 by the SEC had previously initiated some looser rules that included disclosure requirements for naked shorting, but they continued to largely exempt naked short positions from a need to deliver shares except in specific circumstances (Boulton and Braga-Alves, 2012), which could be simply circumvented by sophisticated investors through mere switching naked short positions among different brokerage firms as well as through use of the foreign markets, or through synthetic short positions via options.
4. The pre-2007 uptick constraints that restricted short selling orders to be placed at prices higher than the most recent transaction motivate this form of driving down value, insofar as short sellers set large limit orders just above the most recent traded price, thereby inhibiting the upward price pressure caused by buy orders (Murphy, 2000). The shorting investors are thereby effectively able to pressure the stock value downward at the same time that their cash proceeds are higher than if they shorted at the bid. Short sellers therefore had the incentive to engage in this type of shorting down prices even after the removal of the uptick rule in 2007.
5. Although Blau, Van Ness, Van Ness, and Wood (2010) have discovered evidence of short sellers acting as trend followers as opposed to contrarians in cases of large market moves, that finding may only be picking up a tactic of shorting investors lowering their asking price when a trade occurs at a lower value in a bear market.
6. As shown by Murphy (1990) theoretically in a world with heterogeneous expectations on the value of a security, the market price will reflect the weighted-average valuation estimate of all investors, where the weights are determined by the amount invested by each that include short sellers believing the value is less than the market price.
7. This sample of course excludes many companies that may have needed capital but didn't have it reported in the *Wall Street Journal*. Many other firms issued new equity over the sample, but the lack of a public

announcement in this major financial news source that may reduce the likelihood of the stock being shorted in anticipation might lead to excessive noise in the results. In addition, a large fraction of the companies that actually offered new shares over the 2004-2009 interval may have had little or no urgent need for equity capital and merely issued new stock because of management perceiving market prices to exceed the intrinsic values (Myers and Majluf, 1984). On the other hand, at least some other firms with a desperate funding need that wasn't publicly reported in the financial press doubtlessly went bankrupt because of an inability to raise the needed capital.

8. Standard Granger (1969) causality tests (not shown) designed to determine if naked short sales lead or lag abnormal returns over a 5-day interval also didn't yield any statistically significant results.
9. Additional regressions (not shown) were conducted using different methods of computing abnormal returns, such as market-adjusted and market model returns (Brown and Warner, 1985), using both equal- and value-weighted indexes for the combined NYSE, ASE, and NASDAQ markets, as well as returns adjusted for the Fama and French (1995) factors using the value-weighted indexes. The parameter estimates for the *NAKEDxCAPNEED* variable became statistically insignificant from zero, although the *CapNeed* variable remained significantly negative for all testing methodologies. While this evidence is consistent with a shorting down effect that is unrelated to naked short positions, the failure to adjust for particular industry-specific effects may be resulting in the daily impact of naked short sales being masked by the trading tactics of the naked short sellers who may tend to trade on upticks as mentioned earlier. A further regression (1) was conducted (not shown) that employed an industry-adjusted return using an equal value index, and the parameter estimate for the *NAKEDxCAPNEED* variable was significantly negative just as it was for the results reported in Table 3.
10. On the other hand, the insignificance of *UNSPECNEED* implies that restricting naked short sales by general investors may inhibit price declines relating to new stock issues if there is enough uncertainty with respect to the size of the capital need.
11. Boulton and Braga-Alves (2010) have found evidence that SHO-related announcements of extended failures to deliver shares on particular stocks can cause subsequent price rises due to speculative buying relating to a possible short squeeze. However, these authors may have only picked up the effect of naked short covering by uninformed or unsophisticated investors, who lack the will or knowledge to maintain their positions by switching brokers or markets when legally pressured to do so (see footnote #3), and who would be unlikely to focus on stocks of companies needing external capital.
12. Further regressions indicated (not shown) that the significance and sign of the parameter estimates were unaffected (not shown) by inclusion of dummy variables that picked up the differential effects with respect to firms actually able to raise capital. In particular, three separate 0,1 variables were added, including a dummy with a value of 1 on the date of a public equity issue, a dummy with a value of 1 on every day of the sample for a company that eventually sells new stock, and a dummy with a value of 1 on the date of a new issue and thereafter. Interestingly enough, the parameter estimates for the former and latter dummy variables were negative and significant, whereas it was insignificant for the other dummy that might pick up the effects of any anticipated success in raising capital. Running regression (1) three different times with only one of the dummy variables included in each (also not shown) resulted in each of the three parameter estimates being negative and significant. The significance and sign of the other parameter estimates were unaffected in those regressions. These findings are consistent with companies that actually succeed in raising new capital being subject to the same shorting down effects as firms that fail to do so, with the actual issuance of new stock representing an additional negative effect. The actual public issue of new shares generally requires an underwriting at a price lower than the prior market value in order to attract the additional buying demand needed to absorb the increased number of shares outstanding that results. While a stock issue has the advantage of terminating the impact of further dilution in shareholder value caused by short sales for firms that continue to postpone a new issue, an actual issue might be at such a lowered price that the secondary market price would fall.
13. A separate regression that replaced the nakedxcapneed/NAKEDxCAPNEED variables with a single *NakedxCapneed* variable resulted (not shown) in a negatively significant parameter estimate, implying that naked short sales do indeed contribute to shorting down value. In contrast, the insignificant parameter estimate for *MbxNaked* indicates that naked shorting of companies with high market-to-book ratios has no significant effect.
14. In a study on a totally separate sample of stocks subject to heavy shorting activity, Callaghan, Murphy, and Parkash (2010) also found no evidence of lower returns to stocks of firms with higher market-to-book ratios after controlling for a shorting down value effect relating to an internal company shortage of cash. Even though their aggregate sample of stocks had above average market-to-book ratios, they concluded that this ratio didn't represent overvaluation by the market but was instead a result of the fact that companies in need of external capital tend to have higher market-to-book ratios than the average stock. For instance, companies with large write-downs of their stockholders' equity relating to ongoing losses which are creating a desperate need for external funding might indeed have low book values that would translate into higher market-to-book ratios. High-growth companies might also be expected to have higher market-to-book ratios, which would then be associated with the potentially greater need of capital for those firms, albeit not for the survival purposes existing in the latter case.
15. The amount that a company's equity value can be shorted down is limited by the benefits from issuance that include any net present value from investments to be financed by a new issue or by the losses associated with forced asset sales in the case of being unable to pay current liabilities, with the latter sometimes being so costly that it results in bankruptcy.
16. In particular, within a sample of companies needing external capital, the *Mb* independent variable may pick up variation in the *LniVar* dependent variable that

enables separating out the portion of returns on stocks for which naked shorting is relatively ineffective. For instance, many firms having higher market-to-book values may have a less urgent need for funds, perhaps because the money is needed for expansion as opposed to survival, and so their stock values are therefore subject to be being shorted down by a far smaller amount (Callaghan, Murphy, and Parkash, 2010) that only displays itself over a longer period of time. On the other hand, the negative association between market-to-book ratios and heavily shorted stocks found in prior studies (Asquith, Pathak, and Ritter, 2005) may actually be proxying for low book values of those stocks that may stem from low stockholders' equity relating to write-downs and financial distress that indicate a desperate need for equity financing (Callaghan, Murphy, and Parkash, 2010).

