

Revealing Shorts

An Examination of Large Short Position Disclosures*

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ABSTRACT

Since 2012, all European Union countries have required disclosure of large short positions. This reduces short interest, bid-ask spreads, and the informativeness of prices. After specific disclosures, short-run abnormal returns are insignificantly negative, but 90-day cumulative abnormal returns are a statistically significant -5.23% . We find disclosures are likely to be followed by other disclosures, especially when the initial discloser is large or centrally located. However, there is no subsequent increase in short interest, and prices do not subsequently reverse. These results indicate that large short sellers are well informed, and that disclosures are not being used to coordinate manipulative attacks. (*JEL* G14)

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Although most academic research argues that short sellers improve market efficiency and stabilize share prices, policy makers, journalists, and company executives worry that short sellers may employ abusive trading strategies and damage investor confidence.¹ Historically, regulators responded by enacting rules that limit or discourage certain short sales.³

In contrast to bans, disclosure has recently emerged as an alternative policy response. For example, U.S. exchanges are now required to report the amount of shorting activity in each stock daily. The hope of regulators is that the sunlight of disclosure discourages abusive short selling. However, theory suggests 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 United States has focused on the release of aggregated data on short sales, Europe has taken the lead in requiring the immediate public disclosure of large short positions. The United Kingdom and Spain started requiring short-sale disclosures in 2008. France started requiring disclosures in 2011, and all twenty-seven European Union countries began requiring disclosures in November 2012. Under the current pan-European disclosure regime, any short seller with a short position exceeding 0.5% of the shares outstanding must publicly disclose the size of the short position by the next business day. As a result, the disclosures studied here are novel and distinct from previous types of publicly available short-sale data. Unlike short interest, short-sale volume, and equity loan data, each observation in this study includes the date of the

¹ See, for example, Dechow et al. (2001), Abreu and Brunnermeier (2002), Alexander and Peterson (2008), Boehmer, Jones, and Zhang (2008), Boehmer and Wu (2013), and Diether, Lee, and Werner (2009). See also R. Pozen and Y. Bar-Yam, “There’s a Better Way to Prevent ‘Bear Raids,’” *Wall Street Journal*, November 18, 2008; S. Pulliam et al., “Anatomy of the Morgan Stanley Panic,” *Wall Street Journal*, November 24, 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 (2013), Boehmer, Jones, and Zhang (2013), Battalio and Schultz (2011), and Beber and Pagano (2013), among others.

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

This paper contributes to the literature in several important ways. First, we measure the market-wide effects of the change in the disclosure regime. Next, we analyze the effects of specific disclosures on individual stocks. Finally, we investigate the role of discloser characteristics, both reputation- and geography-based measures, in the effects of disclosure.

In measuring the overall market-wide effects of changes in the disclosure regime, we seek to distinguish between two very different underlying models: a model where short sellers are well informed about fundamentals versus an alternative where short sellers are predatory. In particular, the informed trader model of DeMarzo, Fishman, and Hagerty (1998) predicts that a short position disclosure regime will discourage shorting activity, reduce price informativeness, and increase liquidity, while the predatory model of Brunnermeier and Oehmke (2014) predicts that if the disclosure regime provides a coordinating mechanism, it will be associated with greater shorting activity and greater share price volatility.

Our identification is enhanced by the staggered introduction of the disclosure rules on five distinct event dates in our sample of twelve countries. By measuring the difference between pre- and post-disclosure periods in this broad sample of stocks, we show that the disclosure regime has a significantly negative effect on short interest, with a measured decrease of 1.88% of shares outstanding in stocks subject to the regime. Share prices are also less informative under the disclosure regime, suggesting that less information from short sellers is being impounded into prices. The flip side of less shorting is that the disclosure regime may reduce market participants' concerns about adverse selection, and consistent with that hypothesis, we find a significant reduction in the bid-ask spread of 0.41% in affected stocks. As noted above, the results are

consistent with a model along the lines of DeMarzo, Fishman, and Hagerty (1998), where the regulator's policy toward informed traders can affect their trading behavior. The short position disclosure policy appears to discourage some informed shorting, leading to reduced short interest and reduced informativeness of prices, but greater liquidity. Furthermore, there is little change in volatility. Overall, the results are consistent with well-informed short sellers; there is little support for a model of predatory shorting.

We then turn to the impact of specific disclosures on individual stocks. If short sellers are informed, for example, we should see negative returns after large short positions are initiated. Alternatively, if disclosures provide a coordination device for predatory shorting, we should find disclosures followed by increases in short interest. The evidence is consistent with information, not manipulation. In particular, we find negative returns after large short positions are initiated, and interestingly, we find that disclosures cluster in time and geographically. But there is no evidence of short sellers "piling on" after a disclosure.

Looking at the periods surrounding these specific disclosures, we find rich trading and share price behavior. While we might expect disclosures to be a negative valuation signal from an informed trader, there is little evidence of an immediate share price reaction to the disclosure; the three-day cumulative abnormal return is an insignificant -0.41% . Post-disclosure abnormal returns become more negative at longer horizons. For example, the cumulative 90-day abnormal return after a disclosure is a statistically significant -5.23% . Furthermore, there are no return reversals or other evidence of manipulative shorting activity. The return evidence is consistent with the idea that large short sellers are simply well informed.

