

Revealing shorts: An examination of large short position disclosures*

Charles M. Jones
Columbia Business School
cj88@columbia.edu

Adam V. Reed
Kenan-Flagler Business School, University of North Carolina
adam_reed@unc.edu

William Waller
Kenan-Flagler Business School, University of North Carolina
william_waller@unc.edu

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ABSTRACT

As a policy response to the recent financial crisis, France, Spain and the United Kingdom now require the disclosure of large short positions in equities listed there. We characterize these disclosures, focusing on stock prices and shorting activity before, during and after the disclosure. In addition, we analyze the triggering effect where one disclosure is followed by further disclosures in the same stock. We find that a short position disclosure has little immediate effect on returns. However, when the short position is associated with a rights issue, cumulative abnormal returns over the 20 days following a short position disclosure are -18.66%. This stock price effect is permanent, suggesting that disclosers are not manipulative short sellers but instead are simply well-informed. Outside of rights issues, we find that short position disclosures have little effect on share prices. Across the board, we find significant follow-on shorting activity: a large short position disclosure makes it much more likely that there will be another disclosure within a month in the same stock by a different short seller. Follow-on shorting is more likely when the initial discloser has greater assets under management or is located near other short sellers. These findings shed light on the potential effects of disclosure regulation currently under consideration by the US Securities and Exchange Commission.

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1. Introduction

Short sellers have found themselves under close scrutiny ever since the financial crisis reached its peak in September 2008. Most academic research argues that short sellers improve market efficiency and generally stabilize share prices by identifying and then leaning against overvalued stocks.¹ In contrast, policymakers, journalists, company executives and even a few academics worry that short sellers may employ abusive trading strategies, damage investor confidence and amplify price declines.² Furthermore, regulators have acted on their concerns with new rules that limit or discourage some short sales.³

Rather than banning and restricting short sales, an alternative policy response is increased disclosure. For example, in May 2011, the US Securities and Exchange Commission asked for input on a wide variety of potential short sale disclosure rules (release No. 34-64383) ranging from immediate disclosure of all short sales to the disclosure of large short positions. The sunlight of disclosure could discourage abusive short selling if it exists. However, it is possible that short sale disclosures could do more harm than good. One possible negative consequence of such regulation is that disclosure could provide a coordination mechanism for manipulative short sellers.

While the US is still evaluating short sale disclosure rules, Europe has already acted. The UK, France and Spain now require that short sellers publicly disclose large short positions in all stocks listed in those countries. Under the UK disclosure regime, for example, any short seller with a short position exceeding 0.25% of the shares outstanding is required to publicly disclose the size of the short position, and subsequent disclosure is required if a short position changes by 0.1% of shares outstanding or more. In this paper, we analyze these disclosures. We focus on the effects of these disclosures on share prices and on the subsequent behavior of other short sellers. The key database we employ is a collection of short selling disclosures. This database comprises 654 unique disclosed short sale positions for the UK, France and Spain. Each

¹ See, for example, Dechow, Hutton, Meulbroek and Sloan (2001); Abreu and Brunnermeier (2002); Alexander and Peterson (2008); Boehmer, Jones and Zhang (2008); Boehmer and Wu (2010) and Diether, Lee and Werner (2009).

² For examples see “There’s a Better Way to Prevent ‘Bear Raids’” by R. Pozen and Y. Bar-Yam, *The Wall Street Journal*, 18 November 2008; “Anatomy of the Morgan Stanley Panic” by S. Pulliam et al., *The Wall Street Journal*, 24 November 2008; as well as Gerard and Nanda (1993), Brunnermeier and Pedersen (2005) and Goldstein and Guembel (2008).

³ Recent bans and restrictions are analyzed in Kolasinski, Reed and Thornock (2011); Boehmer, Jones and Zhang (2011); Battalio and Schultz (2011) and Beber and Pagano (2012), among others.

disclosure includes the date of the disclosure, the name of the short seller, the name of the instrument being sold short and the size of the short position.

This type of short selling data is fundamentally different from other types of short selling data. Data that have been examined in the past include short interest, market-wide shorting volume, and equity loan and settlement information (e.g., Asquith, Pathak and Ritter (2005); Boehmer, Jones and Zhang (2008) and Geczy, Musto and Reed (2002)). The database used here is the first to show short positions at the individual short seller level. It is the first to show the evolution of individual short positions over time, and it is the first to show the identity of the short seller.

Although the short sale disclosure regime described here raises a number of interesting questions, our approach is to first establish the basic facts about how the market responds to the disclosure of a short position. We find that in the full sample of disclosed stocks, abnormal returns are significantly negative around the period of disclosure. Specifically, we compare the return of each disclosed stock to the return of that stock's industry benchmark, and we find that the three-day cumulative abnormal return around the disclosure is -2.31%, significant at the 1% level. Over longer periods, short position disclosers seem to be well informed. The average daily return difference from the day of the disclosure until the thirtieth trading day after the disclosure is -0.27% (a cumulative abnormal return of -8.30%). Furthermore, we show that returns from a hypothetical trading strategy designed to capture this return pattern would likely be profitable, especially at the beginning of the period.

Since many of the disclosures are associated with rights issues, we attempt to isolate any incremental effects of short sale disclosures around the time of rights issues. We find that the magnitude of the return pattern is largest in the rights issue subsample. For example, in the 30-day period following the disclosure, the average daily return is -0.59%, for a cumulative abnormal return of -18.34%. In contrast, in the sample without rights issues, there is no statistically significant effect. In other words, the return pattern in the overall sample is driven by the sample of stocks with rights issues.

Given the fact that the literature has found short sellers' trades are profitable (e.g., Asquith, Pathak and Ritter (2005); Boehmer, Jones and Zhang (2008) and Boehmer, Huszar and Jordan (2010)) and given the return finding described above, it is natural to expect market participants to respond to disclosures by shorting disclosed stocks after the public disclosure is

made. To investigate the possibility of increased shorting activity in response to disclosed short positions, we look at a daily measure of short interest. We find that in rights issues with a disclosed short position, short interest does indeed increase by 2.14% around the public disclosure relative to their undisclosed counterparts. Moreover, this increase is also present in our non-rights issue subsample, where short interest increases by 1.01%. In this case, we find the increase is not a response to the disclosure; the increase occurs just prior to the public disclosure.

We further investigate a number of other aspects of short selling using our detailed share lending data. Just prior to the disclosure, we find an increase in the number of open loans and the percentage of share lenders actively lending. In addition, the daily cost of borrowing rises just prior to the short sale disclosure. Taken together, these statistics outline a cohesive story: as the short sale discloser obtains its position, shorting activity increases, and the cost of borrowing shares rises as well, as in Kolasinski, Reed and Ringgenberg (2011).

One criterion that triggers the short disclosure rules in the UK is the presence of a rights issue. This type of corporate event is prevalent in our sample, and we conduct a set of experiments specifically focused on teasing out the effect of short sale disclosures above and beyond the previously documented effects of rights issues (e.g., Slovin, Sushka and Lai (2000)). We first look at abnormal returns during the rights issue, and we find that in the first few days after the rights issue announcement, returns of rights issue stocks with disclosures are indistinguishable from returns of rights issue stocks without disclosures. However, over longer intervals, there is a sharp difference between undisclosed and disclosed samples. Specifically, we show that in the 20-day interval after a rights issue announcement, stocks with disclosed short positions have -18.2% lower returns than stocks with non-disclosed short positions.

Of course, short sellers may be well-informed after a rights issue announcement, either because they are able to process publicly available information or acquire additional value-relevant information, so it is no surprise to find that unconditionally, disclosed rights issues have lower returns than undisclosed rights issues. To address this possibility, we include variables that reflect the terms of the rights issue. We find that even controlling for these rights issue deal characteristics, disclosed rights issues have significantly more negative returns than other rights issues. Specifically, we find that between the announcement and completion of the rights issue deal, the average rights issue with a disclosed short position has a 16.57% lower return than the

average rights issue without a disclosed short position. Moreover, this underperformance is linked to the number of follow-on disclosures subsequent to the initial disclosure of a large short position. The average rights issue with a disclosed short position in our sample has 4.44 such follow-on disclosures, with each being associated with an additional -2.75% cumulative abnormal return (CAR) over the (0,20)-day event window following the announcement of a rights issue.

Although more short selling and more large short sellers are associated with lower returns during a rights issue, this does not mean that short sellers are driving the price down inordinately. It could be that short sellers are well-informed and are able to discern which rights issuers are overvalued. If short sellers are driving share prices below fundamental value, we should see a share price reversal once the rights issue is complete. We do not see any evidence of a share price bounceback. In the 60 days following completion of a rights issue with a short position disclosure, the mean CAR is an insignificant 3.59%.

In our final set of experiments, we investigate the possibility of disclosures driving more disclosures. Regulators have worried that disclosures of short positions could be a coordination device among short sellers allowing a disclosure to act as a signal allowing willing short sellers to act together. To investigate this possibility, we use a logit specification to characterize the probability of a disclosure. Using this approach, we find that the existence of a past disclosure is a strong predictor of a disclosure today. In other words, after controlling for a number of other factors that are likely to drive disclosures, the presence of a short position disclosure significantly increases the probability of another follow-on disclosure.

Given the fact that disclosures drive more disclosures, it is natural to consider how various characteristics of a disclosure can affect the probability of future disclosures. Specifically, we investigate the reputation of disclosing short sellers. Intuitively, if subsequent short sellers are responding to the presence of a disclosed short position (and not just fundamental information about the firm), then we would expect the response to be stronger if the disclosing short seller has a good reputation. We do in fact find that reputation is a significant driver of subsequent disclosures. A stock with a disclosure made in the past five trading days by a short seller with high assets under management (one standard deviation above the mean) is about twice as likely as an undisclosed firm (0.20% versus 0.10%) to experience a disclosure by

another short seller on a given trading day. Similarly, we find that follow-on disclosures by others are more likely when the initial disclosed position is larger.

We also examine the geography of short sellers. Disclosures made by short sellers in New York and London are more likely to be followed by another disclosure, and short sellers with addresses that are close to other short sellers' addresses are more likely to be followed. In fact, follow-on short sellers tend to be located closer to the initial short seller than other short sellers. These clustered short sellers could be communicating with each other directly, or they could independently obtain correlated signals. In any case, geographical proximity seems to matter.

In this paper, we establish some basic facts about a new disclosure regime in which large short positions in French, Spanish and United Kingdom stocks are revealed to the public. We analyze returns around the disclosure date, and we characterize the behavior of short sellers around the disclosure. Furthermore, we investigate the possibility that short sellers respond to public disclosures by shorting more. This analysis is not only important for determining the consequences of the existing rules in Europe, but also for improving our understanding of the likely effects of future direction of regulation in the US.

The remainder of this paper proceeds as follows. Section 2 discusses related literature, and Section 3 discusses the disclosure regime details for each of the three jurisdictions. Section 4 describes the databases and the construction of our variables. Section 5 presents our analyses and findings, and Section 6 concludes.

2. Related literature

There are strong theoretical reasons to expect short sellers to contribute to the informativeness of prices. Diamond and Verrecchia (1987) argue that short sellers are more likely to be informed because they do not have use of the sale proceeds, though they may use short sales to hedge other risks. Miller (1977); Harrison and Kreps (1978) and Duffie, Garleanu and Pedersen (2002) show that prices can be above fundamental values when short selling is constrained. Empirical evidence almost uniformly finds that overpricing is reduced when short selling constraints are relaxed (e.g., Danielsen and Sorescu (2001); Jones and Lamont (2002); Cohen, Diether and Malloy (2007)). Similarly, Saffi and Sigurdsson (2011) find that stocks with tighter short-sale constraints have lower price efficiency.

Short sellers anticipate future returns. For example, Boehmer, Jones and Zhang (2008) find that heavily shorted stocks underperform lightly shorted stocks over the following month, and Diether, Lee and Werner (2009) find that short sellers are contrarian, though Blau, Van Ness, Van Ness and Wood (2010) find some intraday evidence of momentum trading by short sellers. Christophe, Ferri and Angel (2004) and Boehmer, Jones and Zhang (2011) find that daily flows of short sales are concentrated prior to disappointing earnings announcements, analyst forecast revisions and analyst downgrades, which suggests short sellers have access to private information about fundamentals, while Engelberg, Reed and Ringgenberg (2010) find that short sellers trade around negative news releases.