17. For major financial events that can possibly be anticipated significantly in advance of a public announcement, some researchers have utilized a 30-day event window around the announcement date as well as a longer 2-month window (Duso, Gugler, and Yurtoglu, 2010). A further regression was therefore run (not shown) that incorporated an event window of -25 to +5 days around the public reporting of a capital need. The sign and significance of the parameter estimates for regression (2) for most of the variables, including for *CapNeed*, *Mb* and *MbxNaked*, were totally unchanged at the .10 level. However, the parameter estimate for the *NAKEDxCAPNEED* variable became statistically insignificant. The latter results imply that naked short positions significantly drive down share prices of firms with a capital need only over longer time horizons when the market-to-book effects are factored out. In a further regression with this shorter event horizon but without the *Mb* and *MbxNaked* variables (also not shown), the parameter estimate for the *NAKEDxCAPNEED* variable remained significantly negative as in regression (1) with the longer window reported in Table 3.
18. Offerings without a prior filing in the SDC data base and issues with secondary market sales are purged from the sample. Because this sample contains officially announced capital raising activities, there are no observations without a stated amount, and so the independent variable *unspecneed*/*UNSPECNEED* doesn't exist when running the regressions on this sample.
19. The insignificance of the parameter estimate for *CapNeed* reported in Tables 5 and 7 that used regression (2) may stem from filings not being anticipated by sophisticated shorts. However, in further tests using regression equation (1), i.e., without the *Mb* and *MbxNaked* independent variables (not shown), the parameter estimate for the *CapNeed* variable was significantly negative for the filing dates as well as for the offering dates of non-shelf issues. This finding, as well as the positive significance of the parameter coefficient for the *Mb* variable in Table 5, is consistent with a hypothesis that firms conducting non-shelf filings and having an urgent need for capital have lower market-to-book ratios insofar as inclusion of the *Mb* variable allows for such differentiation between non-shelf filers with higher market-to-book ratios that don't suffer the same dilution because the managers of the latter firms are selling stock opportunistically as opposed to out of desperation.
20. As mentioned in the text earlier, those investors taking short positions in equities of firms requiring external funding may not be deliberately trying to manipulate down their intrinsic values, but the impact on value is the same regardless of the investors' intent or knowledge of the effects of their trades. Similarly, short sellers who fail to deliver shares may not be planning to be naked on the date of the shorting transaction, but naked shorting has the same effect on the supply of shares, and hence on market price, regardless of any original intent of the short sellers to borrow the stock. In particular, naked short positions might be more likely to be closed out with purchases if delivery requirements were enforced regardless of the intentions of the shorts, thereby pressuring share prices upward.

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Table 1. Summary Statistics for Naked Short Variables (2004-2009)

Variable[a]	Obs	Median	Mean	Std. Dev	Min	Max
LniVar	7174	-0.003	-0.007	0.087	-1.830	0.805
nakedshort	7670	0.000	0.043	0.137	0.000	2.422
NAKEDSHORT	7670	0.000	0.001	0.009	0.000	0.383
nakedxcapneed	7670	0.000	0.055	0.583	0.000	25.548
NAKEDxCAPNEED	7670	0.000	0.002	0.029	0.000	1.321
Mb	6760	1.096	1.306	1.315	0.004	9.325
MbxNaked	6760	0.000	0.040	0.147	0.000	2.434
Capneed	7670	0.189	0.980	7.434	0.000	308.005
unspecneed	7670	0.000	0.117	0.321	0.000	1.000
UNSPECNEED	7670	0.000	0.027	0.162	0.000	1.000
shortannounce	7670	0.000	0.007	0.063	0.000	1.929
SHORTANNOUNCE	7670	0.000	0.000	0.005	0.000	0.180
BANSHORT	7670	0.000	0.021	0.142	0.000	1.000
POSTBAN	7670	0.000	0.002	0.046	0.000	1.000
vol	7670	18.938	15.819	7.422	0.000	23.275
VOL	7670	0.000	3.300	7.282	0.000	23.344
announce	7670	0.000	0.023	0.150	0.000	1.000
ANNOUNCE	7670	0.000	0.008	0.088	0.000	1.000
fails	7670	0.000	0.003	0.008	0.000	0.113
FAILS	7670	0.000	0.000	0.000	0.000	0.008
EarlierNeed	7670	0.003	0.107	0.257	0.000	1.000

[a]A variable with only CAPITALIZED LETTERS has nonzero values only for observations in time periods when there were restrictions on naked short sales for that stock, while its corresponding uncapitalized name indicates nonzero values only for all other dates. The variable *LniVar* is the natural logarithm of one plus industry adjusted value weighted abnormal daily returns (-59 to +5) on stocks announcing a need for external capital. The variables *nakedshort/NAKEDSHORT* are the ratios of actual daily naked short sales to the daily trading volume of the stock only in the sample time periods before an announced need to obtain external financing (and 0 otherwise). *shortannounce/SHORTANNOUNCE* are the ratios of actual daily naked short sales to the daily trading volume of the stock only in sample time periods after a public announcement of a capital need (and 0 otherwise). The *nakedxcapneed/NAKEDxCAPNEED* variables are constructed by multiplying the ratio of naked short sales to volume by the announced amount of capital being raised divided by the market capitalization. *fails/FAILS* are constructed by lagging by 3 days actual daily naked short sales divided by the number of shares outstanding. The variables *announce/ANNOUNCE* are constructed to have a value of 1 on the day before and day of the published report of a capital need and 0 otherwise. *BANSHORT* has a value of 1 during the ban and 0 otherwise. *POSTBAN* has a value of 1 in the two trading days after the ban and 0 otherwise. The variable *EarlierNeed* is constructed that has a value equal to one divided by the number of days since the firm's most recent announcement of a capital need and zero if there has been no such prior announcement over the entire sample interval. The *Capneed* variable is computed as the announced amount of needed capital divided by the market capitalization for each stock. The values of the dummy variables *unspecneed/UNSPECNEED* equal 1 when the amount of capital needed isn't announced and 0 otherwise. The variables *vol/VOL* have a value equal to the log of the daily dollar trading volume. The variable *Mb* is the market-to-book ratio, while *MbxNaked* is *Mb* multiplied by daily naked short sales.

Table 2. Pairwise Correlation Between Naked Short Variables (2004-2009)

Panel A.