Given that the previous literature suggests 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 longer-horizon 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. However, if disclosures drive more disclosures, there could be cause for concern. Regulators have worried that disclosures of short positions could act as a coordination device enabling manipulative short sellers to act together.

To this end, we first explore the effects of disclosure on overall shorting activity. We find an increase in short interest before disclosure as short-sale disclosers build positions. Similarly, we find increases in the number of active lenders and the number of open loans. Notably, this short activity does not change significantly on or after the date of the disclosure; instead, the significant changes come only before the disclosure. This finding is consistent with the idea that information, not disclosure, is driving the shorting activity.

However, the effects of disclosure on shorting activity may not be the whole story. Disclosures could drive more disclosures without large changes in shorting activity if short sellers are clustered just under the disclosure threshold. To investigate this possibility, we use a logit specification to characterize the probability of a disclosure. This clustering seems to be the case; we find that a recent 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 disclosure.

Discloser-specific characteristics may play a role in the probability of these follow-on disclosures. For example, reputation matters in many disclosure contexts, and here, it may play a role in reducing the costs of disclosure for these subsequent disclosers. We hypothesize that the reputation of a disclosing short seller affects the probability of future disclosures. 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 reputation as an informed trader. We do in fact find that reputation is a significant driver of the probability of subsequent disclosures. A stock with a disclosure made in the past thirty days by a short seller with high assets under management is significantly more likely to have a disclosure by another short seller on a given day.

Because we know the identity of these disclosing short sellers, we can also study their geography to better understand the nature and flow of their information. For example, if nearby short sellers are communicating with each other, we should find that those who are shorting the same stock around the same time are generally closer together. In fact, short sellers with addresses that are close to other short sellers' addresses are more likely to be followed. Furthermore, disclosures made by short sellers in New York and London are more likely to be followed, and 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. Regardless of the exact channel, the combination of public disclosure and geographic proximity seems to matter.

On its face, the finding that disclosures cluster in this way appears inconsistent with the other main findings because it suggests that disclosure, not information, is driving short sales. However, it is important to note that we can only measure clustering once the disclosure regime is in place. There is no way of measuring whether the clustering of short positions has changed because of the disclosure regime. Furthermore, we find that overall short interest does not increase following a disclosure. In fact, there is little change in any of our share-lending metrics following a disclosure. Thus, the most likely explanation for clustered disclosure is that short

sellers receive correlated private signals about equity value and act on this information at about the same time.

Initially, the U.K. disclosure regime applied only to financial stocks and stocks undergoing rights issues. It is important to look at rights issues separately because previous evidence suggests that the manipulation incentives may be clearest around equity offerings. For example, the Securities and Exchange Commission, explicitly concerned about these incentives, prohibits some shorting and covering activity during U.S. seasoned equity offerings. Despite these prohibitions, Henry and Koski (2010) find that short sellers may push prices temporarily below fundamental values during these equity offerings. However, we find no evidence that short-sale disclosures are driving down share prices of EU firms with rights issues. We find, for example, that the presence of a short position disclosure is not related to stock returns during the rights issue. Post-rights-issue stock price behavior also points away from manipulation. If short sellers are temporarily 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 bounce-back; in the sixty days following completion of a rights issue with a short position disclosure, the mean CAR is an insignificant -0.27% . Thus, it does not appear that short-sale disclosures push stock prices down during rights issues.

Overall, there is no evidence that disclosures are being used as a coordination device for manipulation or short squeezes. However, there is less shorting under the disclosure regime, and prices are not as informative, consistent with the idea that some informed trading is being discouraged by the disclosure requirements. Thus, the overall benefit of the short position disclosure regime is not at all clear.

1. Related Literature and Testable Hypotheses

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 sell for liquidity reasons, though they may use short sales to hedge other risks.

Theory also suggests that regulatory policy toward short sellers and other informed traders affects price discovery. For example, 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.⁴ In our context, a particularly relevant paper is that of DeMarzo, Fishman, and Hagerty (DFH; 1998), who develop a model where regulators want to impose restrictions on informed trading. They find that when enforcement is costly, the regulators' optimal enforcement policy is to focus only on trades that exceed a certain size. Compared with a suboptimal enforcement regime without such a threshold, the informed traders trade a smaller amount, and this reduces adverse selection in the trading market and makes prices less informative.

While DeMarzo, Fishman, and Hagerty (1998) have in mind trading by corporate insiders, their model applies to any identifiable class of informed traders, such as short sellers. Thus, if a disclosure threshold is imposed on short sellers, they are more likely to trade smaller amounts in order to stay below the threshold. Under the DFH model, then, a short position disclosure regime should be associated with less shorting, less informative prices, and narrower bid-ask spreads due to less adverse selection.

⁴ Empirical evidence finds that overpricing is generally 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.

An alternative theoretical framework is one in which short sellers might be able to drive share prices below fundamental value. Some market observers and participants have worried recently that this might have occurred during the most recent financial crisis.⁵ For example, Goldstein and Guembel (2008), Goldstein, Ozdenoren, and Yuan (2013), and Liu (2014) suggest that short sellers have an incentive to manipulate a share price if doing so distorts the company's investment decisions or operating performance, thereby harming its fundamental value.