Several theoretical papers explore the possibility that short sellers might drive share prices below fundamental value, which could account for at least some of the relationship between short sales and future returns. In Goldstein and Guembel (2008), aggressive short selling may depress a company's share price and distort the company's investment decision, thereby harming its fundamental value. Brunnermeier and Pedersen (2005); Carlin, Lobo and Viswanathan (2007) and Attari, Mello and Ruckes (2005) model predatory trading involving sellers (including short sellers) profitably exploiting investors that have a need to exit long positions or undercapitalized arbitrageurs. This type of trading would lead to return reversals. Allen and Gale (1992) and Aggarwal and Wu (2006) present theoretical and empirical evidence of "pump-and-dump" manipulation. A similar "bear raid" strategy could be used on the short side. Bear raids were widespread in the early 1900's in the United States, and some market observers and participants have worried recently that these strategies may be returning to the fore.⁴

Manipulative short selling is a particular concern around secondary equity offerings (SEOs). For example, Safieddine and Wilhelm (1996) and Corwin (2003) investigate rule changes in the US designed to curtail manipulative short selling around SEOs.⁵ Particularly relevant for this paper is Henry and Koski (2010), who examine daily US short selling data around SEO pricing dates. In SEOs that are not part of a shelf registration and thus take longer

⁴ For example, see "There's a Better Way to Prevent 'Bear Raids'" by R. Pozen and Y. Bar-Yam, *The Wall Street Journal*, 18 November 2008; "One way to stop bear raids" by G. Soros, *The Wall Street Journal*, 23 March 2009; and "Blame the bear raids" by T. Brennan, CNBC, 20 March 2008.

⁵ SEC Rule 10b-21, adopted in 1988, and its replacement Rule 105, adopted in April 1997 as part of Regulation M, limit short sales and subsequent securities purchases around an SEO.

to execute, they find that more short selling prior to the issue date is associated with larger issue discounts and the price moves are later reversed, consistent with manipulative short selling. Suzuki (2010) studies Japanese SEOs, where no such shorting restrictions exist. Kim and Masulis (2011) study trading behavior around the SEO issue date and find that underwriter market-making activity explains the heavily negative returns after the SEO.

Empirical evidence of manipulative short sales is sparse outside of SEOs. Shkilko, Van Ness and Van Ness (2009) examine stocks that experience large negative intraday price moves followed by a reversal before the end of the day. They find aggressive short sales during the price decline period (though long sellers are even more aggressive than short sellers), and they suggest that short sellers may occasionally engage in predatory trading. Blocher, Engelberg and Reed (2009) find increased levels of short selling in the last hour of the last trading day of the year for stocks that have large short interest. The short selling is accompanied by poor returns and subsequent reversals at the beginning of the year, consistent with year-end manipulation by fund managers holding short positions.

Beyond the short position disclosures that we study here, there are other public releases of information about short sales, notably the twice per month release of short interest information in the US. Asquith, Pathak and Ritter (2005) find that short interest predicts returns only in the smallest stocks and report that the effect is stronger in stocks with low institutional ownership. Desai, Ramesh, Thiagarajan and Balachandran (2002) find that high short interest predicts negative returns in Nasdaq stocks, and Boehmer, Huszar and Jordan (2010) find that low short interest predicts high future returns. However, the relationship between high short interest and future returns is much weaker.

Long position disclosure rules have been in place longer and have been well studied. For example, Brav, Jiang, Partnoy and Thomas (2008) examine Schedule 13D filings in the US by activist hedge funds that disclose ownership stakes of at least 5%. They find average returns of around 2% associated with the disclosure, with an additional upward drift of about 2% over the next month, but they argue that these are associated with shareholder value creation rather than stock picking ability.

Examples of papers that study UK rights issues include Levis (1995); Slovin, Sushka and Lai (2000) and Ho (2005). Levis (1995) mainly studies young firms that return to the market following an IPO. Ho (2005) finds that there is little long-term equity underperformance

following rights issues, while Slovin, Sushka and Lai (2000) find a rights announcement effect of -3.09%. Eckbo and Masulis (1992) develop theory that implies rights issues should have no effect on share price, since existing shareholders receive the rights. They study a small sample of US rights issues and find insignificantly negative stock price announcement effects.

Finally, our work is also related to the literature on institutional herding. For example, Sias (2004) finds that institutions follow each other's trades at quarterly horizons, and Puckett and Yan (2011) show herding at weekly frequencies.

3. Disclosure regimes in the UK, France and Spain

3.1. United Kingdom

Effective September 19, 2008, the UK Financial Services Authority (FSA) banned short selling in financial stocks and instituted a short position disclosure regime. On January 16, 2009, the FSA lifted the short sale ban on financial stocks, but kept and clarified the short position disclosure requirements.⁶ The disclosure requirements apply to financial sector stocks as well as any stock in a rights issue period; as of this writing, the disclosure regime is still in effect.

In the UK, any short seller with a short position exceeding 0.25% of the shares outstanding is required to publicly disclose the size of the short position, and subsequent disclosure is required if a short position changes by 0.1% of shares outstanding or more. The disclosures are required by 3:30 PM on the business day following the first day on which the position reaches, exceeds or falls below the disclosure thresholds. The disclosures require the name of the person who has the position, the amount of the position and the name of the company in relation to which it has the position.

3.2. France

In September 2008, the French securities regulator Autorité des Marchés Financiers (AMF) issued temporary rules mandating the disclosure of short positions in French financial stocks.⁷ However, since short sales in those stocks were banned at the same time, there were

⁶ See the FSA's policy statement "Temporary short selling measures," January 2009, http://www.fsa.gov.UK/pubs/policy/ps09_01.pdf and "FSA confirms extension of short selling disclosure regime," release FSA/PN/009/200, January 14, 2009, "<http://www.fsa.gov.UK/pages/Library/Communication/PR/2009/009.shtml>".

⁷ AMF News Release dated September 19, 2008.

virtually no disclosures of new short positions thereafter. On February 1, 2011, the ban on shorting financial stocks was allowed to lapse, and a permanent disclosure regime came into effect for all French stocks. Short positions of at least 0.50% of shares outstanding must be reported by the next day and are published on the AMF website. Additional thresholds are at 0.1% intervals (0.60% of shares outstanding, 0.70%, 0.80% and so on), and subsequent disclosures are required every time the position crosses one of these thresholds. A final disclosure is also required when the short position falls below the 0.50% threshold. The short position disclosure rules cover all issuers trading on Euronext Paris or Alternext Paris, except firms for which the French market is not the principal trading market. Derivative positions must be included in calculating the discloser's net short position. Bona fide market-makers can apply in advance for an exemption from the short position disclosure requirements.⁸

3.3. *Spain*

Spain also adopted short position disclosure rules for 20 financial stocks in September 2008. As of June 10, 2010, changes were made to the thresholds, and the disclosure regime was expanded to all Spanish stocks. The disclosure rules are now similar to those of France. The Spanish regulator Comisión Nacional del Mercado de Valores (CNMV) publishes individual short positions that are at least 0.50% of shares outstanding with additional thresholds at 0.1% intervals, just as in France. The main difference from the French regime is that those shorting Spanish stocks must report all positions of at least 0.20% of shares outstanding. The CNMV reports the aggregate amount of all short positions that are between 0.20% and 0.50% of shares outstanding, but does not publish any details about the individual short positions in this size category.

4. **Data**

We employ several databases in this study, some novel and some familiar. The first is a collection of short selling disclosures, and the second is data on the European securities lending market. We also obtain several measures of hedge fund reputation from 13F filings to the SEC. In what follows, we describe the sets of data used in this study in more detail.

⁸ Additional details on the French disclosure requirements can be found in AMF Implementing Instruction 2010-08 of November 9, 2010, available at http://www.amf-france.org/documents/general/9738_1.pdf.

4.1. Disclosure Data

We obtain a record of 654 unique disclosed short sale positions from 1,682 disclosure announcements from the beginning of the disclosure regime to June 30, 2011, for the three countries, the UK, France and Spain, in our sample.⁹ The database has several pieces of information about each disclosure, including the date of the disclosure, the name of the short seller, the name and ISIN of the instrument being sold short and the percentage of shares outstanding being sold short.¹⁰ We obtain the UK portion of this database from Data Explorers, which collects the disclosure information from publicly available news sources. We have hand checked a small sub-sample (2% of the announcements) of the database against the London Stock Exchange's regulatory news database, and we find no discrepancies.¹¹ We also validate the UK disclosures by checking that the disclosed short position is below the number of shares borrowed in the UK's CREST database.¹² Disclosure announcements for France and Spain are hand collected from the website of the regulatory body governing the disclosure regime.

Figure 1 presents an example of a UK disclosure announcement retrieved from the Bloomberg newswire. In this example, Millennium Partners, L.P. disclosed a short position of 0.16% shares outstanding in Old Mutual, PLC, (LSEX Ticker: OML) on March 24, 2009, the day after the threshold of 0.25% was crossed from above. This disclosure closes out the position held by Millennium Partners, L.P., for the purpose of our study, and such final disclosures make it possible to describe the life cycle of a disclosed short position. Figure 2 plots the closing price of Old Mutual, PLC, against short positions held in the security for the first three months of the UK disclosure regime. Short interest in this security stays relatively stable around 2% of shares outstanding until February 17, 2009. Two days later on February 19, 2009, Lansdowne Partners

⁹ Specifically, the disclosure regimes for the UK, France and Spain begin on January 17, 2009, February 2, 2011 and June 10, 2010, respectively. A short selling ban was in place in the UK between September 18, 2008 and January 16, 2009. We restrict our analysis to exclude this period to avoid any confounding effects from the shorting ban.

¹⁰ For 94% of the UK observations we also have the time at which the short sales are disclosed.

¹¹ We restrict the UK sample to firms listed on the London Stock Exchange to ensure data availability and to avoid double counting positions across the countries in our sample.

¹² In three cases, the disclosed short position exceeds the percentage of shares that are being lent out as reported by CREST. In the case in which this discrepancy is the greatest, the disclosed short position is 0.85% of shares outstanding and CREST only reports that 0.50% of shares are being lent out. Because there is the possibility of using swap contracts to fulfill short sale requirements in the UK and because CREST data report settled transactions as opposed to initiated short positions, we consider these observations valid.

Limited discloses a short position in Old Mutual, PLC, of 0.39% of shares outstanding. The following day Diamond Master Fund, Ltd., discloses a short position of 0.32% of shares outstanding. Together, these two short positions comprise 26.4% of the total aggregate short interest in Old Mutual, PLC, as reported by CREST. On March 10, 2009, Millennium Partners, L.P., discloses a position of 0.26% of shares outstanding. This disclosure marks the origination of the position that is closed by the announcement in Figure 1. During this period of disclosures, it is worth noting that total short interest in Old Mutual, PLC, increases to a high of 5.15% of shares outstanding, more than double the pre-disclosure level.

These disclosures provide an unusually revealing view of individual short positions summarized in Table 1. Consistent with the clustering of disclosed short positions in Old Mutual, PLC, presented in Figure 2, the average number of positions per disclosed firm ranges from 2.18 in France to over 6 in the UK, the country with the longest disclosure regime. Additional disclosures are required each time the short position crosses a designated threshold. On average, each shorter-issuer pair appears 1.75 times in the UK sample and 5.95 times in Spain. The average disclosed short position ranges from 0.47% of shares outstanding in the UK with a disclosure threshold of 0.25% of shares outstanding to 0.86% of shares outstanding in France with a disclosure threshold of 0.50% of shares outstanding. Similarly, we see that the average holding period length of a short position exceeds 15 trading days in all three of our countries after excluding positions that are still open. This metric roughly aligns with prior findings on the holding period for short positions. Boehmer, Jones and Zhang (2008) estimate that the average short position is 37 days, and Geczy, Musto and Reed (2002) find that the median equity loan length is 3 days. However, unlike the prior literature that estimates holding periods, our measure of holding period length is directly reported and subject to regulatory scrutiny. Table 1 also shows that some of the individual short positions are surprisingly large. The largest single disclosure is a short position made by Ignis Investment Services Limited in the stock of Cookson Group, PLC, which is 9.25% of shares outstanding.

As a first glimpse into the follow-on behavior of other disclosers, Table 1 presents summary statistics on the average number of short positions originated over the (0,20)-day window following disclosure. Follow-on activity is particularly prevalent in the UK, where on average there are over five follow-on short position disclosures per stock. Many of these follow-on positions cross the disclosure threshold within the first few days following a disclosure. For

example, in the UK the average disclosed position has one follow-on after 2.70 trading days and another follow-on after 4.52 trading days. Moreover, multiple follow-ons can cross the disclosure threshold on the same day. In the UK, for example, this occurs 22% of the time.

Table 2 gives some indication of the largest short sellers in the UK, France and Spain. Trafalgar Asset Managers Limited and Millennium Partners, L.P. are the most prolific short position disclosers with positions in 37 and 20 UK issues, respectively. Sell-side firms also appear as frequent disclosers, with Barclays atop the list of frequent disclosers in French firms. There is also substantial variation in the average short position held by these short sellers, ranging from 2.30% of shares outstanding to 0.29%, just above the regulatory threshold.

Figure 3 presents the disclosures by industry and reveals that financial firms dominate the UK data, since the disclosure regime applies only to financial firms and firms undergoing rights offerings. In Spain and France, the disclosure regime is broader, and we have data from firms in a wider variety of industries. Figure 4 charts the percentage of firms disclosed by industry and country. Despite the prevalence of disclosure announcements in UK financial firms, less than 30 percent of UK financial firms have a disclosed short position over our sample period. A much higher percentage of firms in Spain are disclosed, indicative of the smaller exchanges in this country relative to the London and Paris exchanges.

Our subsequent analysis focuses primarily on the initial disclosed position in each firm for more precise identification. Thus, for event studies, our sample is 142 initial disclosed positions with 46 of these disclosed positions occurring during a rights issue.