Variable[a]	LniVar		nakedshort		nakedxcapneed		Mb		MbxNaked	
nakedshort	0.005									
nakedxcapneed	-0.009		0.546	***						
Mb	0.041	***	-0.055	***	-0.091	***				
MbxNaked	0.017		0.788	***	0.414	***	0.167	***		
CapNeed	-0.107	***	0.013		0.053	***	-0.078	***	-0.014	
unspecneed	-0.022	*	0.087	***	-0.034	***	0.020		0.044	***
shortannounce	-0.016		-0.033	***	-0.010		-0.063	***	-0.027	**
vol	-0.017		0.091	***	0.014		0.216	***	0.081	***
announce	-0.067	***	-0.048	***	-0.015		-0.017		-0.042	***
fails	-0.015		0.527	***	0.212	***	-0.136	***	0.328	***

	CapNeed		unspecneed		shortannounce		vol		announce	
unspecneed	-0.048	***								
shortannounce	0.011		0.085	***						
vol	-0.028	**	0.117	***	0.024	**				
announce	0.028	**	0.020	*	0.171	***	0.074	***		
fails	0.028	**	0.046	***	0.333	***	0.111	***	0.052	***

Panel B.

	lnivar		NAKEDSHORT		NAKEDxCAPNEED		Mb		MbxNaked	
NAKEDSHORT	-0.002									
NAKEDxCAPNEED	-0.014		0.683	***						
Mb	0.041	***	-0.030	**	-0.049	***				
MbxNaked	0.017		0.010		-0.011		0.167	***		
CapNeed	-0.107	***	0.012		0.036	***	-0.078	***	-0.014	
UNSPECNEED	0.007		0.046	***	-0.010		-0.156	***	-0.048	***
SHORTANNOUNCE	0.017		-0.006		-0.003		-0.032	***	-0.018	
Banshort	0.016		0.090	***	0.146	***	-0.015		-0.039	***
Postban	-0.025	**	0.027	**	0.064	***	-0.026	**	-0.013	
VOL	0.020	*	0.203	***	0.120	***	-0.209	***	-0.119	***
ANNOUNCE	0.012		-0.009		-0.005		-0.044	***	-0.025	**
FAILS	0.022	*	0.343	***	0.259	***	-0.061	***	-0.025	**
EarlierNeed	-0.003		-0.033	***	-0.018		-0.101	***	0.042	***

	CapNeed		UNSPECNEED		SHORTANNOUNCE		BANSHORT		POSTBAN	
UNSPECNEED	-0.022	*								
SHORTANNOUNCE	0.006		-0.001							
BANSHORT	0.003		0.055	***	0.014					
POSTBAN	0.009		0.028	**	0.006		-0.007			
VOL	0.015		0.351	***	0.116	***	0.334	***	0.100	***
ANNOUNCE	0.005		0.040	***	0.182	***	0.133	***	-0.004	
FAILS	0.016		0.091	***	0.334	***	0.109	***	0.035	***
EarlierNeed	-0.017		-0.050	***	-0.005		-0.010		-0.017	

	VOL		ANNOUNCE		FAILS	
ANNOUNCE	0.200	***				
FAILS	0.280	***	0.105	***		
EarlierNeed	-0.109	***	-0.016		-0.030	***

*Significant at the .10 level.
**Significant at the .05 level.
***Significant at the .01 level.

[a]A variable with only CAPITALIZED LETTERS has nonzero values only for observations in time periods when there were restrictions on naked short sales for that stock, while its corresponding uncapitalized name indicates nonzero values only for all other dates. The variable *LniVar* is the natural logarithm of one plus industry adjusted value weighted abnormal daily returns (-59 to +5) on stocks announcing a need for external capital. The variables *nakedshort/NAKEDSHORT* are the ratios of actual daily naked short sales to the daily trading volume of the stock only in the sample time periods before an announced need to obtain external financing (and 0 otherwise). *shortannounce/SHORTANNOUNCE* are the ratios of actual daily naked short sales to the daily trading volume of the stock only in sample time periods after a public announcement of a capital need (and 0 otherwise). The *nakedxcapneed/NAKEDxCAPNEED* variables are constructed by multiplying the ratio of naked short sales to volume by the announced amount of capital being raised divided by the market capitalization. *fails/FAILS* are constructed by lagging by 3 days actual daily naked short sales divided by the number of shares outstanding. The variables *announce/ANNOUNCE* are constructed to have a value of 1 on the day before and day of the published report of a capital need and 0 otherwise. *BANSHORT* has a value of 1 during the ban and 0 otherwise. *POSTBAN* has a value of 1 in the two trading days after the ban and 0 otherwise. The variable *EarlierNeed* is constructed that has a value equal to one divided by the number of days since the firm's most recent announcement of a capital need and zero if there has been no such prior announcement over the entire sample interval. The *Capneed* variable is computed as the announced amount of needed capital divided by the market capitalization for each stock. The values of the dummy variables *unspecneed/UNSPECNEED* equal 1 when the amount of capital needed isn't announced and 0 otherwise. The variables *vol/VOL* have a value equal to the log of the daily dollar trading volume. The variable *Mb* is the market-to-book ratio, while *MbxNaked* is *Mb* multiplied by daily naked short sales.

Table 3. Regression Test of Naked Shorting Down Value[a](2004-2009)

$$LniVar = a_1 nakedshort + a_2 NAKEDSHORT + a_3 nakedxcapneed + a_4 NAKEDxCAPNEED + a_5 CapNeed + a_6 unspecneed + a_7 UNSPECNEED + a_8 shortannounce + a_9 SHORTANNOUNCE + a_{10} BANSHORT + a_{11} POSTBAN + a_{12} Vol + a_{13} VOL + a_{14} Announce + a_{15} ANNOUNCE + a_{16} Fails + a_{17} FAILS + a_{18} EarlierNeed + a_0 + e \quad (1)$$

Estimated covariances = 115	Number of observations	7174
Estimated autocorrelations = 115	Number of groups	115
Estimated coefficients = 19	Observations per group: minimum	14
	average	62
	maximum	65
	Wald $Chi^2(18)$	66.4
Log likelihood = 11071.12	Probability > Chi^2	0.00

	Dependent Variable: LniVar					
Variables[b]	**Coef.**	**Std. Err.**	**z**	**P>|z|**	**[95% Conf. Interval]**	
Nakedshort	0.008	0.006	1.410	0.158	-0.003	0.019
NAKEDSHORT	0.121	0.077	1.580	0.115	-0.029	0.272
Nakedxcapneed	-0.001	0.002	-0.580	0.565	-0.005	0.003
NAKEDxCAPNEED	-0.084 ***	0.031	-2.730	0.006	-0.145	-0.024
CapNeed	-0.001 ***	0.000	-4.640	0.000	-0.002	-0.001
Unspecneed	-0.003 *	0.001	-1.780	0.074	-0.006	0.000
UNSPECNEED	0.001	0.009	0.070	0.942	-0.018	0.019
shortannounce	-0.013	0.011	-1.160	0.246	-0.036	0.009
SHORTANNOUNCE	0.266	0.202	1.320	0.188	-0.130	0.662
BANSHORT	0.018 ***	0.005	3.720	0.000	0.008	0.027
POSTBAN	-0.009	0.018	-0.490	0.624	-0.043	0.026
Vol	-0.001 **	0.000	-2.380	0.017	-0.001	0.000
VOL	-0.001 ***	0.000	-2.840	0.005	-0.001	0.000
Announce	-0.003	0.002	-1.390	0.165	-0.008	0.001
ANNOUNCE	-0.016 **	0.008	-2.060	0.039	-0.031	-0.001
Fails	-0.198	0.191	-1.040	0.298	-0.572	0.175
FAILS	3.826	2.544	1.500	0.133	-1.159	8.812
Earlierneed	-0.002	0.002	-1.270	0.206	-0.006	0.001
Intercept	0.009 **	0.004	2.060	0.040	0.000	0.017

*Significant at the .10 level.
**Significant at the .05 level.
***Significant at the .01 level.