A particularly relevant model in our context is that of Brunnermeier and Oehmke (2014), who find that short sellers may be able to force a vulnerable financial institution to liquidate assets at fire-sale prices. They specifically argue that public disclosure of shorting activity could facilitate coordination by predatory short sellers, leading to the liquidation outcome. In contrast to DFH, the Brunnermeier and Oehmke (2014) model predicts that if a disclosure regime facilitates such coordination, it should increase shorting activity and increase share price volatility.

Other models of predatory shorting predict return reversals. For example, 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. Allen and Gale (1992) and Aggarwal and Wu (2006) present theoretical and empirical evidence of “pump-and-dump” manipulation, and a similar “bear raid” strategy could be used on the short side. Return reversals in the days and weeks after a short position is disclosed would provide evidence of this type of predatory shorting.

⁵ For example, see Pozen and Bar-Yam, “Better Way to Prevent ‘Bear Raids’”; G. Soros, “One Way to Stop Bear Raids,” *Wall Street Journal*, March 23, 2009; and T. Brennan, “Blame the Bear Raids,” CNBC, March 20, 2008.

Empirically, the evidence is uniform that short sellers anticipate future negative 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 et al. (2010) find some intraday evidence of momentum trading by short sellers. Christophe, Ferri, and Angel (2004) and Boehmer, Jones, and Zhang (2013) find that daily flows of short sales are concentrated prior to disappointing earnings announcements, analyst forecast revisions, and analyst downgrades, which suggests that short sellers have access to private information about fundamentals, while Engelberg, Reed, and Ringgenberg (2012) find that short sellers trade profitably around news releases. These results are consistent with informed shorting, and if short position disclosers are informed in our sample, we would expect to see permanent price declines following the disclosure.

Manipulative short selling is of particular concern around certain corporate events, such as seasoned equity offerings (SEOs).⁶ For example, Safieddine and Wilhelm (1996) and Corwin (2003) investigate rule changes in the United States designed to curtail manipulative short selling around SEOs.⁷ Henry and Koski (2010) find that in SEOs that are not part of a shelf registration and thus take longer to execute, 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 (2013) study trading behavior around the SEO issue date and find that underwriter

⁶ Outside of SEOs, Shkilko, Van Ness, and Van Ness (2012) find aggressive short selling when stocks experience large negative intraday price moves followed by a reversal before the end of the day. 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.

⁷ 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.

market-making activity explains the heavily negative returns after the SEO.⁸ Because most European equity issues are conducted via rights issues, we examine short position disclosures around these events. If there is predatory shorting during rights issues that exploits other investors, we should see return reversals following the completion of the rights issue. Alternatively, predatory shorting during a rights issue might cause the rights issue to fail, leading to a permanent loss of value. Thus, we also look at whether short position disclosures lead to lower rights issue completion rates.

Two other papers study changes in short-sale disclosure regimes: Beber and Pagano (2013) and Duong, Huszar, and Yamada (2015). While Beber and Pagano (2013) focus on short-selling bans, they also include in their international panel of stocks an indicator variable if short sellers are required to disclose their trades. They find as we do that a disclosure regime narrows bid-ask spreads. Duong, Huszar, and Yamada (2015) study the November 2008 imposition of a short position disclosure regime in Japan using an event-study and panel-data approach. There are potentially confounding events, including the failure of Lehman Brothers in September 2008 and a naked shorting ban introduced in Japan four days before the disclosure regime, but they conclude that there is less shorting once disclosure is required. In contrast to the latter paper, which has no control firms, we achieve much more powerful identification by exploiting the staggered introduction of a disclosure regime both within and across countries. We also exclude any disclosure regime change that occurs around a shorting ban, in order to avoid any confounding effects. Finally, our paper goes beyond analyzing the effects of disclosure regimes by examining individual disclosures.

⁸ In a related set of results on initial public offerings (IPOs), Edwards and Hanley (2010) find that short sales are not as important to IPO pricing, as suggested by the literature.

The short position disclosures that we study here are also related to other public releases of information about short sales. Aitken et al. (1998) examine real-time disclosures of short sales in Australia and find that short sales have a large, immediate negative price impact. Many studies focus on the monthly (now bimonthly) release of short interest information in the United States. Asquith, Pathak, and Ritter (2005) find that short interest predicts returns only in small stocks and report that the effect is stronger in stocks with low institutional ownership. Desai et al. (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. Finally, Senchack and Starks (1993) find negative short-term reactions to short interest announcements, especially for non-optioned stocks with unexpectedly large increases in short interest. In this paper, short interest is an important conditioning variable, because we expect that the larger the short interest in a stock, the bigger the effect of the disclosure regime.