4.2. European Securities Lending Data

Securities lending data were generously provided by Data Explorers. Although they are not easily available, versions of this database have been used by a number of previous papers, including Ringgenberg (2011); Saffi and Siggurdson (2011) and Berkman and McKenzie (2012). The database contains information about short selling and short-selling constraints for stocks in the UK, France and Spain markets from January 1, 2008 through July 31, 2011. The data come from two main sources: the “wholesale” data come from securities lenders, such as custodians, who lend stock to prime brokers; the “retail” data come from borrowers, such as hedge funds, who borrow stock from prime brokers. According to Data Explorers, their “wholesale” data cover at least 80% of the equity loan transactions in the market. Data Explorers is a firm whose

main product is aggregate securities lending data, which they sell to individual market participants who themselves cannot see market rates for securities loans because of the significant opacity of the market (e.g., Kolasinski, Reed and Ringgenberg (2011)).

The key short activity variables that we employ in the paper are as follows. *Daily Cost of Borrowing Score* is a variable describing the borrowing cost as reported by securities lenders. The variable is a rank variable with fixed, but unreported, bin cutoffs where rank one indicates the lowest loan fees and rank ten indicates the highest loan fee. *Concentration of Open Loans* is the Herfindahl index of loans, where zero indicates small loans across many lenders and one indicates one loan at one lender. *Percent of Lenders Active* is the number of lenders with available inventory currently making loans divided by the total number of lenders with available inventory. *Scaled Number of Open Loans* is the number of open loans in the database divided by shares outstanding (in millions), and *Short Interest* is the percentage of shares outstanding currently borrowed or on loan net of double counting.¹³ These variables are measured as of the settlement day, which is three days after the trade day in our sample. We adjust the variables by three days to eliminate this settlement lag and reflect data in trade time. In other words, short interest and loan variables at time t reflect positions as of trading day t , though they will not appear in short interest or loan market databases until date $t + 3$. Sometimes it is important to ensure that short interest is an element in the public information set. When this is necessary (in Table 12 and as a criterion for our matching algorithm, for example), we do not adjust for the three-day settlement lag. For clarity, we label this variable *Short Interest at Settlement*.

4.3. Measures of Hedge Fund Reputation

In addition to the variables described above, we add a number of variables for each discloser of a short position. First, we collect the geographic location of each of the short sellers from 13F filings available on EDGAR. For firms not subject to this regulation, we supplement the EDGAR filings by hand collecting the location of the firm through web search. Using these data, we construct two measures of centrality to other disclosers. *MoneyCtr* is a dummy variable

¹³ For UK stocks, we also have access to data from CREST Co, the UK's electronic settlement system. The advantage of the CREST data is that it is a market-wide clearing system, as opposed to Data Explorers, which bases its aggregates on the voluntary reporting of borrowers and lenders. Within our sample, the average ratio of shares reported borrowed/loaned by Data Explorers to shares reported borrowed/loaned by CREST is 73.79%. Moreover, short interest from Data Explorers is highly correlated with short interest from CREST, with a correlation coefficient of 0.7261.

equal to one if the discloser is headquartered in New York or London and equal to zero otherwise. *Centrality* is a percentile rank based on the average pairwise distance between short sellers in our sample. Thus, a centrality measure of 0.01 would be the short seller furthest on average from other short sellers, while a centrality measure of 0.99 would be the short seller closest on average to other short sellers. We are able to find geographic location information for 98.6% of the disclosed positions in our sample and 97.7% of the short sellers in our sample.

We construct two additional measures of short seller reputation from total assets under management subject to 13F filings from EDGAR. *AUM* is the natural logarithm of the discloser's most recently reported assets under management subject to 13F filings. *PositionSize* is the dollar value of the disclosed short position divided by assets under management subject to 13F filings multiplied by 10. While *AUM* potentially understates the size of long-short or short-only hedge funds, it has the benefit of being publicly available; unlike other databases of hedge fund characteristics, disclosure is not discretionary. We are able to find performance variables for 74.9% of the disclosed positions in our sample and 75.1% of the short sellers in our sample.

4.4. Additional Data and Match Criteria

We also employ the following securities-level data. Daily stock returns and trading volume are from Yahoo! Finance;¹⁴ shares outstanding data are from Data Explorers or from DataStream where unavailable. *Share Turnover* is equal to trading volume scaled by total shares outstanding. Country-level one-digit Industry Classification Benchmark (ICB) sector indices are obtained from DataStream.¹⁵

Our analysis investigates disclosed short positions in stocks undergoing rights issues separately from disclosed short positions in stocks without rights issues, in an effort to disentangle the effects of the announcement of a known corporate event and the disclosure announcement of a short position. We obtain a list of rights issues occurring during our sample period in our sample countries from Data Explorers. In addition to the announcement and

¹⁴ Returns are filtered to delete potentially erroneous values following Griffin, Kelly and Nardari (2009). Specifically, we delete single-day returns in excess of 200%. We also delete two-day returns in which either of the single-day returns is in excess of 100% and the two-day cumulative return is less than 20%.

¹⁵ Results are qualitatively similar using three-digit Industry Classification Benchmark (ICB) sector indices; however, these indices are often sparse with fewer than five firms in a given sector portfolio. Results using this alternative set of benchmarks are available from the authors upon request.

completion dates of the rights issue, the data include two measures of rights issue quality.¹⁶ *Ratio of Rights to Total Shares* is equal to the number of rights shares divided by total shares outstanding at the announcement date. *Discount to Share Price* is the difference in price between the share price and the rights price at announcement scaled by share price. Of the 73 rights issues we obtain, 46 have the disclosure of a short position occurring within the window between the announcement and the completion date. The other 27 rights issues without disclosed short position comprise our sample of undisclosed rights issues.

For subsequent analysis, we match each disclosed firm to a control firm that did not undergo a rights issue and did not have a disclosed short position over our sample period. We select a control firm in the same country as the disclosed firm by minimizing the sum of the squared differences between the disclosed firm and the control firm as of the disclosure date for four match criteria: percentile *Short Interest at Settlement*,¹⁷ percentile *Market Capitalization*, percentile *Share Turnover* and percentile *Change in Short Interest at Settlement* over the past month (22 trading days). Percentiles are calculated each trading day and for each country.

Table 3 presents summary statistics for the match criteria and short activity measures for both the disclosed group and the control group. We find no significant differences in mean between the two groups for any of our four match criteria. At the date of initial disclosure, the average disclosed stock has short interest of 5.88% of shares outstanding, roughly two percentage points more than the control group.¹⁸ The average disclosed stock also has slightly more than one open loan per million shares outstanding. Disclosed firms have a significantly higher percentage of lenders active than the control group, 53.52% versus 44.80%. Disclosed firms are also significantly more costly to borrow than their counterparts.

5. Results

5.1. Stock Returns Around Short Sale Disclosure

There are a number of interesting aspects of short sale disclosure, but one of the primary facts to establish is how the market responds to the disclosure of a short position. As a first pass,

¹⁶ For uncompleted rights issues or other rights issues with missing completion dates, we define the completion date to be 180 days after the announcement date of the rights issue.

¹⁷ Using short interest at settlement versus short interest in trade time assures that our match criteria are in the information set at the disclosure date.

¹⁸ Short interest here is measured in trade time, adjusted for the three-day settlement lag.

we examine a relatively simple setting: the abnormal returns around the first disclosure of a short position in a particular stock.

Examining the full sample of disclosed stocks in Table 4, we see that the abnormal returns are significantly negative around the period of disclosure. Specifically, we compare the return of each disclosed stock to the return of that stock's one-digit Industry Classification Benchmark (ICB) index, and we find that the cumulative difference is negative for many of the windows around the day of disclosure. For example, there is an immediate stock price response to the disclosure. The cumulative abnormal return from the day of the disclosure through the second day after the disclosure is -2.31%, which is significant at the 1% level. Stock prices continue to fall thereafter. Cumulative abnormal returns from disclosure until the thirtieth day after the disclosure average -8.30%. Furthermore, the monthly return is large economically; the -0.27% average daily return over the 30-day period is equivalent to an annual return of -49%.¹⁹

Figure 5 sheds a bit more light on the negative returns post-disclosure. In this figure, we present results from a hypothetical trading strategy that buys each stock on the day it is initially disclosed and short sells that stock's one-digit Industry Classification Benchmark (ICB) index.²⁰ Each position is held for 30 trading days. Panel A shows that the distribution of monthly returns from this strategy is negatively skewed and that the mean and median of the distribution are both negative. Similarly, Panel B shows that the trading strategy has a negative return in most months, with much of negative return coming in the beginning of the sample. Overall, Figure 5 shows that it would likely be profitable to short sell stocks with disclosed short positions, especially at the beginning of the period.

It is interesting to note that returns are also negative in the period immediately preceding the disclosure. Specifically, for the full sample, the window from three days to one day before the disclosure has a negative and statistically significant return; the -1.07% average daily return over this period is large relative to the returns measured over the later periods. This negative return before disclosure indicates that the disclosure itself is likely only part of the explanation for the negative returns.

¹⁹ $-0.4913 = ((1 + -0.0027)^{250}) - 1$

²⁰ Since this strategy captures the abnormal returns of disclosed stocks, a strategy that short-sold disclosed stocks would have a return that is -1 times the returns presented here.

Of course, there are a number of possible factors that may also be driving the downward return around the time of the short sale disclosure, and it is important to try to understand the relative impact of those factors on the overall return. To this end, we split short sale disclosures into two main groups: those with rights issue announcements and those without. In the sample of rights issues, we can pinpoint the one important corporate event that is likely to affect returns. In subsequent experiments, we will attempt to isolate any incremental effects of short sale disclosures around the time of these corporate events. On the other hand, for the sample without rights issues, there is no obvious single reason for observed return patterns, which allows us to more directly examine the average effect of short sale disclosures on returns.

In Table 4 Panel B, we see that the magnitude of the return pattern is largest in the rights issue subsample. For example, in the 30-day period following the disclosure, the average return is -0.59%, which is equivalent to an annual return of -73%. Furthermore, in the sample without rights issues, there is no statistically significant effect. In other words, the return pattern in the overall sample is driven by the sample of stocks with rights issues.

It is also interesting to note that only the first disclosure of a short position in a particular stock is associated with negative returns. Table 5 reports industry-adjusted returns following various kinds of short position disclosures. Increases in short positions (which we call upticks), decreases in short positions (referred to as downticks), and moving below the disclosure threshold (“closed-outs”) are not associated with significant returns. Neither is the first short position disclosure by a particular short seller in a given stock. The two-day announcement abnormal return is only -0.54%, which is statistically indistinguishable from zero. Thus, there is no evidence that follow-on disclosures by other short sellers are associated with negative returns.

Since we know the identity of the short seller, we can also investigate whether some disclosers are associated with more negative stock returns. To be precise, for each of the three countries, we take the first short position disclosure for each stock and regress its industry-adjusted three-day post-disclosure stock return on discloser-level fixed effects. Table 6 lists the top ten short sellers in each country by this metric. Among short sellers of UK stocks, average daily profits (which are defined as the negative of the industry-adjusted returns) are as high as 8.51%, but only four out of the top ten short sellers have average daily profits that are significantly different from zero: BGI UK 32 Capital Fund at 7.47%, Odey Asset Management at 3.58%, Blue Ridge Capital at 2.83%, and Millennium Partners at 2.29%. In Spain, Centaurus

Capital and Egerton Capital rise to the top, with average daily industry-adjusted profits over the three-day window of 4.54% and 1.87%, respectively, both of which are significantly different from zero at the 5% level. However, this variation could just be due to chance. For each country, we fail to reject the null hypothesis that all the discloser fixed effects are jointly zero during the three-day window.

5.2. Shorting Activity Around Disclosure

One of the overarching results in the short selling literature is that short sellers' trades are profitable (e.g., Asquith, Pathak and Ritter (2005); Boehmer, Jones and Zhang (2008) and Boehmer, Huszar and Jordan (2010)). Furthermore, the results above show that returns are negative following disclosures of short positions. So it stands to reason that market participants may respond to disclosures by shorting disclosed stocks after the public disclosure is made. In this section we look at a number of measures of shorting activity to gauge the magnitude of this potential follow-on behavior.

In our empirical setup, we conduct a difference in difference analysis. The first difference is between disclosed stocks and matched sample control stocks without disclosures. Specifically, we match every disclosed stock to a control firm in the same country as the disclosed firm by minimizing the sum of the squared differences in percentile *Short Interest at Settlement*,²¹ percentile *Market Capitalization*, percentile *Share Turnover* and percentile *Change in Short Interest at Settlement* over the past month (22 trading days). The second difference is between the measured statistic over the event window.

We start by looking at a daily measure of short interest from our data provider. In Table 7 we find that *Short Interest* does indeed increase significantly, but nearly all of the increase is before the public disclosure. Compared to the matched sample of firms without disclosures, short interest increases by 0.89% of shares outstanding during the period from three days to one day before the announcement. This pre-disclosure short position increase is strongest among rights issue stocks, but there is also a statistically significant effect among non-rights issue stocks. In the first five days after the disclosure, there is virtually no change in relative short interest, and the increase in short interest is reversed in the next few days thereafter.