[a]A panel set of Feasible Generalized Least Squares (FGLS) regressions is employed that adjusts for heteroscedasticity and first-order autocorrelation.

[b]The dependent variable (*LniVar*) is the natural logarithm of one plus industry adjusted value weighted abnormal daily returns (-59 to +5) on stocks announcing a need for external capital. The independent variables with only CAPITALIZED LETTERS have nonzero values only for observations in time periods when there were restrictions on naked short sales for that stock, while their corresponding uncapitalized names indicate nonzero values only for all other dates. *nakedshort/NAKEDSHORT* are the ratios of actual daily naked short sales to the daily trading volume of the stock only in the sample time periods before an announced need to obtain external financing (and 0 otherwise). *shortannounce/SHORTANNOUNCE* are the ratios of actual daily naked short sales to the daily trading volume of the stock only in sample time periods after a public announcement of a capital need (and 0 otherwise). The *NakedxCapneed/NAKEDxCAPNEED* variables are constructed by multiplying the ratio of naked short sales to volume by the announced amount of capital being raised divided by the market capitalization. *fails/FAILS* are constructed by lagging by 3 days actual daily naked short sales divided by the number of shares outstanding. *announce/ANNOUNCE* are constructed that has a value of 1 on the day before and day of the published report of a capital need and 0 otherwise. *BANSHORT* has a value of 1 during the ban and 0 otherwise. *POSTBAN* has a value of 1 in the two trading days after the ban and 0 otherwise. The variable *EarlierNeed* is constructed that has a value equal to one divided by the number of days since the firm's most recent announcement of a capital need and zero if there has been no such prior announcement over the entire sample interval. *CapNeed* is computed as the announced amount of needed capital divided by the market capitalization for each stock. The dummy variables *unspecneed/UNSPECNEED* have a value of 1 when the amount of capital needed isn't announced and 0 otherwise. The variables *vol/VOL* have a value equal to the log of the daily dollar trading volume.

Table 4. Test of Market-to-Book Effects on Naked Shorting Down Hypothesis[a] (2004-2009)

$$LniVar = a_1 nakedshort + a_2 NAKEDSHORT + a_3 nakedxcapneed + a_4 NAKEDxCAPNEED + a_5 CapNeed + a_6 unspecneed + a_7 UNSPECNEED + a_8 shortannounce + a_9 SHORTANNOUNCE + a_{10} BANSHORT + a_{11} POSTBAN + a_{12} Vol + a_{13} VOL + a_{14} Announce + a_{15} ANNOUNCE + a_{16} Fails + a_{17} FAILS + a_{18} EarlierNeed + a_{19} Mb + a_{20} MbxNaked + a_0 + e \quad (2)$$

Estimated covariances = 102	Number of observations	6341
Estimated autocorrelations = 102	Number of groups	102
Estimated coefficients = 21	Observations per group: minimum	14
	average	62
	maximum	65
	Wald $Chi^2(20)$	72.2
Log likelihood = 9447.7	Probability > Chi^2	0.0

	Dependent Variable: Lnivar						
Variables[b]	**Coef.**		**Std. Err.**	**z**	**P>|z|**	**[95% Conf. Interval]**	
Nakedshort	0.009		0.015	0.600	0.549	-0.020	0.038
NAKEDSHORT	0.145	*	0.077	1.880	0.060	-0.006	0.296
nakedxcapneed	-0.002		0.011	-0.210	0.831	-0.024	0.020
NAKEDxCAPNEED	-0.075	**	0.031	-2.400	0.017	-0.136	-0.014
CapNeed	-0.001	***	0.000	-3.920	0.000	-0.001	0.000
unspecneed	-0.003	**	0.002	-2.090	0.036	-0.006	0.000
UNSPECNEED	0.002		0.009	0.250	0.801	-0.016	0.021
shortannounce	-0.006		0.013	-0.460	0.646	-0.033	0.020
SHORTANNOUNCE	-0.248		0.423	-0.590	0.558	-1.076	0.581
BANSHORT	0.017	***	0.005	3.390	0.001	0.007	0.026
POSTBAN	-0.009		0.018	-0.530	0.598	-0.044	0.025
Vol	0.000		0.000	0.010	0.995	-0.001	0.001
VOL	-0.000		0.000	-0.150	0.884	-0.001	0.001
Announce	-0.009	***	0.003	-3.220	0.001	-0.014	-0.003
ANNOUNCE	-0.016	**	0.008	-2.010	0.045	-0.031	0.000
Fails	-0.172		0.267	-0.640	0.519	-0.694	0.351
FAILS	3.622		3.112	1.160	0.244	-2.478	9.723
EarlierNeed	-0.001		0.002	-0.680	0.495	-0.005	0.002
Mb	0.001	***	0.000	3.600	0.000	0.000	0.002
MbxNaked	-0.001		0.008	-0.130	0.896	-0.017	0.015
Intercept	-0.004		0.007	-0.630	0.530	-0.017	0.009

*Significant at the .10 level.
**Significant at the .05 level.
***Significant at the .01 level.

[a]A panel set of Feasible Generalized Least Squares (FGLS) regressions is employed that adjusts for heteroscedasticity and first-order autocorrelation.

[b] The dependent variable (*LniVar*) is the natural logarithm of one plus industry adjusted value weighted abnormal daily returns (-59 to +5) on stocks announcing a need for external capital. The independent variables with only CAPITALIZED LETTERS have nonzero values only for observations in time periods when there were restrictions on naked short sales for that stock, while their corresponding uncapitalized names indicate nonzero values only for all other dates. *nakedshort/NAKEDSHORT* are the ratios of actual daily naked short sales to the daily trading volume of the stock only in the sample time periods before an announced need to obtain external financing (and 0 otherwise). *shortannounce/SHORTANNOUNCE* are the ratios of actual daily naked short sales to the daily trading volume of the stock only in sample time periods after a public announcement of a capital need (and 0 otherwise). The *nakedxcapneed/NAKEDxCAPNEED* variables are constructed by multiplying the ratio of naked short sales to volume by the announced amount of capital being raised divided by the market capitalization. *fails/FAILS* are constructed by lagging by 3 days actual daily naked short sales divided by the number of shares outstanding. *announce/ANNOUNCE* are constructed that has a value of 1 on the day before and day of the published report of a capital need and 0 otherwise. *BANSHORT* has a value of 1 during the ban and 0 otherwise. *POSTBAN* has a value of 1 in the two trading days after the ban and 0 otherwise. The variable *EarlierNeed* is constructed that has a value equal to one divided by the number of days since the firm's most recent announcement of a capital need and zero if there has been no such prior announcement over the entire sample interval. The variables *capneed/CAPNEED* are computed as the announced amount of needed capital divided by the market capitalization for each stock. The dummy variables *unspecneed/UNSPECNEED* have a value of 1 when the amount of capital needed isn't announced and 0 otherwise. The variables *vol/VOL* have a value equal to the log of the daily dollar trading volume. The variable *Mb* is the market-to-book ratio, while *MbxNaked* is *Mb* multiplied by daily naked short sales.