Short position disclosure rules seem to be modeled on existing long position disclosure regimes, but the regulatory motivation is somewhat different. Large long positions are often associated with corporate control effects, including the possibility of a takeover and the influence of large blockholders on corporate decision-making. In contrast, short-sale disclosure is explicitly motivated by concerns about predatory trading activity and the potential for negative real effects on companies, which may explain the lower thresholds associated with short position disclosure in the European Union. Researchers find that the disclosure of large long positions is informative, and we might expect something similar on the short side. For example, Brav et al. (2008) examine Schedule 13D filings in the United States by activist hedge funds that disclose ownership stakes of at least 5% of shares outstanding. They find average returns of around 2% associated with the disclosure, with an additional upward drift of about 2% over the next month,

though they argue that these are associated with shareholder value creation rather than stock-picking ability.

Our short-sale data may also shed light on some of the rights issue results in the literature. For example, Eckbo and Masulis (1992) develop a theory implying that rights issues should have no effect on share price, since existing shareholders receive the rights. They study a small sample of U.S. rights issues and find insignificantly negative stock price announcement effects. However, Slovin, Sushka, and Lai (2000) find a U.K. rights announcement effect of -3.09% , and Ho (2005) finds that there is little long-term equity underperformance following U.K. rights issues. Levis (1995) mainly studies young firms that return to the equity market with a rights issue following an initial public offering (IPO). With our disclosure data, it is now possible to assess whether any of the documented stock price moves around rights issues are associated with the activities of large short sellers.

Finally, our work is also related to the existing 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. Our disclosure data allow us to shed light for the first time on the timing and the geography of herding on the short side.

2. European Disclosure Regimes

The short position disclosure requirements that we study were adopted at different times in various countries and differ in some details, but the requirements are broadly similar. In particular, there is always a minimum position size threshold calculated as a fraction of shares outstanding, additional disclosures are required if the short position changes substantially or shrinks below the threshold, and disclosure of the position and the identity of the short seller

must occur within one business day after the threshold is reached. In addition, short sellers must include positions in equity derivatives on a delta-adjusted basis, including options and total-return swaps, but do not require the inclusion of short positions in bonds or credit-default swaps.

2.1. Pan-European disclosure requirements

A uniform short position disclosure regime came into force throughout the entire European Union on November 1, 2012. Under this regime, net short positions must be privately reported to the relevant national regulator if they are at least 0.2% of shares outstanding, and short positions must be publicly disclosed if they are at least 0.5% of shares outstanding. Subsequent disclosures are required in 0.1% increments. For example, additional private disclosures are required if the short position crosses 0.3% or 0.4% of shares outstanding, and additional public disclosures are required as the short position crosses 0.6% or 0.7%. Disclosures must be made the day after a threshold is crossed, and the disclosure requires the name of the entity that has the position, the amount of the position, and the name of the company in which it has the position. There are exceptions for market-makers and for stocks where the primary listing venue is outside the European Union.

In the four years prior to the start of the pan-European regime, the United Kingdom, France, and Spain each instituted some form of short-position disclosure at the national level. There is some variation across these three jurisdictions in the stocks covered, and the next sections detail the relevant features of each of these national disclosure regimes. All of the disclosure regimes are summarized in Figure 1.

2.2. United Kingdom

The U.K. Financial Services Authority (FSA) was the first to institute a short-position disclosure regime, requiring disclosures starting on June 20, 2008, in stocks undergoing rights issues. On September 19, 2008, the FSA banned short selling in financial stocks and expanded the disclosure regime to include financial stocks. About four months later, on January 16, 2009, the FSA lifted the short-sale ban on financial stocks, but kept and clarified the short position disclosure requirements for financial-sector stocks as well as any stock in a rights issue period.⁹ The U.K. disclosure requirements were expanded to all stocks when the pan-European regime came into effect in November 2012.

In the United Kingdom prior to November 2012, any short seller with a short position exceeding 0.25% of the shares outstanding was required to publicly disclose the size of the short position, with subsequent disclosures if a short position were to change by 0.1% of shares outstanding or more. The disclosures are required by 3:30 p.m. on the business day following the first day on which the position reaches, exceeds, or falls below the disclosure thresholds. The U.K. national regime never required private disclosure only to the regulator: short positions of less than 0.25% of shares outstanding did not require any disclosure.

2.3. 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

⁹ See FSA press release FSA/PN/057/2008, June 13, 2008; “Temporary Short Selling Measures,” FSA, January 2009, http://www.fsa.gov.UK/pubs/policy/ps09_01.pdf, and “FSA Confirms Extension of Short Selling Disclosure Regime,” press release FSA/PN/009/200, January 14, 2009, <http://www.fsa.gov.UK/pages/Library/Communication/PR/2009/009.shtml>.

stocks.¹⁰ However, since short sales in those stocks were banned at the same time, there were virtually no disclosures of new short positions during that period. 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 were required to be reported by the next day and are published on the AMF website. Short positions below this threshold did not require any form of disclosure. Additional thresholds are at 0.1% intervals (0.60% of shares outstanding, 0.70%, 0.80%, and so on), and subsequent disclosures were required every time the position crossed one of these thresholds. A final disclosure was also required when the short position falls below the 0.50% threshold. The short position disclosure rules covered all issuers trading on Euronext Paris or Alternext Paris, except firms for which the French market is not the principal trading market. Derivative positions were included in calculating the discloser's net short position. Bona fide market-makers could apply in advance for an exemption from the short position disclosure requirements.¹¹ The French disclosure regime is superseded by the EU regime in November 2012.