²¹ Using short interest at settlement versus short interest in trade time assures that our match criteria are in the information set at the disclosure date.

We next turn to the percentage of lenders actively lending a particular stock, or *Percent of Lenders Active*, and again we see an increase in lending activity for disclosed stocks during the three days leading up to a disclosure. Turning to the number of open loans, or *Scaled Number of Open Loans*, we see that the number of loans is also increasing during the pre-disclosure period. *Concentration of Open Loans* does not appear to change either before or after the disclosure, indicating that shorting is not dominated by small positions or large positions; the distribution of position size remains constant despite the overall increase in number of positions. Finally, the *Daily Cost of Borrowing Score* shows a dramatic increase in the days immediately preceding the short sale disclosure. Specifically, we see a statistically significant increase of 0.2385 in the full sample in the three days before the day of the disclosure.²²

Taken together, a clear picture emerges. Just before the disclosure, short interest increases, as does the number of lenders and loans in the equity loan market, and this increase in borrowing drives borrowing costs up. Although the result is apparent in many of the variables, the fact that the increases occur *before* the disclosure of the short position is not adequately explained by the disclosure itself. Although the building-up of the disclosed position could be the driver of some of the increase, the change in short interest is considerably larger than the average disclosed short position, as reported in Table 1. This suggests that other, smaller short sellers are also adding to or initiating short positions at the same time as the discloser.

5.3. Results for Rights Issues

As noted earlier, we have identified 46 rights issues in UK, French and Spanish stocks where a short position disclosure occurs during a rights issue. There are also 27 rights issues subject to the disclosure requirements where there is no short position disclosure during the rights issue. Of these 73 rights issues, 71 are in the UK and 2 are in Spain.²³ Additional summary statistics on the rights issues can be found in Table 8. On average, firms undergoing rights issues are slightly larger in terms of market capitalization than the rest of the firms in our sample, but this difference is fairly modest, with the median rights issue firm at the 57th

²² Since the bin cutoffs are not reported by Data Explorers, it is difficult to interpret the economic magnitude of this finding.

²³ Additionally, there are five rights issues in UK financial firms that occur during the 2008-2009 short selling ban. Due to the small sample size and the unusual macroeconomic events in this interval, we do not attempt to analyze these events.

percentile of the distribution of market caps across all sample firms. Of the rights issues we examine, 82.2% are successfully completed. The mean rights issue in our sample is 31.7% of the (pre-rights offering) shares outstanding, though the distribution is somewhat skewed because the median rights issue is only 18.8% of shares outstanding. The exercise price on the rights is always at a discount to the pre-announcement share price. The average discount of 43.4% is fairly substantial, with the discount ranging from 33.4% to 58.0% for the two middle quartiles.

We first look at abnormal returns during the rights issue. Returns are calculated beginning on the announcement day of the rights issue and ending one week later (post-announcement day 5), one month later (post-announcement day 20) or upon completion. Prior to February 10, 2009, UK rights issues had to remain open for at least 21 calendar days; UK FSA Policy Statement 09/2 reduced this minimum to ten business days. Rights issues typically remain open for a slightly longer period. In our sample, the interval from announcement to completion averages 26.74 trading days. Abnormal returns are computed relative to the stock's one-digit Industry Classification Benchmark (ICB) sector index, and we use cross-sectional regressions to characterize the cross-sectional variation in the abnormal returns. The results are summarized in Table 9.

Not much happens to the stock in the first week following the announcement of a rights issue. Specification 1 in Panel A shows that the cumulative abnormal return (CAR) over the (0,5)-day interval is -3.12% for rights issues where there is no short position disclosure and $-3.12\% + 2.96\% = -0.16\%$ for rights issues where a large short position is disclosed in this time interval. These CARs are statistically indistinguishable from zero and from each other.

Things get more interesting over the next three weeks, documented in Panel B. As before, Specification 1 shows that the CAR over the (0,20)-day interval is insignificantly different from zero for the rights issues where there is no short position disclosure. In contrast, there is a sharp downward share price move if a large short position is disclosed in this interval, with a 20-day CAR of $-4.61\% - 18.20\% = -22.81\%$, significant at the 1% level.²⁴ The more large

²⁴ We also have a sample of 47 rights issues that take place when there was no short position disclosure regime. This sample includes: 9 UK rights issues from February 28, 2008 to June 26, 2008; 25 French rights issues from April 17, 2008 to September 28, 2010; and 13 Spanish rights issues from November 10, 2008 to April 14, 2010. The average 20-day CAR for these earlier rights issues is -18.53%, which is statistically indistinguishable from the average CAR of -16.08% for rights issues undertaken in the disclosure regime ($t = 0.75$). That is, rights issues are generally associated with very negative stock returns, whether or not there is a disclosure regime. On average, the presence of the short position disclosure requirement does not affect stock returns during the rights offering.

short sellers there are, the bigger the share price drop. Specification 2 shows that each additional disclosing short seller beyond the first one is associated with an additional -2.75% CAR over this month-long period, and this incremental effect is strongly statistically significant. For rights issues with at least one associated short position disclosure, there is significant herding, with 4.44 disclosing short sellers on average in the (0,20)-day window. Panel C shows that there is not much change in the average share price from day 20 to completion of the rights issue.

Next, we look at the publicly available details of the rights issues to see if large short sellers are targeting particular types of firms. We include as regressors the size of the rights issue relative to the number of existing shares, as well as the rights issue discount to the pre-announcement share price. Our priors were that the larger the equity issue relative to the shares already outstanding, the bigger should be the negative share price reaction. Larger discounts to the pre-announcement share price might be interpreted as a negative signal about the expected share price post-announcement.

Panel B Specification 3 has the results for the 20-day returns. The size of the rights issue is not significant, but bigger rights issue discounts are reliably associated with more negative stock returns. Adding these two variables does not change the main result on the number of disclosers. Each additional large short seller continues to be associated with an incremental -2.24% cumulative abnormal return during the first month of the rights issue.

Returns are sharply negative during rights issues, and are more negative when there are large short sellers present. This could mean that short sellers are informed. Alternatively, short sellers could be manipulating the price downward during the rights issue. In the latter case, we would expect a reversal once the rights expire. Table 10 has 5-day, 20-day, and 60-day returns after the rights issue is completed. There is no statistical evidence of a reversal in rights issues with a short position disclosure. For rights issues with no large short position, prices continue to fall over the next three months, with 60-day post-completion returns averaging -13.26%. This is statistically different from zero and statistically different from the corresponding return for rights issues with short disclosures. Thus, the post-completion evidence provides no evidence of abusive shorting activity. In fact, the continued negative returns in rights issues without short position disclosures could reflect shorting constraints. If there are significant impediments to shorting in some firms, prices might not immediately adjust to negative news during the rights issue period, but might instead adjust more gradually over time.

Next we compare overall shorting activity and equity loan activity in rights issues with a short position disclosure versus those rights issues without a short position disclosure. The goal is to determine whether a disclosure is associated with the amount of overall shorting demand, or whether a disclosure just conveys information about the concentration or composition of shorting demand, as opposed to the total amount of shorting demand. To separate these effects, we match each rights issue to a non-rights issue stock that is similar along the dimensions of share turnover, market capitalization, level of *Short Interest at Settlement* and change in *Short Interest at Settlement*. Then we compare disclosed rights issues shorting activity (versus activity in the matched control firms) to non-disclosed rights issues (versus their matched non-rights issue control firms) during various windows after the rights issue announcement.

Figure 6 demonstrates the result graphically.²⁵ In this relatively closely matched setting, we see a dramatic difference in short interest between disclosed stocks and undisclosed stocks. In the stocks with disclosures, abnormal short interest is much higher at the time of disclosure. Interestingly, abnormal short interest remains fairly constant for about two weeks after the short position disclosure, followed by a return to normal levels. For stocks without short position disclosures, there is no obvious increase in short interest relative to control stocks.

Formal statistical tests using differences-in-differences are in Table 11. From one day before to one day after the rights issue announcement, short interest in disclosed stocks rises by 2.14% of shares outstanding compared to stocks without a disclosure, and this is strongly statistically significant. Compared to rights issue stocks without a disclosure, rights-issue stocks with a disclosure experience little change in short interest during the (0,5) interval, matching the graphical evidence from Figure 6. The bump in short interest is completely reversed by the tenth day after the announcement of the rights issue. The increase in overall short interest is much larger than the size of the disclosed short, indicating that a rights issue with a large short position disclosure is associated with more shorting overall, not just more shorting by the initial discloser.

The results on returns during rights issues might seem a bit puzzling. On first glance, short sellers appear to be well informed and able to identify the overvalued equity issuers. Short sellers are in possession of and trade on this negative fundamental news. Moreover, the stronger the negative signal, the more likely it is to be received by multiple short sellers. In these

²⁵ To eliminate the possibility of differing periods between rights issue announcements and disclosures, we graph only the disclosures that occur on the second day after the rights issue announcement. This criterion captures 58.7% of the sample of rights issues with short sale disclosures.

overvalued stocks identified by short sellers, the negative news then becomes public several days later.

But why don't these large negative returns appear in the first five days after the rights issue announcement? Rights issues and other equity issues are typically strong negative signals. One would expect a similar reaction here, and share prices should fall immediately on the rights issue announcement. We suspect that shorting constraints are at work. As noted in Reed (2007), prices may adjust slowly to negative information when shorting is costly. During the five-day period beginning the day of the short position disclosure in rights issues, the daily cost of borrowing score averages 2.61. While we do not have an exact mapping of this score to a rebate rate, it is our sense that this constitutes a significant cost of borrowing measured in hundreds of basis points. Thus, it seems likely that shorting constraints could easily account for the delayed negative price response.²⁶

While we find no evidence that short sellers are inappropriately driving down the share price, there is some evidence that this effect occurs in other contexts. For instance, Henry and Koski (2010) find that short sellers create downward price pressure in the US during secondary equity offerings despite the existence of certain restrictions on shorting then. Also, Mitchell, Pulvino and Stafford (2004) find price pressure around mergers due to short selling by merger arbitrage traders. In the next section, we look at short sales by disclosers and others to see if their behavior can account for the strongly negative returns that we measure.

5.4. Follow-on Behavior

Some practitioners have worried that disclosures of short positions could be a coordination device among short sellers, with a disclosure inducing other short-sellers to pile on. When commenters were asked by the FSA (DP09/1, Q15) whether they agreed with the FSA's analysis that the benefits of public disclosure of significant short positions outweigh the costs, "a smaller, but significant, group actively disagreed with us..." (FSA FS09/4, paragraph 3.9)

²⁶ We have attempted to test this hypothesis formally by running regressions of the general form, $\left| \frac{CAR_{(0,t)}}{CAR_{(0,t+k)}} \right| = f(DCBS)$, where *DCBS* is a measure of the daily cost of borrowing just prior to or at the time of the rights issue announcement. While we observe results in the hypothesized direction, i.e., the speed of adjustment is negatively related to the existence of short selling constraints, the significance is marginal and dependent on the specification. We attribute this lack of significance to power issues stemming from the small number of rights issues in our sample (73 total rights issues and 61 with non-missing daily cost of borrowing score) coupled with the coarseness of our data on specialness.

“Those who did not agree with us all raised similar concerns. Namely, the risk of ‘herding’ behaviour when the identities of big-name short sellers are revealed, forced disclosure of companies’ intellectual property (i.e. the information they have garnered that led them to take the position), the risk of short ‘squeezes’ by competitors, compliance costs and, as a result of all of these factors, deterring short selling and damaging market quality.” (paragraph 3.10)

The FSA responded (also in paragraph 3.10) that “we have not seen any evidence of these phenomena occurring.”

To provide direct empirical evidence on some of these issues, we use a logit specification to characterize the persistence of short position disclosures. Our specification has an observation for each stock-day, and the dependent variable is equal to one if there is an initial short position disclosure by a short seller in a given stock on a given date and zero otherwise. The explanatory variables of interest are lagged indicator variables indicating recent short position disclosures, often interacted characteristics of these previous disclosers, such as their assets under management (AUM), the size of their disclosed short position, and their location. In addition to country fixed effects, unreported control variables include the level of *Short Interest at Settlement*, the stock’s log trading volume in shares and its log market capitalization on date $t-1$, along with abnormal stock returns on dates $t-1$, $t-2$, and $t-3$ relative to the industry return (using the one-digit ICB sector index).

What do we expect to find? It is possible that nothing emerges from these size and location variables, but if there is a relationship, we would expect *AUM* and *PositionSize* might proxy for the quality of the short selling signal. The better the signal, the more likely other short sellers would take a similar position. Other literature, such as Huberman (2001), indicates that proximity is associated with similar investor positions, and we might expect something similar here. Such a correlation could be due to actual information sharing between the two short sellers, either privately or through the disclosure process, but follow-on shorting might simply reflect the unrelated acquisition of correlated signals by multiple asset managers.

The results are in Table 12. Panel A deals with the full sample, including stocks with and without rights issues underway. Panel B has the subsample of rights issues, and the complement is in Panel C.