Table 5. Test of Market-to-Book Effects on Naked Shorting Down Hypothesis for Non-Shelf Issues (Filing Date)[a] (2004-2009)

$$LniVar = a_1 nakedshort + a_2 NAKEDSHORT + a_3 nakedxcapneed + a_4 NAKEDxCAPNEED + a_5 CapNeed + a_6 shortannounce + a_7 SHORTANNOUNCE + a_8 BANSHORT + a_9 POSTBAN + a_{10} Vol + a_{11} VOL + a_{12} Announce + a_{13} ANNOUNCE + a_{14} Fails + a_{15} FAILS + a_{16} EarlierNeed + a_{17} Mb + a_{18} MbxNaked + a_0 + e \quad (3)$$

Estimated covariances = 450	Number of observations	28816
Estimated autocorrelations = 450	Number of groups	450
	Observations per group:	
Estimated coefficients = 19	minimum	18
	average	64.24
	maximum	65
	Wald $Chi^2(20)$	149.07
Log likelihood = 54500.44	Probability > Chi^2	0.000

	Dependent Variable: Lnivar						
Variables[b]	**Coef.**		**Std. Err.**	**z**	**P>|z|**	**[95% Conf. Interval]**	
Nakedshort	0.000		0.000	0.550	0.581	0.000	0.000
NAKEDSHORT	-0.003		0.006	-0.490	0.626	-0.015	0.009
nakedxcapneed	0.000		0.000	0.000	0.998	0.000	0.000
NAKEDxCAPNEED	-0.000		0.000	-1.080	0.278	0.000	0.000
CapNeed	-0.000		0.000	-0.730	0.465	0.000	0.000
shortannounce	-0.000		0.001	-0.540	0.588	-0.002	0.001
SHORTANNOUNCE	-0.021		0.028	-0.750	0.452	-0.075	0.033
BANSHORT	-0.009		0.007	-1.360	0.174	-0.023	0.004
POSTBAN	0.010		0.082	0.120	0.902	-0.150	0.170
Vol	0.001	***	0.000	6.390	0.000	0.000	0.001
VOL	0.000	***	0.000	5.490	0.000	0.000	0.001
Announce	-0.006	***	0.001	-5.600	0.000	-0.008	-0.004
ANNOUNCE	-0.009	**	0.004	-2.190	0.028	-0.017	-0.001
Fails	-0.011		0.054	-0.210	0.836	-0.116	0.094
FAILS	2.274	*	1.238	1.840	0.066	-0.152	4.700
EarlierNeed	-0.002		0.002	-0.790	0.432	-0.006	0.002
Mb	0.000	**	0.000	2.020	0.043	0.000	0.000
MbxNaked	-0.000		0.000	-0.240	0.811	0.000	0.000
Intercept	-0.007	***	0.001	-5.930	0.000	-0.009	-0.004

*Significant at the .10 level.
**Significant at the .05 level.
***Significant at the .01 level.

[a] A panel set of Feasible Generalized Least Squares (FGLS) regressions is employed that adjusts for heteroscedasticity and first-order autocorrelation.

[b] The dependent variable (*LniVar*) is the natural logarithm of one plus industry adjusted value weighted abnormal daily returns (-59 to +5) on newly issued stocks with filing date as event date (0). The independent variables with only CAPITALIZED LETTERS have nonzero values only for observations in time periods when there were restrictions on naked short sales for that stock, while their corresponding uncapitalized names indicate nonzero values only for all other dates. *nakedshort/NAKEDSHORT* are the ratios of actual daily naked short sales to the daily trading volume of the stock only in the sample time periods before an announced need to obtain external financing (and 0 otherwise). *shortannounce/SHORTANNOUNCE* are the ratios of actual daily naked short sales to the daily trading volume of the stock only in sample time periods after a public announcement of a capital need (and 0 otherwise). The *nakedxcapneed/NAKEDxCAPNEED* variables are constructed by multiplying the ratio of naked short sales to volume by the filed amount of capital being raised divided by the market capitalization. *fails/FAILS* are constructed by lagging by 3 days actual daily naked short sales divided by the number of shares outstanding. *announce/ANNOUNCE* are constructed that has a value of 1 on the day before and day of the filing date and 0 otherwise. *BANSHORT* has a value of 1 during the ban and 0 otherwise. *POSTBAN* has a value of 1 in the two trading days after the ban and 0 otherwise. The variable *EarlierNeed* is constructed that has a value equal to one divided by the number of days since the firm's most recent stock issues and zero if there has been no such prior announcement over the entire sample interval. The variables *capneed/CAPNEED* are computed as the filed amount of new stock issues divided by the market capitalization for each stock. The variables *vol/VOL* have a value equal to the log of the daily dollar trading volume. The variable *Mb* is the market-to-book ratio, while *MbxNaked* is *Mb* multiplied by daily naked short sales.

Table 6. Test of Market-to-Book Effects on Naked Shorting Down Hypothesis for Non-Shelf Issues (Offering Date)[a] (2004-2009)

$$LniVar = a_1 nakedshort + a_2 NAKEDSHORT + a_3 nakedxcapneed + a_4 NAKEDxCAPNEED + a_5 CapNeed + a_6 shortannounce + a_7 SHORTANNOUNCE + a_8 BANSHORT + a_9 POSTBAN + a_{10} Vol + a_{11} VOL + a_{12} Announce + a_{13} ANNOUNCE + a_{14} Fails + a_{15} FAILS + a_{16} EarlierNeed + a_{17} Mb + a_{18} MbxNaked + a_0 + e \quad (3)$$

Estimated covariances = 521	Number of observations		33461
Estimated autocorrelations = 521	Number of groups		521
	Observations per group:		
Estimated coefficients = 19	minimum		29
	average		64.41
	maximum		65
	Wald $Chi^2(20)$		165.37
Log likelihood = 61797.39	Probability > Chi^2		0.000

	Dependent Variable: Lnivar					
Variables[b]	**Coef.**		**Std. Err.**	**z**	**P>|z|**	**[95% Conf. Interval]**
Nakedshort	0.000		0.000	1.060	0.289	0.000 0.001
NAKEDSHORT	-0.005		0.004	-1.110	0.268	-0.013 0.004
nakedxcapneed	0.000		0.000	0.490	0.625	0.000 0.000
NAKEDxCAPNEED	-0.000		0.000	-1.150	0.249	0.000 0.000
CapNeed	-0.000	**	0.000	-2.190	0.029	0.000 0.000
shortannounce	-0.000		0.000	-0.610	0.544	0.000 0.000
SHORTANNOUNCE	-0.007		0.009	-0.820	0.410	-0.024 0.010
BANSHORT	-0.012	**	0.006	-2.060	0.040	-0.023 -0.001
POSTBAN	0.042	*	0.024	1.740	0.083	-0.005 0.090
Vol	0.000	***	0.000	4.430	0.000	0.000 0.000
VOL	0.000	***	0.000	3.340	0.001	0.000 0.000
Announce	-0.005	***	0.001	-5.590	0.000	-0.007 -0.004
ANNOUNCE	-0.019	***	0.003	-6.310	0.000	-0.025 -0.013
Fails	-0.023		0.057	-0.400	0.687	-0.134 0.089
FAILS	-0.338		0.580	-0.580	0.560	-1.475 0.798
EarlierNeed	0.000		0.003	0.040	0.971	-0.005 0.006
Mb	0.000	*	0.000	1.690	0.092	0.000 0.000
MbxNaked	0.000		0.000	-1.480	0.139	0.000 0.000
Intercept	-0.004	***	0.001	-4.170	0.000	-0.006 -0.002

*Significant at the .10 level.
**Significant at the .05 level.
***Significant at the .01 level.