2.4. Spain

Spain also adopted short-position disclosure rules for twenty 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 thereafter were similar to those of France. The Spanish regulator Comisión Nacional del Mercado de Valores (CNMV) published individual short positions of at least 0.50% of shares outstanding with additional thresholds at 0.1% intervals, just as in France. During the period before November 2012, the

¹⁰ AMF news release, September 19, 2008.

¹¹ Additional details on the French disclosure requirements can be found in AMF Implementing Instruction 2010-08, November 9, 2010, http://www.amf-france.org/documents/general/9738_1.pdf.

main difference from the French regime is that those shorting Spanish stocks had to report to the regulator all positions of at least 0.20% of shares outstanding. The CNMV reported the aggregate amount of all short positions that were between 0.20% and 0.50% of shares outstanding, but did not publish any details about the individual short positions in this size category. As with the United Kingdom and France, the Spanish disclosure regime was superseded by the EU regime in November 2012.

3. Data

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

3.1. Disclosure Data

We obtain a record of over 23,000 disclosures of 3,647 distinct short positions in 771 firms. The sample of disclosures begins on January 17, 2009; February 2, 2011; and June 10, 2010, for the United Kingdom, France, and Spain, respectively, and disclosures start on November 1, 2012, for the nine other countries in our sample (Austria, Belgium, Finland, Germany, Ireland, Italy, the Netherlands, Portugal, and Sweden).¹² The sample extends through December 31, 2013.¹³ The database has several pieces of information about each disclosure,

¹²These countries consist of MSCI EAFE members for which a disclosure regime was enacted, a short position was disclosed over our sample period, and data on the disclosed firm are available from both Datastream and Data Explorers.

¹³As discussed above, short-selling bans are instituted at various times in many European countries (see also Beber and Pagano 2013). We exclude all disclosures that occur while a shorting ban is in effect in order to avoid any confounding effects from the ban.

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.¹⁴ We obtain the initial U.K. portion of this database from Data Explorers, which collected the disclosure information from publicly available news sources. We have hand checked a small subsample (2% of the announcements) of the database against the London Stock Exchange's regulatory news database, and we find no discrepancies. We also validate the U.K. disclosures by checking that the disclosed short position is below the number of shares borrowed in the United Kingdom's CREST database.¹⁵ Disclosure announcements for all other countries are collected from the website of the regulatory body governing the disclosure regime.

Figure 2 presents an example of a U.K. disclosure announcement retrieved from the Bloomberg newswire. In this example, Millennium Partners LP 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 LP for the purpose of our study, and such final disclosures make it possible to describe the life cycle of a disclosed short position. Figure 3 plots the closing price of Old Mutual PLC against short positions held in the security for the first three months of the U.K. 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 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

¹⁴ For many but not all of the disclosures, we also have the exact time at which the short sales are disclosed.

¹⁵ 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 United Kingdom and because CREST data report settled transactions as opposed to initiated short positions, we consider these observations valid.

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 LP 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 2. 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, and some summary statistics by country are given in Table 1. The United Kingdom accounts for a little more than half of the sample, with 7,265 disclosures of 1,953 distinct short positions relating to 399 different firms. From those last two numbers, we discern that the average U.K. stock in the disclosure sample is subject to 4.89 distinct short positions over the sample period. The corresponding number for the whole sample is quite similar, at 4.73 disclosed positions per stock. Consistent with the clustering of disclosed short positions in Old Mutual PLC presented in Figure 3, there are an average of 2.78 follow-on disclosures by others within twenty trading days of the first disclosure by a short seller. Additional disclosures are required each time the short position crosses a designated threshold. On average, each shorter-issuer pair appears 6.42 times in the overall sample. The average disclosed short position in the sample is 0.95% of shares outstanding.

Similarly, we see that the average holding period of a disclosable short position is 51 trading days after excluding positions that are still open at the end of our sample. On average, the short position builds up and reaches its maximum 16 trading days after the first disclosure. This average holding period 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 taken by Two Sigma Investments LLC in the stock of Pernod-Ricard, which is 14% of shares outstanding.

As a first glimpse into the follow-on behavior of other short sellers, Table 1 presents summary statistics on the average number of disclosed short positions originated by other short sellers over the (0,20)-day window following a disclosure. Follow-on activity is particularly prevalent in the United Kingdom, where on average there are 3.57 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 United Kingdom the average disclosed position has one follow-on disclosure after 3.17 trading days and another follow-on after 4.44 trading days. Moreover, multiple short sellers can cross the disclosure threshold on the same day. In the United Kingdom, for example, this occurs 39% of the time.

Table 1 also presents the disclosures by industry and reveals that financial firms account for about 17% of the disclosures overall, and as high as 38% in Italy. This is unsurprising, since European banks and financial firms have faced well-publicized problems during the sample period. However, recall that the disclosure regime in the United Kingdom and Spain initially focuses on financial firms, so that could account for some of finance's overrepresentation in the sample. In addition, banks and other financial firms in Italy experienced capital concerns during the 2012–13 period.