Specification 1 includes only lagged disclosure dummies and is designed to simply measure whether there is time-series persistence and clustering of large short positions for a given stock. There are two lags: an indicator variable equal to one if there is a disclosure in the previous week ($t-1$ to $t-5$) and an indicator if a short position disclosure occurs at lags -6 through -30, inclusive. Both lagged indicator variables are significant in the full sample and in both subsamples. In the full sample, for example, a disclosure in the previous week in the same stock more than doubles the probability of a disclosure on a given day from the baseline probability of 0.10% to 0.28%. A disclosure in the earlier period increases the disclosure probability by an additional 0.04%. Comparing the rights issue subsample in Panel B with the non-rights issue sample in Panel C, large short positions are more prevalent in rights issues (the baseline probability is 0.29% versus 0.07% for the non-rights issue sample), but the magnitude of the (log odds ratio) persistence is similar.

We then add *AUM* for the prior discloser interacted with the prior disclosure dummies; this estimation is Specification 2 in Table 12. Follow-on short positions are significantly more likely when the previous discloser is large, and this increase in the predicted probability of follow-on disclosure holds for both the rights issue and non-rights issue subsamples. The cross-sectional standard deviation in assets under management is 2.61, so each increase of one standard deviation in *AUM* by a short position discloser is associated with an increase of 0.02% to 0.03% in the probability of a follow-on disclosure relative to the baseline probability of 0.10%. The results are similar in both rights and non-rights issue subsamples.

In Specification 3, we replace *AUM* with the size of the prior disclosed short position, measured as a fraction of assets under management. The average disclosed short position is 0.306% of assets under management, with a standard deviation of 1.717%. Consistent with the *AUM* results, larger weights on a given disclosed short are associated with a higher probability of a follow-on disclosure in the next week or month, and the magnitude is quite similar to that of the *AUM* effect. Interestingly, the statistical relationship is stronger in non-rights issues (Panel C) than it is in our rights issue subsample (Panel A).

5.5. Geography and Follow-ons

It is possible that the likelihood of follow-on shorting is related to the physical location of the short sellers. To begin to look into this, we replace the *AUM* interaction variable with an

interacted indicator variable that is equal to one if the lagged discloser is headquartered in New York or London. Here the evidence is somewhat mixed in terms of statistical significance. However, the full-sample coefficient estimates in Specification 4 of Panel A are quite similar in magnitude for both the $\{t-1, t-5\}$ lag and the $\{t-6, t-30\}$ lag, and a short position discloser located in New York or London increases the probability of a follow-on disclosure by 0.03% to 0.04%.

We also examine whether a follow-on disclosure is more likely when the initial disclosing short seller is closer to other short sellers. The results are in Specification 5 of Table 12, and they indicate that a short position disclosure by a centrally located short seller is significantly more likely to result in a follow-on disclosure within the next week or month. Recall that the centrality variable is defined as a quantile and thus has an approximately uniform distribution. Thus, a unit standard deviation increase in centrality of 0.292 increases the probability of a follow-on disclosure by $0.29\% * 0.292 = 0.08\%$.

To further investigate the connection to physical location, we examine the distance between pairs of short position disclosers in the same stock. We identify the principal location of each discloser using web searches and fund databases. When we compare the physical distance between an initial discloser and a follow-on short seller, we find evidence that the follow-on discloser tends to be located closer to the original discloser. The results are in Table 13. For example, we find that in the full sample follow-on disclosers between 6 and 30 days after the initial disclosure are 397.2 miles away from the initial discloser, while the unconditional average distance between a pair of disclosers is 470.6 miles. The difference in these average distances is statistically significant. Similarly, 42.09% of follow-on disclosers between 6 and 30 days after the initial disclosure are within 100 miles of the initial discloser, whereas only 34.92% of other discloser pairs are within 100 miles of one another. While the distance differences are broadly similar for the rights issue and non-rights issue subsamples (Panels B and C, respectively), the statistical significance is stronger for the rights issue subsample. Clearly, large short position disclosure sequences are characterized by significant geographical clustering.

Overall, our results indicate the possibility that the disclosure regime encourages herding by short sellers. However, it is important to emphasize that we cannot rule out the alternative explanation that multiple short sellers independently receive similar information or apply similar analyses, leading to approximately contemporaneous short positions. In future work, we hope to

distinguish between these two possible explanations by comparing the persistence of shorting activity under the disclosure regime to shorting activity when there is no disclosure.

6. Conclusion

Disclosure is becoming an important tool in short sales regulation. For example, the UK, France and Spain have recently promulgated rules forcing short sellers to disclose their positions as well as details, such as their identity, that have never been required before. This new kind of regulation raises some unique concerns among regulators and market participants alike. For example: Does disclosure lead to stock price declines? Or, perhaps more worryingly, does disclosure provide a means for short sellers to coordinate their actions? These questions are likely at the forefront of regulatory discussions as the US Securities and Exchange Commission responds to Section 417 of the Dodd-Frank Act, which requires a study of “the feasibility, benefits, and costs of requiring reporting publicly, in real time short sale positions of publicly listed securities.”

In this paper, we provide the first analysis of a new post-crisis regulatory regime that mandates the disclosure of large short positions in UK, French and Spanish stocks. We characterize the disclosers and the disclosures, stock price behavior around the disclosure, and equity lending market effects.

Our results indicate that in some ways the effects of disclosure are not economically meaningful. First of all, we find no abnormal return for stocks with disclosed short positions that are not involved in rights issues. Furthermore, we find little evidence that the level of short interest increases in response to disclosure.

However, disclosure is associated with some negative effects. Among stocks with rights issues, we find that disclosed rights issues have a significantly negative abnormal return when compared with their non-disclosed counterparts. The evidence suggests that these negative returns are not the result of manipulative shorting, because there is no price reversal after the rights issue is completed.

We also find significant follow-on shorting activity: a large short position disclosure makes it much more likely that there will be another disclosure within a month in the same stock by a different short seller. Furthermore, follow-on shorting is more likely when the initial discloser has greater assets under management or is located near other short sellers.

Our work also has implications for regulatory policy towards short selling around equity offerings. Abusive shorting during secondary equity offerings has long been a concern of regulators. Regulation M in the US limits shorting during a secondary equity offering, for example. In a recent release (DP09/1), the UK FSA suggested that disclosure could serve as an alternative to shorting restrictions, asking commenters, “Do you agree that, subject to having a satisfactory disclosure regime, we should not ban short selling of the stocks of companies engaging in rights issues?” The FSA recently concluded (in FS09/4) that it would not ban shorting (including shorting by underwriters) during equity issuances. Overall, our evidence suggests that the price declines during rights issues are not the result of manipulative short sales, implying that the UK’s current policy is on the right track.

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Figure 1: Sample Disclosure

This figure presents a sample disclosure of a short position in Old Mutual, PLC, (LSEX Ticker: OML) as it appears on the web-based newswire, Bloomberg. The web clip was retrieved September 22, 2011 from <http://www.bloomberg.com/apps/news?pid=21070001&sid=a49bgTzL0tt4>.

Bloomberg	
OML: Millennium Partners, L.P.: Short Selling Disclosure	
Mar 24, 2009	
OML: Millennium Partners, L.P.: Short Selling Disclosure	
UK Regulatory Announcement	
LONDON	
Form TR-4. FSA Version 1.0 September 2008	
TR-4^1:	Disclosure of Short Position relating to UK Financial Sector Company^2
1. Full name of person(s) holding the disclosable short position^3:	Millennium Partners, L.P.
2: Name of the issuer of the relevant securities	Old Mutual Plc
3: Disclosable short position^4	0.16%
4. Date that disclosable short position was held	23 March 2009

Figure 2: Example of Short Selling Disclosures

This figure presents price and short interest in Old Mutual, PLC, (LSEX Ticker: OML) during the UK disclosure regime for short positions. Stock price is from Yahoo! Finance. *Short Interest* is defined as the number of shares on loan divided by the total number of shares outstanding. *Undisclosed Short Interest* is defined as the aggregate short interest from the CREST database less the total short interest held by disclosed positions.

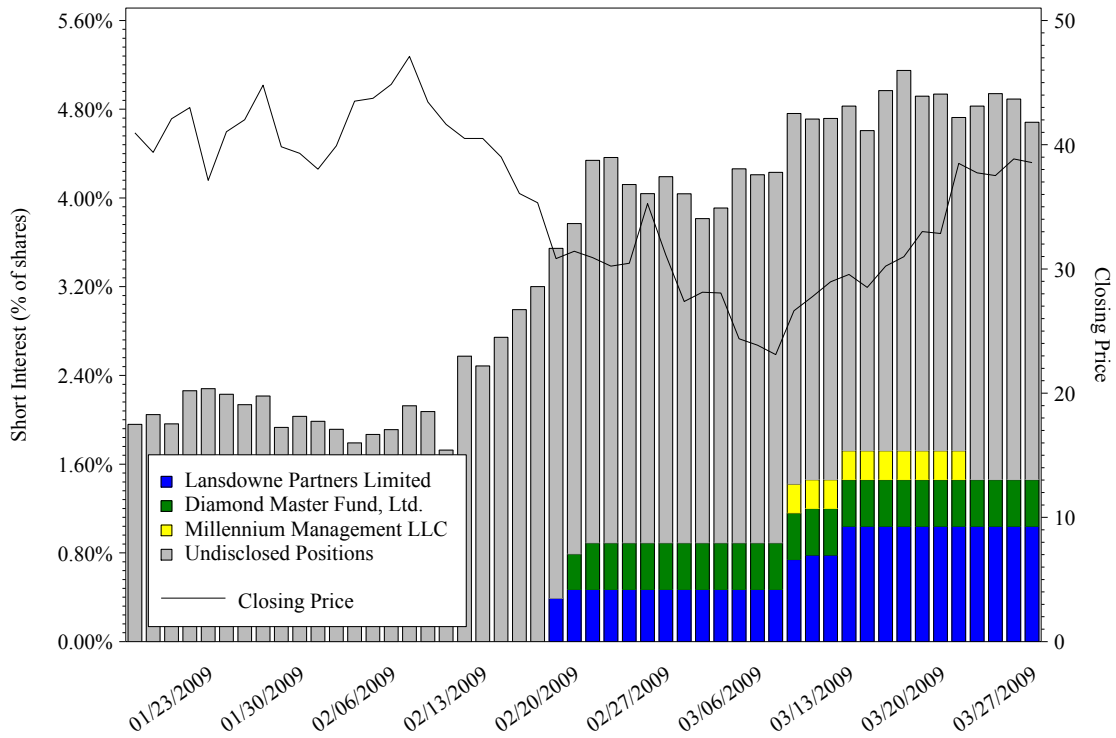
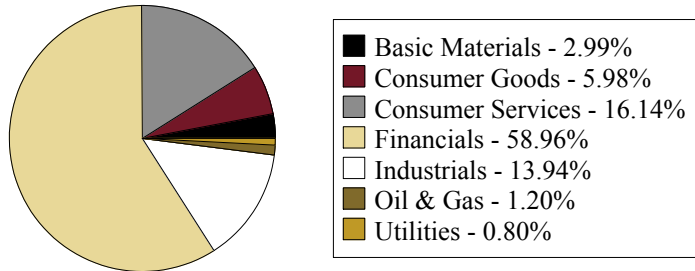


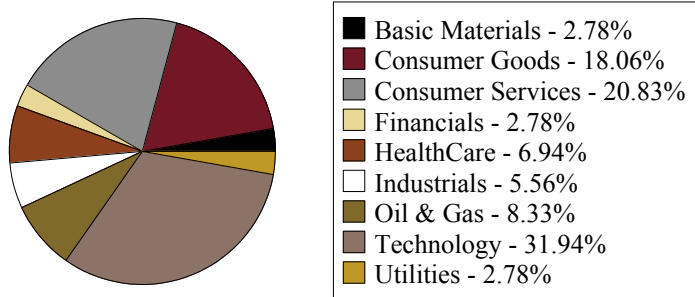
Figure 3: Disclosures by Industry

This figure presents the distribution of disclosed position by country and one-digit Industry Classification Benchmark (ICB) sector. A disclosed position is opened by the disclosure of a short position above the regulatory threshold and is closed by the disclosure of the same position below the regulatory threshold.

United Kingdom



France



Spain

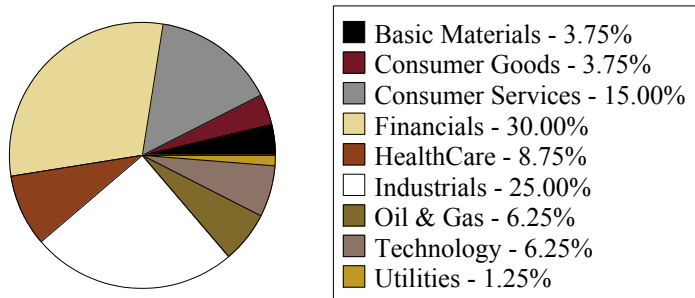


Figure 4: Percentage of Firms Disclosed

This figure reports the ratio of disclosed firms to total firms in our sample by country and one-digit Industry Classification Benchmark (ICB) sector. The specifics of each country’s disclosure regulations are discussed in the text.