[a]A panel set of Feasible Generalized Least Squares (FGLS) regressions is employed that adjusts for heteroscedasticity and first-order autocorrelation.

[b] The dependent variable (*LniVar*) is the natural logarithm of one plus industry adjusted value weighted abnormal daily returns (-59 to +5) on newly issued stocks with offering date as event date (0). The independent variables with only CAPITALIZED LETTERS have nonzero values only for observations in time periods when there were restrictions on naked short sales for that stock, while their corresponding uncapitalized names indicate nonzero values only for all other dates. *nakedshort/NAKEDSHORT* are the ratios of actual daily naked short sales to the daily trading volume of the stock only in the sample time periods before an announced need to obtain external financing (and 0 otherwise). *shortannounce/SHORTANNOUNCE* are the ratios of actual daily naked short sales to the daily trading volume of the stock only in sample time periods after a public announcement of a capital need (and 0 otherwise). The *nakedxcapneed/NAKEDxCAPNEED* variables are constructed by multiplying the ratio of naked short sales to volume by the offered amount of capital being raised divided by the market capitalization. *fails/FAILS* are constructed by lagging by 3 days actual daily naked short sales divided by the number of shares outstanding. *announce/ANNOUNCE* are constructed that has a value of 1 on the day before and day of offering and 0 otherwise. *BANSHORT* has a value of 1 during the ban and 0 otherwise. *POSTBAN* has a value of 1 in the two trading days after the ban and 0 otherwise. The variable *EarlierNeed* is constructed that has a value equal to one divided by the number of days since the firm's most recent stock issues and zero if there has been no such prior announcement over the entire sample interval. The variables *capneed/CAPNEED* are computed as the offered amount of new stock issues divided by the market capitalization for each stock. The variables *vol/VOL* have a value equal to the log of the daily dollar trading volume. The variable *Mb* is the market-to-book ratio, while *MbxNaked* is *Mb* multiplied by daily naked short sales.

Table 7. Test of Market-to-Book Effects on Naked Shorting Down Hypothesis for Shelf Offerings (Filing Date) (2004-2009)

$$LniVar = a_1 nakedshort + a_2 NAKEDSHORT + a_3 nakedxcapneed + a_4 NAKEDxCAPNEED + a_5 CapNeed + a_6 shortannounce + a_7 SHORTANNOUNCE + a_8 BANSHORT + a_9 POSTBAN + a_{10} Vol + a_{11} VOL + a_{12} Announce + a_{13} ANNOUNCE + a_{14} Fails + a_{15} FAILS + a_{16} EarlierNeed + a_{17} Mb + a_{18} MbxNaked + a_0 + e \quad (3)$$

Estimated covariances = 1088	Number of observations	70316
Estimated autocorrelations = 1088	Number of groups	1088
	Observations per group:	
Estimated coefficients = 19	minimum	4
	average	64.64
	maximum	65
	Wald $Chi^2(20)$	97.69
Log likelihood = 141151.5	Probability > Chi^2	0.000

	Dependent Variable: Lnivar						
Variables[b]	**Coef.**		**Std. Err.**	**z**	**P>|z|**	**[95% Conf.**	**Interval]**
Nakedshort	-0.000		0.000	-0.680	0.499	0.000	0.000
NAKEDSHORT	-0.010	*	0.006	-1.670	0.095	-0.022	0.002
nakedxcapneed	0.000		0.000	0.020	0.987	0.000	0.000
NAKEDxCAPNEED	0.000		0.000	1.490	0.135	0.000	0.000
CapNeed	0.000		0.000	1.540	0.124	0.000	0.000
shortannounce	-0.000		0.000	-0.680	0.495	-0.001	0.000
SHORTANNOUNCE	0.002		0.006	0.280	0.783	-0.011	0.014
BANSHORT	-0.006	*	0.003	-1.830	0.068	-0.013	0.000
POSTBAN	-0.011		0.010	-1.050	0.293	-0.031	0.009
Vol	0.000	***	0.000	5.500	0.000	0.000	0.000
VOL	0.000	***	0.000	4.380	0.000	0.000	0.000
Announce	-0.001	**	0.001	-2.540	0.011	-0.002	0.000
ANNOUNCE	-0.009	***	0.002	-3.890	0.000	-0.013	-0.004
Fails	-0.024		0.051	-0.460	0.643	-0.124	0.077
FAILS	0.196		0.430	0.460	0.648	-0.646	1.038
EarlierNeed	0.000		0.000	0.460	0.643	0.000	0.000
Mb	0.000		0.000	0.770	0.439	0.000	0.000
MbxNaked	-0.000		0.000	-0.020	0.983	0.000	0.000
Intercept	-0.004	***	0.001	-4.880	0.000	-0.006	-0.003

*Significant at the .10 level.
**Significant at the .05 level.
***Significant at the .01 level.

[a]A panel set of Feasible Generalized Least Squares (FGLS) regressions is employed that adjusts for heteroscedasticity and first-order autocorrelation.

[b] The dependent variable (*LniVar*) is the natural logarithm of one plus industry adjusted value weighted abnormal daily returns (-59 to +5) on shelf offerings with filing date as event date (0). The independent variables with only CAPITALIZED LETTERS have nonzero values only for observations in time periods when there were restrictions on naked short sales for that stock, while their corresponding uncapitalized names indicate nonzero values only for all other dates. *nakedshort/NAKEDSHORT* are the ratios of actual daily naked short sales to the daily trading volume of the stock only in the sample time periods before an announced need to obtain external financing (and 0 otherwise). *shortannounce/SHORTANNOUNCE* are the ratios of actual daily naked short sales to the daily trading volume of the stock only in sample time periods after a public announcement of a capital need (and 0 otherwise). The *nakedxcapneed/NAKEDxCAPNEED* variables are constructed by multiplying the ratio of naked short sales to volume by the filed amount of shelf offering divided by the market capitalization. *fails/FAILS* are constructed by lagging by 3 days actual daily naked short sales divided by the number of shares outstanding. *announce/ANNOUNCE* are constructed that has a value of 1 on the day before and day of filing and 0 otherwise. *BANSHORT* has a value of 1 during the ban and 0 otherwise. *POSTBAN* has a value of 1 in the two trading days after the ban and 0 otherwise. The variable *EarlierNeed* is constructed that has a value equal to one divided by the number of days since the firm's most recent shelf offering and zero if there has been no such prior announcement over the entire sample interval. The variables *capneed/CAPNEED* are computed as the filed amount of shelf offering divided by the market capitalization for each stock. The variables *vol/VOL* have a value equal to the log of the daily dollar trading volume. The variable *Mb* is the market-to-book ratio, while *MbxNaked* is *Mb* multiplied by daily naked short sales.