While we analyze each short position disclosure, we focus greater attention on the first disclosed short position in each firm for more precise identification. Thus, for many of our analyses, the sample consists of 771 initial disclosed positions.

3.2. European securities lending data

Securities lending data were generously provided by Data Explorers, now a division of Markit. Versions of this database have been used by a number of previous papers, including Ringgenberg (2014), Saffi and Siggurdson (2011), and Berkman and McKenzie (2012). The database contains information about short selling and short-selling constraints for stocks in European markets from January 1, 2008, through December 31, 2013. 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 2013).

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. *Percentage 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 number of shares outstanding currently borrowed or on loan net of double counting scaled by the total number of shares outstanding.¹⁶ 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 7 as a criterion for our matching algorithm), we do not adjust for the three-day settlement lag. For clarity, we label this variable *Short interest at settlement*.

We also employ the following securities-level data. Daily stock returns, trading volume, shares outstanding, and bid-ask spread are from Datastream.¹⁷ *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.¹⁸

¹⁶ For U.K. stocks, we also have access to data from CREST Co., the United Kingdom'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.

¹⁷ Returns are filtered to delete potentially erroneous values following Griffin, Kelly, and Nardari (2010). 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%.

¹⁸ 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.

4. Results

4.1. *Effects of the disclosure regime*

We begin by considering the overall effects of changes in the disclosure regime. As discussed above, two canonical models provide opposite predictions. A model of informed trading where informed traders dislike regulatory scrutiny, such as DeMarzo, Fishman, and Hagerty (1998), predicts that a short position disclosure regime will discourage shorting activity, reducing price informativeness but increasing liquidity due to the smaller amount of adverse selection that is present in the trading market. In contrast, Brunnermeier and Oehmke (2014) predict that if the disclosures are a coordination device for predatory short sellers, the disclosure regime should be associated with greater shorting activity and greater share price volatility.

To investigate the overall effects of the change in policy, we want to examine short interest and other measures before and after the implementation of a short position disclosure regime. The challenge is to rule out other contemporaneous influences. To this end, we take advantage of the breadth of our dataset and the staggered introduction of the disclosure regime by combining multiple event dates and multiple countries into one experimental design, similar in spirit to Beber and Pagano (2013). In order to avoid confounding effects, we exclude disclosure events where there is a contemporaneous shorting ban. The analysis presented is a balanced panel. For clarity, consider the event around a single disclosure regime change. For this regime change, the treatment firms are the firms subject to a change in disclosure regime. The control firms are firms that are not subject to a change in the disclosure regime. These control firms may be in the same country in an industry unaffected by the regime change, or the control firms may be in a different country that is unaffected by the regime change. All eligible control firms are pooled rather than matching one-to-one or one-to-many with the treatment firms. Thus,

we can measure the difference between pre- and post-disclosure measures on a broad sample of stocks. Our panel is balanced in the sense that we require both a pre- and post-regime observation for a firm to be included as either a treatment or control firm for a given disclosure regime change. For example, when we look at bid-ask spreads, the unit of observation is the average bid-ask spread over the three-month interval, with each stock having two observations per event.¹⁹

The outcome variable is denoted y_{ijkst} for firm i in industry j and country k either prior to ($t = 0$) or after ($t = 1$) event s , and given this notation, the estimated regression is:

$$y_{ijkst} = \alpha_j + \gamma_k + \delta_s + \beta_1 I_{ijkst}^D + \beta_2 I_{ijkst}^A + \beta_3 I_{ijkst}^D I_{ijkst}^A + \varepsilon_{ijkst},$$

where I_{ijkst}^D is a “disclosure” indicator variable equal to one if and only if a short position disclosure regime is in effect for this observation, and I_{ijkst}^A is an “after” indicator variable equal to one if and only if $t = 1$ (i.e., if the observation is after event s). There are fixed effects for industry, country, and event, and standard errors are clustered at the firm level. The regression coefficient of interest is β_3 , which captures the incremental effect of the disclosure regime on the measured outcome variable.

The disclosure regime dates are provided in Figure 1. We use four distinct event dates corresponding to the implementation dates of disclosure rules in our sample of twelve countries.²⁰ The first two dates are for Spanish stocks. On September 22, 2008, Spanish financials become subject to short position disclosure. Around this event date, then, treatment firms are Spanish financials, and controls are all other firms in our EU countries that are not

¹⁹ By condensing the panel down to two observations per event, we eliminate the potential understatement of standard errors identified in Bertrand, Duflo, and Mullainathan (2004).

²⁰ We drop the regime change occurring in the United Kingdom on January 16, 2009. Concurrent with the regime change there was a ban on short selling that was later removed. More broadly, when there is a ban on short selling in a given firm within three months of the event date, we drop that firm for the analysis around that event date, because a short seller’s ability to open a position could be drastically affected by the ban.

subject to a shorting ban, including Spanish non-financials. On June 10, 2010, the disclosure regime is expanded to all Spanish stocks. Thus, the treatment firms around this date are Spanish non-financials, and the controls are all other firms in our EU sample, including Spanish financials.²¹ Our next date is February 1, 2011, when the disclosure regime came into effect in France. For this date, our treatment firms are French non-financial stocks, and our control firms are stocks not listed in France.²² Our final date is November 1, 2012, when short position disclosure begins in the remaining EU countries. For this event date, the treatment group is the EU firms for which there is not already a disclosure regime in place, and our control firms are French, Spanish, and U.K. financials.