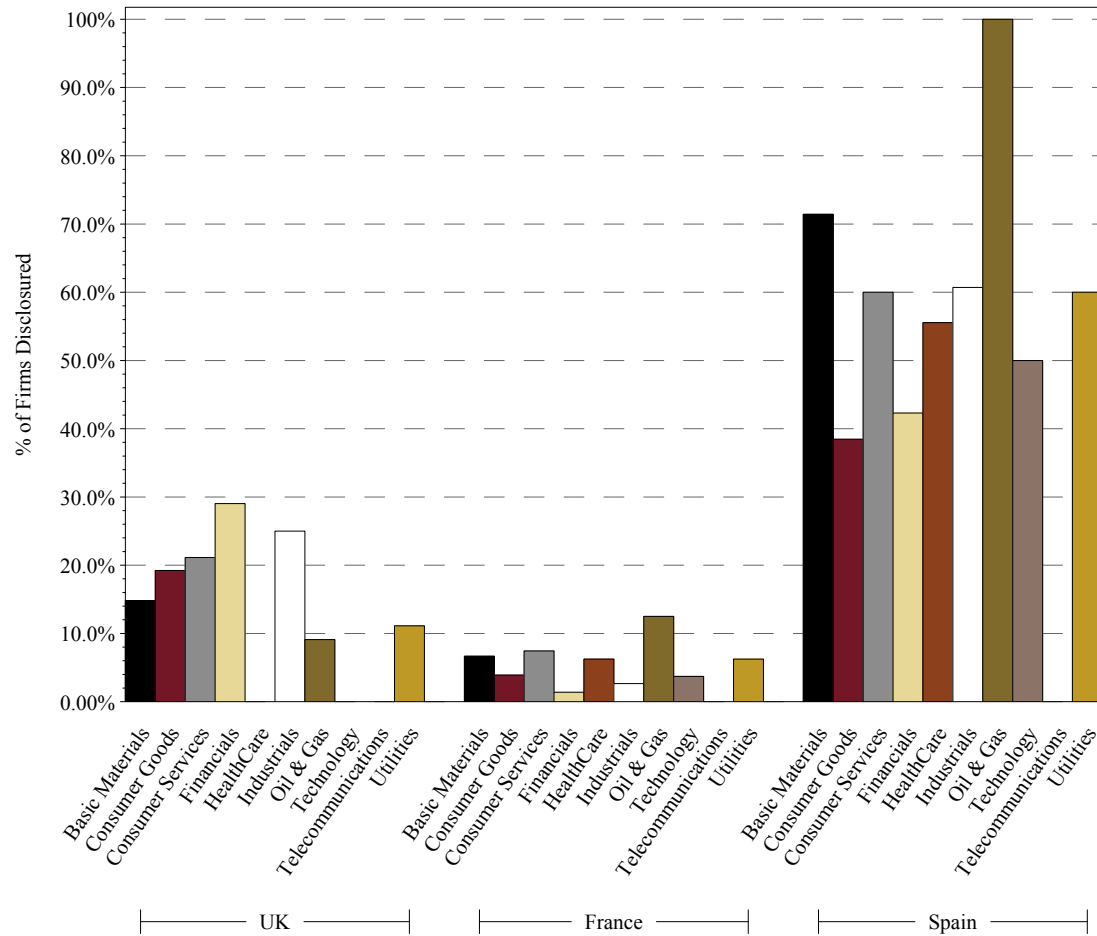
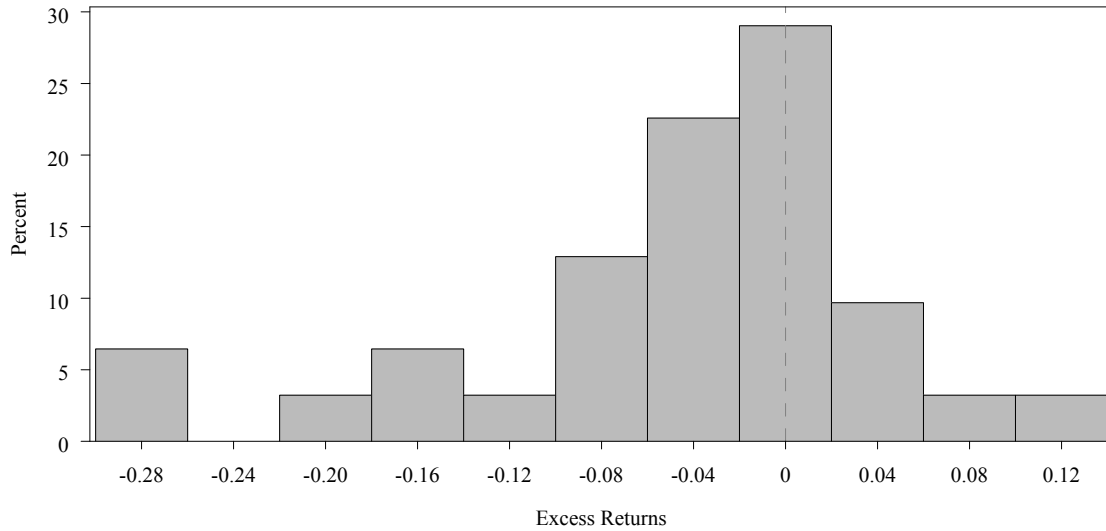


Figure 5: Monthly Returns Post-disclosure

This figure presents the histogram of monthly returns from a calendar-time portfolio holding disclosed stocks. Relative to the date of a stock's initial disclosure, the portfolio is long one share of the disclosed stock for each date in the (0,30)-day event window and short one share of the stock's one-digit Industry Classification Benchmark (ICB) sector index. Panel A presents the histogram of the monthly portfolio returns. Panel B presents the monthly portfolio returns in calendar time. Disclosed firms are as defined in the text.

Panel A: Histogram of Returns



Panel B: Monthly Returns in Calendar Time

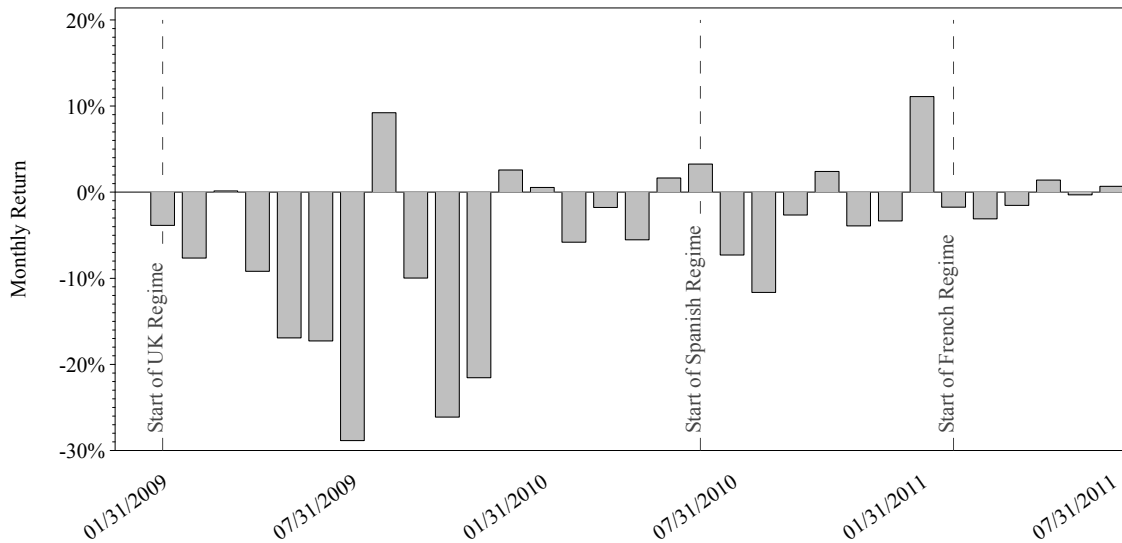


Figure 6: Short Interest Around Rights Issue Announcement

This figure plots the average short interest around a rights issue announcements relative to their matched counterpart over the event window. Each firm is matched to a control firm one trading month prior to the announcement of a rights issue by minimizing the sum of the square differences of percentile *Share Turnover*, percentile *Market Capitalization*, percentile *Short Interest at Settlement* and percentile *Change in Short Interest at Settlement* over the previous month (22 trading days). Disclosed rights issues are the subsample of stocks with a rights issue announcement and a disclosed short position within the (0,1)-day event window. Undisclosed rights issues are the subsample of stocks with a rights issue announcement and no disclosed short position within the window between the announcement and completion of the rights issue.

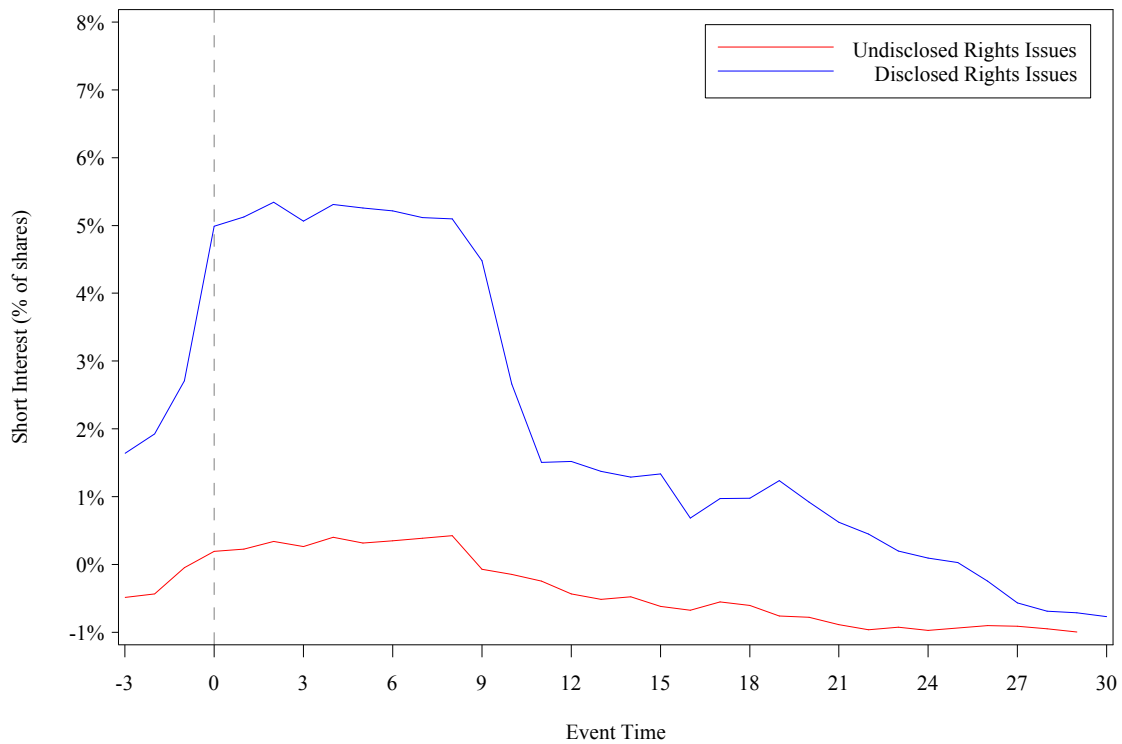


Table 1: Summary Statistics of Disclosures by Country

This table reports summary statistics concerning the number of disclosed short positions since the onset of the disclosure regime by country. The specifics of each country's disclosure regulations are discussed in the text. *Average Length of Holding Period*, *Average Length of Build-up Period* and *Average Length of Unwind Period* are calculated excluding positions that are still open (above the regulatory threshold). *Length of Build-up Period* is defined as the number of trading days between the initial disclosure of the short position and the maximum disclosed position. *Length of Unwind Period* is defined as the number of trading days between the maximum disclosed position and the closure of the short position. *# of Follow-on Disclosures* is the number of short positions originated over the (0,20)-day window following the first disclosure.

	United Kingdom	France	Spain
Number of Positions	502	72	80
Number of Disclosed Firms	81	33	28
Average Number of Positions Per Disclosed Firm	6.20	2.18	2.86
Ratio of Disclosed Firms to Total Firms	0.21	0.04	0.41
Average Disclosures Per Position	1.75	4.54	5.95
Percentage Initiations	57.05	22.02	16.81
Percentage Decreases in Short Interest	22.50	39.76	34.66
Percentage Increases in Short Interest	18.41	38.23	48.11
Average Length of Holding Period	25.23	16.37	52.05
Average Length of Build-up Period	6.10	0.93	14.74
Average Length of Unwind Period	19.13	15.43	37.31
Average Disclosed Short Position	0.47	0.86	0.80
Maximum Disclosed Short Position	9.25	3.91	4.23
Average # of Follow-on Disclosures	5.05	1.70	1.18
Average # of Trading Days to 1 st Follow-on	2.70	5.25	7.91
Average # of Trading Days to 2 nd Follow-on	4.52	8.89	17.00
Percentage of Dates with Multiple Originations	22.09	6.12	1.89

Table 2: Most Active Disclosers by Country

This table reports the ten most active disclosers, as defined by the highest number of disclosed short positions, by country. *Number of Short Positions* is the total number of short positions disclosed since the beginning of the disclosure regime. *Average Short Position* is the average percent of shares outstanding shorted by a discloser in a particular position.