Table 8. Test of Market-to-Book Effects on Naked Shorting Down Hypothesis for Shelf Offerings (Offering Date)[a] (2004-2009)

$$LniVar = a_1 nakedshort + a_2 NAKEDSHORT + a_3 nakedxcapneed + a_4 NAKEDxCAPNEED + a_5 CapNeed + a_6 shortannounce + a_7 SHORTANNOUNCE + a_8 BANSHORT + a_9 POSTBAN + a_{10} Vol + a_{11} VOL + a_{12} Announce + a_{13} ANNOUNCE + a_{14} Fails + a_{15} FAILS + a_{16} EarlierNeed + a_{17} Mb + a_{18} MbxNaked + a_0 + e \quad (3)$$

Estimated covariances = 1493	Number of observations	96604
Estimated autocorrelations = 1493	Number of groups	1493
	Observations per group:	
Estimated coefficients = 19	minimum	22
	average	64.72
	maximum	65
	Wald $Chi^2(20)$	569.56
Log likelihood = 181317.3	Probability > Chi^2	0.000

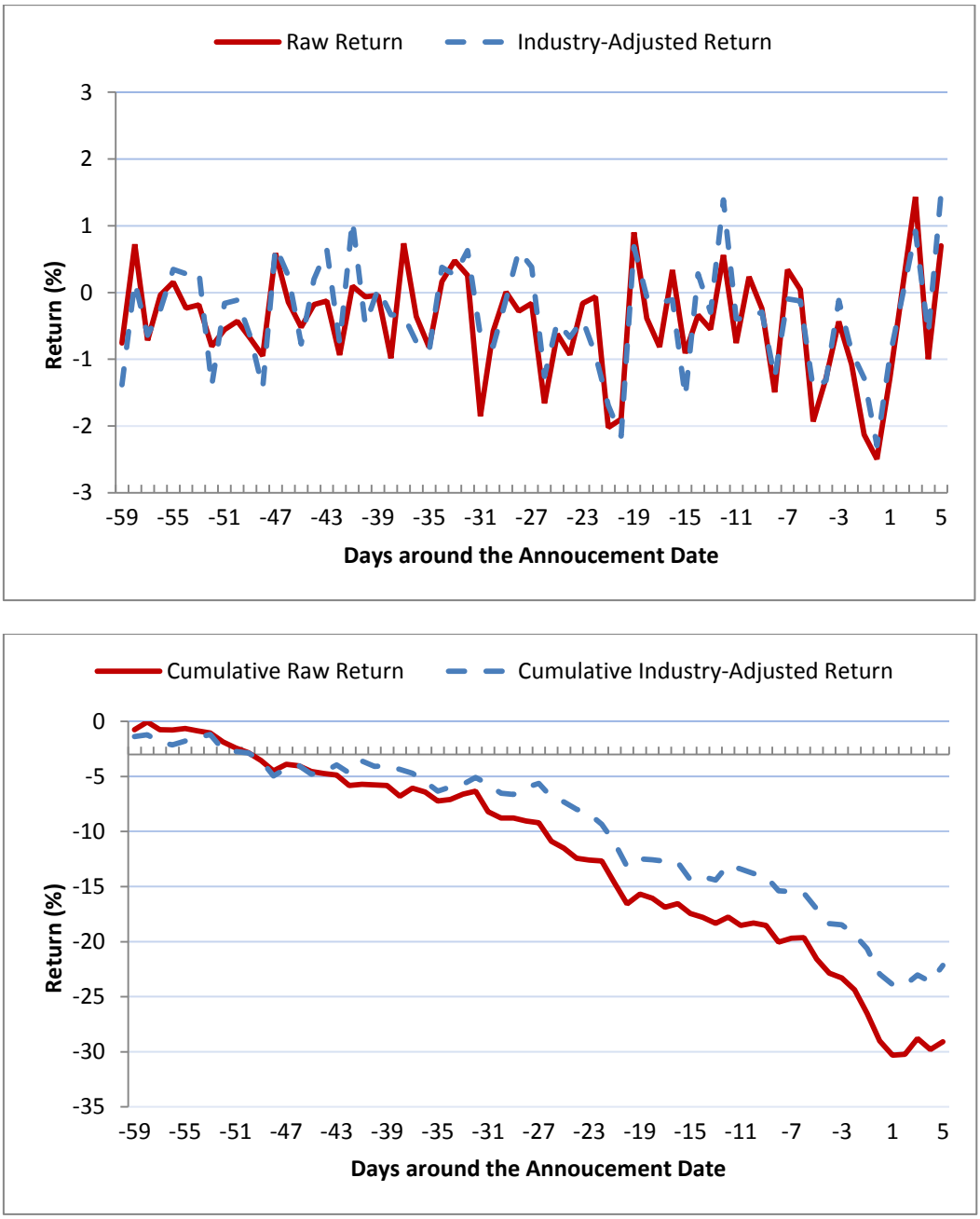
	Dependent Variable: Lnivar					
Variables[b]	**Coef.**		**Std. Err.**	**z**	**P>|z|**	**[95% Conf. Interval]**
Nakedshort	-0.000		0.000	-0.140	0.889	-0.001 0.001
NAKEDSHORT	0.003		0.005	0.670	0.501	-0.006 0.013
nakedxcapneed	-0.000		0.000	-0.480	0.634	0.000 0.000
NAKEDxCAPNEED	-0.000		0.000	-0.890	0.375	0.000 0.000
CapNeed	-0.000		0.000	-0.260	0.791	0.000 0.000
shortannounce	-0.001	*	0.000	-1.810	0.071	-0.002 0.000
SHORTANNOUNCE	-0.003		0.006	-0.540	0.586	-0.014 0.008
BANSHORT	0.001		0.003	0.410	0.684	-0.005 0.007
POSTBAN	0.001		0.017	0.080	0.934	-0.031 0.034
Vol	0.000	***	0.000	6.900	0.000	0.000 0.000
VOL	0.000	***	0.000	6.680	0.000	0.000 0.000
Announce	-0.007	***	0.001	-13.980	0.000	-0.008 -0.006
ANNOUNCE	-0.023	***	0.001	-16.830	0.000	-0.025 -0.020
Fails	0.021		0.034	0.620	0.533	-0.046 0.088
FAILS	-0.048		0.262	-0.190	0.853	-0.562 0.465
EarlierNeed	0.001		0.001	0.960	0.335	-0.001 0.004
Mb	0.000		0.000	0.570	0.568	0.000 0.000
MbxNaked	-0.000		0.000	-0.210	0.830	0.000 0.000
Intercept	-0.005	***	0.001	-6.130	0.000	-0.007 -0.004

*Significant at the .10 level.
**Significant at the .05 level.
***Significant at the .01 level.