The results of this regression analysis can be found in Table 2. For the purposes of this analysis, we use the three months before the event as the pre-period and the three months after the event as the post-period. Panel A shows that in the full sample, the disclosure regime has a significantly negative effect on short interest (based on Data Explorers share-lending data). The point estimate is -1.88% of shares outstanding for the differential effect on firms subject to the disclosure regime. Furthermore, we look at subsamples based on terciles of short interest and size.²³ Panel B indicates that the effect is larger in high short interest stocks, which matches the findings of Duong, Huszar, and Yamada (2015) for Japan's introduction of a disclosure regime. Panels C and D find greater effects on small stocks and on small stocks with high short interest.

²¹ According to Beber and Pagano (2013), Spain instituted a short-selling ban for all stocks on September 24, 2008. However, we follow at least one paper in the literature by considering the ban on short selling Spanish stocks to be ineffective. Table 1 of Jain et al. (2013) shows that short selling technically has been prohibited in Spain since 1992. However, their footnote 3 states: "Our stock borrowing data show that it is very feasible to short sell in Spain." We use similar data in this study and also find substantial share lending in Spanish stocks during this period. Thus, we include Spain in our sample throughout.

²² At the start of the disclosure regime in France, French financials were under a short-selling ban; therefore, these firms are excluded from the treatment and control groups around this event date.

²³ Specifically, for the high short interest subsample, we include firms in the top third of average short interest in the pre-regime period, where terciles are calculated within country. Similarly, for the small size subsample, we include firms in the bottom third of size. For the high short interest and small size subsample, we first form terciles on short interest, and then form terciles on size within the short interest terciles.

These results are consistent with the idea that the disclosure regime deters some short sellers, and furthermore, the result is especially strong among those stocks that are most likely to trigger a disclosure. In particular, stocks that are both high in short interest and small in market cap show a short interest reduction of 7.08% of shares outstanding. Overall, these results strongly suggest that the disclosure regime reduces short interest, and it reduces short interest most in those stocks that are most likely to be subject to disclosures.

We also investigate changes in loan concentration around the disclosure regime, and we find that concentration increases. In particular, in the full sample, concentration increases by 0.0291. Because loan concentration is a Herfindahl index, it can be interpreted as the average market share if all share lenders are identical. The 2.91% change in loan concentration is from 29.4% to 32.3% in this case, and inverting these figures implies a move from about 3.4 equal-sized lenders to 3.1 of them. This full sample result is generally consistent with the reduction in short interest discussed above; as short sellers borrow fewer shares, they may borrow shares from fewer lenders, as suggested by Kolasinski, Reed, and Riggerberg (2013). However, this result is not very consistent; we find that there are both increases and decreases in concentration among different subsamples.

To investigate changes in liquidity associated with the disclosure policy, we first measure changes in the bid-ask spread. When we estimate the difference-in-difference specification, we find a statistically significant reduction in the percentage bid-ask spread of 41 basis points, which indicates an increase in liquidity. Since the pre-period mean is 0.0259 (or 2.59%), average spreads are narrowing from 2.59% to 2.18%, or about 16%. Beber and Pagano (2013) find a similar result in their panel regression. The reduction in the bid-ask spread is also significant among small stocks with high short interest.

We also include the natural log of the Amihud (2002) measure of illiquidity, and we find an increase in illiquidity. The point estimate on the full sample is a statistically significant 12.83% (log) increase, indicating that stocks become less liquid after the disclosure regime begins. At first glance, this result is at odds with the bid-ask spread result. However, since the Amihud (2002) measure is sensitive to turnover and volatility, changes in either of these variables could drive the result even if liquidity is increasing. To investigate this possibility, in Table 2 we also present turnover and volatility, and we see that turnover is indeed decreasing, in a result consistent with the reduction in short interest. Furthermore, in the full sample, there is no change in volatility. When broken up into these two components, the decline in turnover is consistent with the informed shorting model, and the volatility result does not provide any support for the predatory shorting model.

In order to further investigate changes in informed trading, we look at the Hou and Moskowitz (2005) measure of price informativeness. Hou and Moskowitz (2005) measure price delay by regressing the weekly returns r_{it} of stock i on the contemporaneous value-weighted market return R_{mt} and four lags of the value-weighted market return:

$$r_{i,t} = \alpha_i + \beta_i R_{m,t} + \delta_{i,1} R_{m,t-1} + \dots + \delta_{i,4} R_{m,t-4} + \varepsilon_{i,t}.$$

Intuitively, non-zero coefficients on lagged market returns indicate price delay. We use the D1 measure from that paper, which is essentially the contribution of the lagged market returns to the regression goodness-of-fit:

$$D1 = 1 - \frac{R_R^2}{R_U^2},$$

where subscript R refers to the restricted regression with $\delta_i = 0$, $i = 1, \dots, 4$, and subscript U refers to the unrestricted regression above. We find that price delay increases after the beginning of the disclosure regime. The coefficient estimate of 0.0376 indicates prices respond more slowly once

the disclosure regime is in place. Relative to the pre-period mean D1 measure of 0.3890, this represents a 9.67% increase ($= 0.0376 / 0.3890$) in price delay. Since the previous literature suggests that short sellers increase price informativeness, the reduced presence of short sellers indicated by the table is consistent with the reduction in price informativeness.