Discloser	Number of Short Positions	Average Short Position
United Kingdom Disclosers		
Trafalgar Asset Managers Limited	37	0.43%
Millennium Partners, LP	20	0.38%
ABC Arbitrage SA	18	0.34%
Lansdowne Partners Limited	14	1.05%
Davidson Kempner International Ltd	13	0.39%
Guevoura Fund Limited	12	0.51%
Davidson Kempner European Partners	11	0.41%
Odey Asset Management LLP	10	0.36%
Highbridge Capital Management, LLC	9	0.29%
GLG Partners LP	8	0.38%
French Disclosers		
BNP Paribas Arbitrage SNC	4	0.89%
Barclays PLC	4	0.66%
Oceanic Hedge Fund	4	0.56%
JABCAP Multi Strategy Master Fund Limited	3	0.82%
AKO Master Fund Limited	2	2.30%
Samana Capital, LP	2	1.36%
Lansdowne UK Equity Fund Limited	2	1.11%
Egerton Capital Limited	2	1.02%
Pictet Asset Management SA	2	0.68%
AQR Capital Management, LLC	2	0.68%
Spanish Disclosers		
Amber Capital LP	6	1.25%
Morton Holdings, INC	6	1.13%
Egerton Capital Limited Partnership	4	0.77%
Discovery Capital Management, LLC	4	0.72%
Highbridge Capital Management, LLC	4	0.71%
Marshall Wace LLP	4	0.64%
Eminence Capital, LLC	3	0.77%
Conatus Capital Management LP	3	0.64%
TT International	3	0.62%
Wellington Management Company, LLP	2	1.34%

Table 3: Summary Statistics for Disclosed and Control Groups

This table reports summary statistics for the match criteria and short activity variables for disclosed firms and their matched controls. Each firm is matched on the disclosure date to a firm listed in the same country by minimizing the sum of the square differences of percentile *Share Turnover*, percentile *Market Capitalization*, percentile *Short Interest at Settlement* and percentile *Change in Short Interest at Settlement* over the previous month (22 trading days). Short activity measures are defined in the text. Data are provided by Data Explorers. For the test of the difference in means, *, **, and *** denote significance at the 5 percent, 1 percent and 0.1 percent levels, respectively. Standard errors are clustered at the firm-level for this test.

	Disclosed Group		Control Group		Difference in Means
	Mean	Std Dev	Mean	Std Dev	
Match Criteria:					
Percentile Market Capitalization	58.7982	27.8358	62.2752	27.1828	-3.4771
Percentile Share Turnover	78.1468	21.5122	75.2936	19.2951	2.8532
Percentile Short Interest at Settlement	73.4495	26.8464	70.4312	24.9864	3.0183
Percentile Δ Short Interest at Settlement	62.6147	38.2620	59.6881	35.9930	2.9266
Short Activity Measures:					
Short Interest	0.0588	0.0443	0.0376	0.0315	0.0212***
Percent of Lenders Active	0.5352	0.1621	0.4480	0.1654	0.0872***
Scaled Number of Open Loans	1.1545	2.2800	0.8908	1.3475	0.2637
Concentration of Loans	0.2452	0.1804	0.2759	0.1774	-0.0307
Daily Cost of Borrowing Score	2.3670	1.6024	1.6422	1.1182	0.7248***

Table 4: Abnormal Returns Around Disclosure - Initial Disclosed Positions

This table reports the mean daily abnormal returns from a calendar-time portfolio holding disclosed stocks. Relative to the date of a stock's initial disclosure, the portfolio is long one share of the disclosed stock for each date in the event window and short one share of the stock's one-digit Industry Classification Benchmark (ICB) sector index. *CAR* is the mean daily abnormal return multiplied by the length of the event window. Disclosed firms are as defined in the text. For the (0,2)-day window, Panel A has 246 observations, Panel B has 96 observations and Panel C has 174 observations. *, ** and *** denote significance at the 5 percent, 1 percent and 0.1 percent levels, respectively.

Event Window	CAR	Abnormal Return	Std Err
Panel A: Full Sample			
(-30,-3)	-0.0104	-0.0004	0.0015
(-3,-1)	-0.0322	-0.0107**	0.0036
(0,2)	-0.0231	-0.0077**	0.0027
(0,5)	-0.0208	-0.0035*	0.0017
(0,10)	-0.0341	-0.0031**	0.0012
(0,20)	-0.0753	-0.0036***	0.0011
(0,30)	-0.0830	-0.0027***	0.0008
(0,60)	-0.0787	-0.0013*	0.0006
(0,90)	-0.0836	-0.0009	0.0005
Panel B: Rights Issue Subsample			
(-30,-3)	-0.0891	-0.0032	0.0024
(-3,-1)	-0.0688	-0.0229**	0.0080
(0,2)	-0.0355	-0.0118*	0.0053
(0,5)	-0.0286	-0.0048	0.0032
(0,10)	-0.0403	-0.0037	0.0021
(0,20)	-0.1866	-0.0089***	0.0024
(0,30)	-0.1834	-0.0059***	0.0017
(0,60)	-0.1522	-0.0025*	0.0010
(0,90)	-0.1294	-0.0014	0.0009
Panel C: Non-Rights Issue Subsample			
(-30,-3)	-0.0083	-0.0003	0.0021
(-3,-1)	-0.0145	-0.0048	0.0036
(0,2)	-0.0090	-0.0030	0.0027
(0,5)	-0.0054	-0.0009	0.0019
(0,10)	-0.0175	-0.0016	0.0014
(0,20)	-0.0242	-0.0012	0.0012
(0,30)	-0.0427	-0.0014	0.0009
(0,60)	-0.0515	-0.0008	0.0007
(0,90)	-0.0466	-0.0005	0.0006

Table 5: Abnormal Returns Around Alternative Events

This table reports the mean daily abnormal returns from a calendar-time portfolio holding disclosed stocks. Relative to the date of the event in a stock, the portfolio is long one share of the disclosed stock for each date in the (0,1)-day window and short one share of the stock's one-digit Industry Classification Benchmark (ICB) sector index. *CAR* is the mean daily abnormal return multiplied by the length of the event window. Disclosed firms are as defined in the text. For *Initial Disclosed Positions*, the event date is the date of the origination of the first disclosed position in a stock. For *All Disclosed Positions*, the event date is the date of the origination of any disclosed position in a stock. For *Close-Outs*, the event date is the date on which the position is reported to be below the regulatory threshold thus indicating a closure of that position. For *Upticks*, the event date is the date of an upward adjustment in the size of the disclosed position. For *Downticks*, the event date is the date of a downward adjustment in the size of the disclosed position. For *No Change in Position*, the event date is the date of a new disclosure related to an open position in which the size of the disclosed position does not change. *, ** and *** denote significance at the 5 percent, 1 percent and 0.1 percent levels, respectively.

(0,1)-day Event Window	N	CAR	Abnormal Return	Std Err
Panel A: Full Sample				
Initial Disclosed Positions	177	-0.0173	-0.0087*	0.0036
All Disclosed Positions	444	-0.0054	-0.0027	0.0019
Closed-Outs	220	-0.0115	-0.0057	0.0045
Upticks	353	-0.0008	-0.0004	0.0017
Downticks	411	-0.0046	-0.0023	0.0017
Panel B: Rights Issue Subsample				
Initial Disclosed Positions	65	-0.0241	-0.0121	0.0073
All Disclosed Positions	218	-0.0166	-0.0083*	0.0033
Closed-Outs	62	-0.0431	-0.0215	0.0152
Upticks	99	-0.0315	-0.0157	0.0104
Downticks	92	-0.0097	-0.0049	0.0076
Panel C: Non-Rights Issue Subsample				
Initial Disclosed Positions	121	-0.0065	-0.0033	0.0035
All Disclosed Positions	359	0.0052	0.0026	0.0020
Closed-Outs	174	-0.0017	-0.0008	0.0020
Upticks	294	0.0035	0.0017	0.0013
Downticks	365	-0.0012	-0.0006	0.0013

Table 6: Most Profitable Disclosers by Country

This table reports the ten most profitable disclosers, as defined by the lowest abnormal returns over the two days following the initial disclosure of the short position, by country. Abnormal daily returns are short the disclosed stock for each date in the event window and long the stock's one-digit Industry Classification Benchmark (ICB) sector index. These returns are regressed on discloser-level fixed effects to obtain an estimate of the daily profits attributable to each discloser. Disclosed firms are as defined in the text. Regressions are run by country with standard errors clustered by date. *, ** and *** denote significance at the 5 percent, 1 percent and 0.1 percent levels, respectively.

Discloser	Avg. Daily Profits (0,2)-day Window	Avg. Daily Profits (0,20)-day Window
United Kingdom Disclosers		
32 Cap Smaller Companies Europe	0.0851	0.0490
Morton Holdings Inc	0.0791	-0.0007
BGI UK 32 Capital Fund	0.0747*	0.0419**
Odey Asset Management LLP	0.0358*	0.0104
RH Moore, LP	0.0289	0.0392
Wellington Management	0.0286	0.0212
Blue Ridge Capital	0.0283***	0.0048
Blackrock Investment Management (UK) Ltd	0.0253	0.0052
Societe Generale SA	0.0246	0.0133
Millennium Partners, LP	0.0229***	-0.0077
<i>p</i> -value for F-Test of Joint Significance of Fixed Effects	0.9653	0.5110
French Disclosers		
Barclays PLC	0.0302	-0.0057
Deutsche Bank AG	0.0119	0.0014
GLG Partners LP	0.0098	0.0020
BNP Paribas Arbitrage SNC	0.0076*	-0.0010
Greenlight Capital LP	0.0074	0.0054
AQR Capital Management, LLC	0.0056	0.0051
CQS Convertible & Quant. Strategies Master Fund	0.0043	-0.0017
Polygon Convertible Opportunity Fund	0.0035	0.0006
Adelphi Capital LLP	0.0016	0.0039
Sabre Fund Management Limited	0.0013	-0.0021
<i>p</i> -value for F-Test of Joint Significance of Fixed Effects	0.7624	0.8326
Spanish Disclosers		
Centaurus Capital LP	0.0454*	0.0208
Egerton Capital Limited Partnership	0.0187*	0.0051
Cheyne Capital Management (UK) LLP	0.0150	0.0038
Brookside Capital Management, LLC	0.0107	0.0028
Lansdowne Partners LTD	0.0096	0.0038
Dalton Capital (Guernsey) LTD	0.0084*	0.0086***
Wellington Management Company, LLP	0.0068**	0.0033**
JP Morgan Asset Management (UK) LTD	0.0038	0.0011
Marshall Wace LLP	0.0030***	-0.0009
Gartmore Investment LTD	0.0011	0.0024
<i>p</i> -value for F-Test of Joint Significance of Fixed Effects	0.1815	0.1186

Table 7: Changes in Short Activity Around Disclosure

This table reports the difference-in-difference estimator for stocks with a disclosed short position relative to their matched counterparts over the event window. Each firm is matched on the disclosure date to a firm listed in the same country by minimizing the sum of the square differences of percentile *Share Turnover*, percentile *Market Capitalization*, percentile *Short Interest at Settlement* and percentile *Change in Short Interest at Settlement* over the previous month (22 trading days). Short activity measures are defined in the text. Data are provided by Data Explorers. Standard errors are clustered at the firm-level. *, **, and *** denote significance at the 5 percent, 1 percent and 0.1 percent levels, respectively.

Window	Short Interest	Percent of Lenders Active	Scaled Number of Open Loans	Concentration of Loans	Daily Cost of Borrowing Score
Panel A: Full Sample					
(-3,-1)	0.0089***	0.0337***	0.0686**	-0.0090	0.2385**
(-1,0)	0.0005	-0.0016	0.0026	0.0012	0.0642
(-1,1)	0.0009	0.0008	0.0037	0.0009	-0.0185
(0,2)	0.0002	-0.0006	0.0043	-0.0102	-0.0550
(0,5)	0.0001	-0.0014	-0.0280	-0.0117	-0.0642
(0,10)	-0.0087*	0.0002	-0.0937	-0.0105	-0.1468
(0,20)	-0.0116**	-0.0017	-0.0541	-0.0221	-0.0642
Panel B: Rights Issue Subsample					
(-3,-1)	0.0068	0.0228	0.0541*	-0.0182	0.2308
(-1,0)	-0.0008	0.0092	0.0283	-0.0089	0.0513
(-1,1)	0.0004	0.0122	0.0516*	-0.0052	0.0256
(0,2)	-0.0000	0.0015	0.0329	0.0033	-0.1026
(0,5)	0.0018	-0.0049	0.0275	0.0134	-0.0256
(0,10)	-0.0041	0.0088	0.0373	0.0322	0.2051
(0,20)	-0.0028	0.0118	0.0965	0.0137	0.0513
Panel C: Non-Rights Issue Subsample					
(-3,-1)	0.0101***	0.0398***	0.0766*	-0.0039	0.2429*
(-1,0)	0.0013	-0.0076	-0.0118	0.0068	0.0714
(-1,1)	0.0011	-0.0057	-0.0234	0.0043	-0.0435
(0,2)	0.0003	-0.0017	-0.0116	-0.0177	-0.0286
(0,5)	-0.0009	0.0006	-0.0589	-0.0256	-0.0857
(0,10)	-0.0113*	-0.0046	-0.1667	-0.0343	-0.3429*
(0,20)	-0.0165**	-0.0093	-0.1381	-0.0421	-0.1286

Table 8: Summary Statistics for Rights Issue Subsample

This table reports summary statistics for the subsample of firms undergoing rights issues. *Percentile Market Capitalization* is calculated each trading day and for each country. *Ratio of Rights to Total Shares* is the number of rights shares offered scaled by total shares outstanding. *Discount to Share Price* is the difference in price between the share price and the rights price at announcement scaled by share price.