[a]A panel set of Feasible Generalized Least Squares (FGLS) regressions is employed that adjusts for heteroscedasticity and first-order autocorrelation.

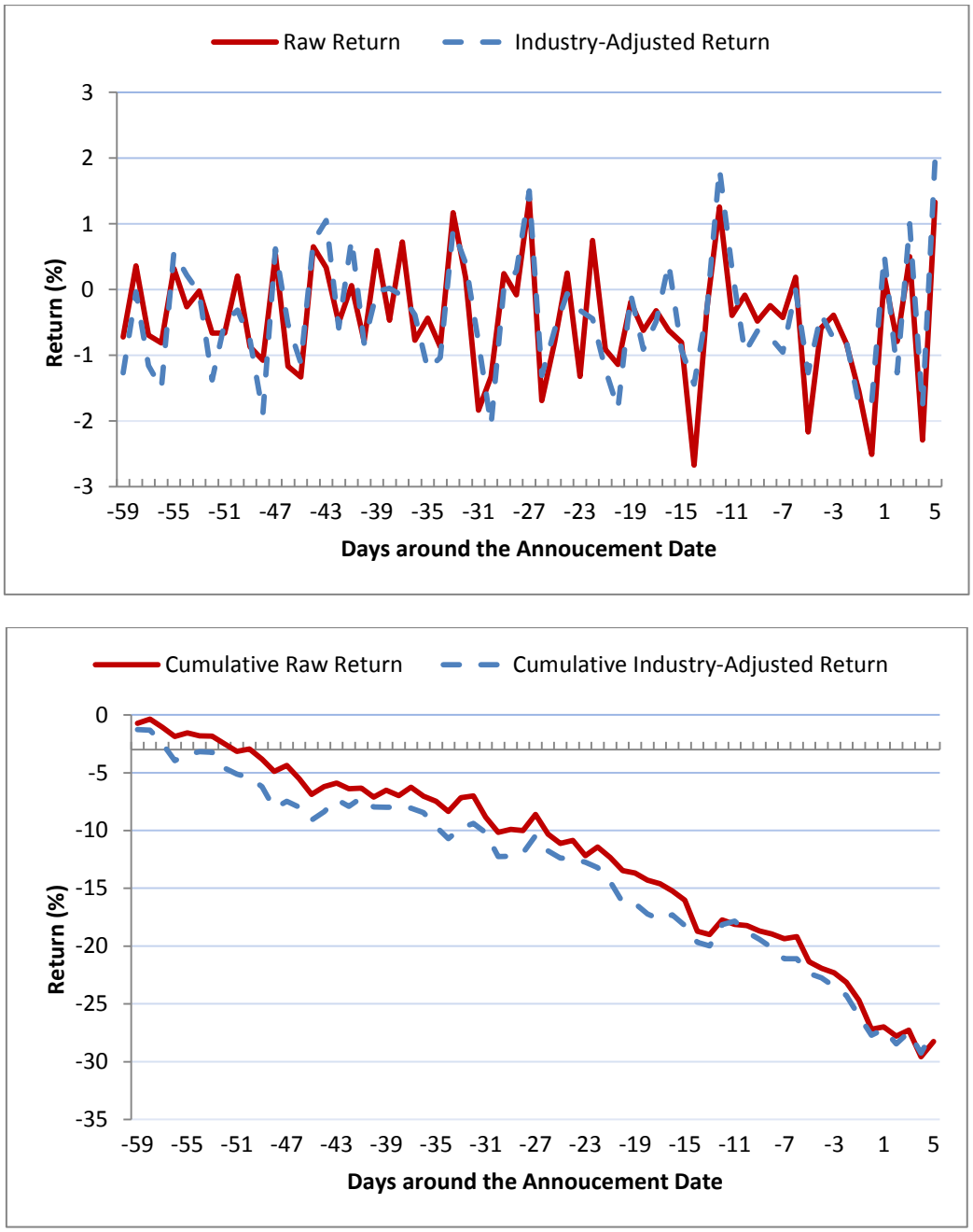
[b] The dependent variable (*LniVar*) is the natural logarithm of one plus industry adjusted value weighted abnormal daily returns (-59 to +5) on shelf offerings with offering date as event date (0). The independent variables with only CAPITALIZED LETTERS have nonzero values only for observations in time periods when there were restrictions on naked short sales for that stock, while their corresponding uncapitalized names indicate nonzero values only for all other dates. *nakedshort/NAKEDSHORT* are the ratios of actual daily naked short sales to the daily trading volume of the stock only in the sample time periods before an announced need to obtain external financing (and 0 otherwise). *shortannounce/SHORTANNOUNCE* are the ratios of actual daily naked short sales to the daily trading volume of the stock only in sample time periods after a public announcement of a capital need (and 0 otherwise). The *nakedxcapneed/NAKEDxCAPNEED* variables are constructed by multiplying the ratio of naked short sales to volume by the offered amount of shelf offering divided by the market capitalization. *fails/FAILS* are constructed by lagging by 3 days actual daily naked short sales divided by the number of shares outstanding. *announce/ANNOUNCE* are constructed that has a value of 1 on the day before and day of offering and 0 otherwise. *BANSHORT* has a value of 1 during the ban and 0 otherwise. *POSTBAN* has a value of 1 in the two trading days after the ban and 0 otherwise. The variable *EarlierNeed* is constructed that has a value equal to one divided by the number of days since the firm's most recent shelf offering and zero if there has been no such prior announcement over the entire sample interval. The variables *capneed/CAPNEED* are computed as the offered amount of shelf offering divided by the market capitalization for each stock. The variables *vol/VOL* have a value equal to the log of the daily dollar trading volume. The variable *Mb* is the market-to-book ratio, while *MbxNaked* is *Mb* multiplied by daily naked short sales.

Figure 1. Average Cross-Sectional Returns Cumulative Cross-Sectional Returns Around an Announcement of a Need for Capital (2004-2009)



This figure plots the average cross-sectional returns and cumulative cross-sectional returns to the sample stocks around the announcement dates of their need for capital, from 59 days before the announcement date to 5 days after the announcement date. Both raw returns and industry-adjusted (value-weighted) returns are presented.

Figure 2. Average Cross-Sectional Returns and Cumulative Cross-Sectional Returns Around an Announcement of a Need for Capital Excluding All Announcements Except the First One (2004-2009)



For the sample of announcements that wasn't preceded by a prior announced need for capital, this figure plots the average cross-sectional stock returns and cumulative cross-sectional returns around the announcement dates of their need for capital, from 59 days before the announcement date to 5 days after the announcement date. Both raw returns and industry-Adjusted (value-weighted) returns are presented.

Figure 3. Average Industry-Adjusted Cross-Sectional Returns and Cumulative Cross-Sectional Returns Around Filings and Offerings of New Equity (2004-2009)