Total Number of Rights Issues	73.00
Number of Rights Issues in UK	71.00
Number of Rights Issues in France	0.00
Number of Rights Issues in Spain	2.00
Percentage of Rights Issues Completed	82.19
Average Trading Days to Completion	26.74
Percentile Market Capitalization	
Mean	55.45
Std Dev	28.57
5 th Percentile	9.00
Lower Quartile	33.00
Median	57.50
Upper Quartile	80.00
95 th Percentile	96.00
Discount to Share Price	
Mean	0.4336
Std Dev	0.3279
5 th Percentile	0.0149
Lower Quartile	0.3344
Median	0.4926
Upper Quartile	0.5796
95 th Percentile	0.7902
Ratio of Rights to Total Shares	
Mean	0.3172
Std Dev	0.4707
5 th Percentile	0.0766
Lower Quartile	0.1227
Median	0.1883
Upper Quartile	0.3038
95 th Percentile	0.7943

Table 9: Determinants of Rights Issue Cumulative Abnormal Returns

This table reports the model estimates for cumulative abnormal returns (CARs) around the announcement date of a rights issue. Abnormal returns are relative to the stock's one-digit Industry Classification Benchmark (ICB) sector index. *Disclosed* is a dummy variable equal to 1 if a short position in the stock was disclosed during the event window and 0 otherwise. *# of Follow-on Disclosures* is the number of short positions originated over the event window beyond the first disclosure. *Ratio of Rights to Total Shares* is the number of rights shares offered scaled by total shares outstanding. *Discount to Share Price* is the difference in price between the share price and the rights price at announcement scaled by share price. Effects are fixed at the country-level, and standard errors are clustered by firm. *, ** and *** denote significance at the 5 percent, 1 percent and 0.1 percent levels, respectively.

	Specification 1		Specification 2		Specification 3	
	Estimate	Std Err	Estimate	Std Err	Estimate	Std Err
Panel A: (0,5) CAR						
Intercept	-0.0312	0.0189	-0.0312	0.0190	-0.0546	0.0333
Disclosed	0.0296	0.0378	0.0166	0.0403	0.0202	0.0468
# of Follow-on Disclosures			0.0077	0.0132	0.0066	0.0133
Ratio of Rights to Total Shares					0.0023	0.0205
Discount to Share Price					0.0412	0.0486
Panel B: (0,20) CAR						
Intercept	-0.0461	0.0366	-0.0461	0.0368	-0.0117	0.0683
Disclosed	-0.1820**	0.0559	-0.0597	0.0576	0.0262	0.0658
# of Follow-on Disclosures			-0.0275**	0.0081	-0.0224**	0.0076
Ratio of Rights to Total Shares					-0.0261	0.0649
Discount to Share Price					-0.2705*	0.1056
Panel C: (0, Completion) CAR						
Intercept	-0.0582	0.0639	-0.0582	0.0644	-0.1120	0.0956
Disclosed	-0.1657*	0.0741	-0.0692	0.0763	-0.0305	0.0702
# of Follow-on Disclosures			-0.0173*	0.0078	-0.0188*	0.0094
Ratio of Rights to Total Shares					-0.1023	0.0529
Discount to Share Price					0.0880	0.2267

Table 10: Rights Issue Cumulative Abnormal Returns around Completion

This table reports the mean cumulative abnormal returns (CARs) around the completion date of a rights issue. Abnormal returns are relative to the stock's one-digit Industry Classification Benchmark (ICB) sector index. *Disclosed* is the set of rights issues in which a short position in the stock was disclosed between the announcement date and the completion date of the rights issue. Similarly, *Undisclosed* is the set of rights issues in which a short position in the stock was not disclosed between the announcement date and the completion date of the rights issue. Effects are fixed at the country-level, and standard errors are clustered by firm. *, ** and *** denote significance at the 5 percent, 1 percent and 0.1 percent levels, respectively.

	<u>Disclosed</u>		<u>Undisclosed</u>		Difference in Means
	Mean	Std Err	Mean	Std Err	
(Completion, 5) CAR	0.0072	0.0126	0.0064	0.0194	0.0008
(Completion, 20) CAR	0.0184	0.0184	-0.0589	0.0311	0.0772*
(Completion, 60) CAR	0.0359	0.0298	-0.1326*	0.0601	0.1685*

Table 11: Changes in Short Activity Around Rights Issue Announcement

This table reports the difference-in-difference-in-difference (DDD) estimator for stocks with a rights issue announcement and a disclosed short position relative to their undisclosed counterparts over the event window. Each firm is matched to a control firm one trading month prior to the announcement of a rights issue by minimizing the sum of the square differences of percentile *Share Turnover*, percentile *Market Capitalization*, percentile *Short Interest at Settlement* and percentile *Change in Short Interest at Settlement* over the previous month (22 trading days). Disclosed rights issues are the subsample of stocks with a rights issue announcement and a disclosed short position within the (0,1)-day event window. Undisclosed rights issues are the subsample of stocks with a rights issue announcement and no disclosed short position within the window between the announcement and completion of the rights issue. Short activity measures are defined in the text. Data are provided by Data Explorers. Standard errors are clustered at the firm-level. *, ** and *** denote significance at the 5 percent, 1 percent and 0.1 percent levels, respectively.

Window	Short Interest	Percent of Lenders Active	Scaled Number of Open Loans	Concentration of Open Loans	Daily Cost of Borrowing Score
(-3,-1)	0.0063	0.0289	0.0715*	0.0078	0.2000
(-1,0)	0.0204***	0.0506*	0.1422***	-0.0355*	0.5238*
(-1,1)	0.0214***	0.0573*	0.1475***	-0.0409	0.4190
(0,2)	0.0021	-0.0165	-0.0040	-0.0182	-0.2286
(0,5)	0.0015	0.0142	0.0478	-0.0478	-0.2381
(0,10)	-0.0198	0.0094	-0.1908	-0.0773	-0.6381
(0,20)	-0.0310*	0.0430	-0.2594*	-0.0857*	-0.2095

Table 12: Likelihood of the Disclosure of a Short Position

This table reports the parameter estimates for a logit model of the disclosure of a short position. The sample includes stock-day observations for all firms in our sample and the two subsamples defined in the text. The dependent variable is a binary variable equal to one if a short position in the stock was disclosed on day t and equal to zero otherwise. $Disclosure_{\{t-i,t-i-k\}}$ is a binary variable equal to one if a short position in the stock was disclosed on day $t-i$ to day $t-i-k$ and equal to zero otherwise. AUM is the natural logarithm of the discloser's most recently reported assets under management subject to 13F filings. $PositionSize$ is the ratio of the size of the short position disclosed and AUM multiplied by 10. $MoneyCtr$ is a binary variable equal to one if the discloser is headquartered in New York or London and equal to zero otherwise. $Centrality$ is defined in the text. Country-level effects are fixed, and standard errors are clustered at the firm level. Additional controls (unreported) include *Short Interest at Settlement* on day $t-1$, log trading volume on day $t-1$, log market capitalization on day $t-1$ and return in excess of the stock's one-digit Industry Classification Benchmark (ICB) sector index on days $t-1$, $t-2$ and $t-3$. *, ** and *** denote significance at the 5 percent, 1 percent and 0.1 percent levels, respectively.

	Specification 1		Specification 2		Specification 3		Specification 4		Specification 5	
	Estimate	Marginal Effect	Estimate	Marginal Effect	Estimate	Marginal Effect	Estimate	Marginal Effect	Estimate	Marginal Effect
Panel A: Full Sample (Baseline Probability = 0.0010)										
Disclosed $_{\{t-1,t-5\}}$	1.492***	0.0018	0.630***	0.0008	1.473***	0.0018	1.261***	0.0016	0.818***	0.0010
Disclosed $_{\{t-6,t-30\}}$	0.363***	0.0004	-0.022	-0.0000	0.358***	0.0004	0.162	0.0002	-0.017	-0.0000
Disclosed $_{\{t-1,t-5\}} \times AUM$			0.071***	0.0001						
Disclosed $_{\{t-6,t-30\}} \times AUM$			0.082***	0.0001						
Disclosed $_{\{t-1,t-5\}} \times PositionSize$					1.397**	0.0017				
Disclosed $_{\{t-6,t-30\}} \times PositionSize$					1.210**	0.0015				
Disclosed $_{\{t-1,t-5\}} \times MoneyCtr$							0.279	0.0003		
Disclosed $_{\{t-6,t-30\}} \times MoneyCtr$							0.297*	0.0004		
Disclosed $_{\{t-1,t-5\}} \times Centrality$									1.569***	0.0019
Disclosed $_{\{t-6,t-30\}} \times Centrality$									2.364***	0.0029

Table 12: Likelihood of the Disclosure of a Short Position (cont.)

	Specification 1		Specification 2		Specification 3		Specification 4		Specification 5	
	Estimate	Marginal Effect	Estimate	Marginal Effect	Estimate	Marginal Effect	Estimate	Marginal Effect	Estimate	Marginal Effect
Panel B: Rights Issue Subsample (Baseline Probability = 0.0029)										
Disclosed _{t-1,t-5}	1.338***	0.0051	0.476**	0.0018	1.325***	0.0050	1.048***	0.0040	0.652***	0.0024
Disclosed _{t-6,t-30}	0.309***	0.0012	-0.183**	-0.0007	0.301***	0.0011	0.393**	0.0015	-0.217**	-0.0008
Disclosed _{t-1,t-5} × AUM			0.080***	0.0003						
Disclosed _{t-6,t-30} × AUM			0.082***	0.0003						
Disclosed _{t-1,t-5} × PositionSize					0.923*	0.0035				
Disclosed _{t-6,t-30} × PositionSize					0.203	0.0008				
Disclosed _{t-1,t-5} × MoneyCtr							0.382	0.0014		
Disclosed _{t-6,t-30} × MoneyCtr							-0.101	-0.0004		
Disclosed _{t-1,t-5} × Centrality									1.794***	0.0067
Disclosed _{t-6,t-30} × Centrality									2.403***	0.0089
Panel C: Non-Rights Issue Subsample (Baseline Probability = 0.0007)										
Disclosed _{t-1,t-5}	1.412***	0.0012	0.721***	0.0006	1.387***	.0012	1.323***	0.0011	0.948***	0.0008
Disclosed _{t-6,t-30}	0.382***	0.0003	0.100	0.0001	0.380***	0.0003	0.011	0.0000	0.090	0.0001
Disclosed _{t-1,t-5} × AUM			0.053**	0.0000						
Disclosed _{t-6,t-30} × AUM			0.071***	0.0001						
Disclosed _{t-1,t-5} × PositionSize					4.329***	0.0037				
Disclosed _{t-6,t-30} × PositionSize					8.179***	0.0070				
Disclosed _{t-1,t-5} × MoneyCtr							0.068	0.0001		
Disclosed _{t-6,t-30} × MoneyCtr							0.581***	0.0005		
Disclosed _{t-1,t-5} × Centrality									1.054	0.0009
Disclosed _{t-6,t-30} × Centrality									2.205***	0.0019

Table 13: Distance between the Disclosers in the Same Stock

This table reports summary statistics on the distance between disclosers of a follow-on position and the discloser of a position in the same stock between day $t - i$ and day $t - i - k$. Statistics on the distance between all discloser pairs in our sample are reported for comparison. *Percentage within 100 miles* is the percentage of disclosers of a follow-on position that are within 100 miles of the discloser of a position in the same stock over the prior window. For the test of the difference in means, *, **, and *** denote significance at the 5 percent, 1 percent and 0.1 percent levels, respectively.

	Mean Distance	Difference in Means	Percentage within 100 miles	Difference in Means
All Pairs	470.60		34.92	
Panel A: Full Sample				
Days ($t - 1, t - 5$)	412.30	-58.30***	36.59	1.67
Days ($t - 6, t - 30$)	397.20	-73.40***	42.09	7.17***
Panel B: Rights Issue Subsample				
Days ($t - 1, t - 5$)	415.40	-55.20***	36.06	1.14
Days ($t - 6, t - 30$)	379.60	-91.00***	44.37	9.45***
Panel C: Non-Rights Issue Subsample				
Days ($t - 1, t - 5$)	392.10	-78.50*	40.00	5.08
Days ($t - 6, t - 30$)	445.90	-24.70	35.83	0.91