We might expect high short interest stocks to be more affected by the disclosure regime in terms of price efficiency. Interestingly, the impact of the disclosure regime on the price delay measure for high short interest stocks is 0.0234, which is smaller than the 0.0376 coefficient for the whole sample. However, these two estimates are not statistically different from each other (the standard error on the difference is 0.0099, $t = -1.39$), and the two coefficients are actually quite similar on a relative basis, because there is less price delay in the high short interest subsample. The high short interest subsample has a pre-period mean D1 measure of 0.2144. Relative to the pre-period means, the percentage changes in the two subsamples are similar: a 9.67% increase ($0.0376 / 0.3890$) for the full sample and a 10.91% increase ($0.0234 / 0.2144$) for the high short interest subsample.

We also calculate an additional price efficiency measure, the Hou and Moskowitz (2005) price-delay measure D2 as implemented by Engelberg, Reed, and Ringgenberg (2015). Specifically,

$$D2 = \frac{\sum_{j=1}^4 |\delta_{i,j}|}{|\beta_i| + \sum_{j=1}^4 |\delta_{i,j}|}.$$

We find very similar results. Prices adjust with significantly more delay under the disclosure regime. Coefficient estimates are smaller for the high short interest subsample (0.0213 vs. 0.0344

for the full sample), but as was the case for the D1 measure, the two coefficients are statistically indistinguishable, and the percentage changes for the two groups are very similar.

To summarize, the imposition of the disclosure regime reduces the overall amount of shorting and price informativeness. There is an increase in liquidity as measured by the bid-ask spread, and volatility changes little. These results are consistent with a model of informed short sellers; there is little support for a model of predatory shorting.

4.2. Stock returns around short-sale disclosure

In a standard efficient markets setting, the stock price response to the disclosure of a short position is a measure of that disclosure's information content. However, that stock price response may instead reflect the market's expectation that abusive or manipulative behavior lies ahead. As a first pass, 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 3, Panel A, we see that the abnormal returns are flat to negative around the period of disclosure. Specifically, we calculate abnormal returns as the return of a disclosed stock less the return of that stock's one-digit Industry Classification Benchmark (ICB) index.²⁴ Using a calendar-time portfolio approach, we find that the cumulative difference is only negative in the longer windows around the day of disclosure. For example, there is no significant 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 an insignificant -0.41% . However, there is a stronger downward trend for longer windows; cumulative abnormal returns from the day of disclosure until the tenth day after the

²⁴ All of our results are unchanged when we use market-adjusted or beta-adjusted returns as in Griffin, Hirschey, and Kelly (2011).

disclosure average are -1.24% , which is significant at the 5% level. Similarly, returns to the 90th day after disclosure are -5.23% , which is again significant at the 5% level.

Figure 4 displays these results graphically. In the full sample, we see that cumulative abnormal returns have only a gradual decrease after the disclosure, and in the rights issue subsample, there is no decrease until well after the disclosure. These returns then remain relatively stable, with no evidence of price reversals at any time up to 90 days following the disclosure. In summary, stock prices show no effect in the days immediately after disclosure, but over time, a gradual decrease can be measured in the full sample.

Recognizing that there are potentially multiple types of disclosures for a given short position, we partition disclosures into types. It is interesting to note that the results are largely consistent across types. Table 3, Panel B, reports industry-adjusted returns following various types of short position disclosures.²⁵ Increases in short positions (which we call upticks), decreases in short positions (referred to as downticks), and moving below the disclosure threshold (“closeouts”) 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 -0.15% , which is statistically indistinguishable from zero. Thus, there is no evidence that follow-on disclosures by other short sellers are associated with negative returns. We also partition into groups based on the size of the short position as a fraction of shares outstanding. Again, we find that returns are insignificant for both relatively large and relatively small disclosed short positions. Table 3, Panel B, shows that short positions at or above the

²⁵ It is worth noting that some disclosures in the database are unnecessary. For example, we find 29 disclosures where there is no change in the short position. Perhaps these short sellers simply do not understand the exact details of the disclosure requirements, but an alternative explanation is that some short sellers perceive a benefit from disclosure, an idea developed in Fishman and Hagerty (1989). Although we do not include these non-mandatory disclosures in our sample, we find that there is a negative price reaction around these events. The average daily abnormal return is -0.38% (two-day announcement cumulative abnormal return of -0.77%), with a standard error of 0.22%, and is statistically significant at the 10% level.

median position size have statistically insignificant average CARs of 0.57% in the (0,1)-day window, compared with a statistically insignificant -0.30% for smaller short positions.

Since we know the identity of the short seller, we can also investigate whether discloser attributes are associated with differences in stock returns. For instance, an intuitive interpretation of Diamond and Verrecchia (1987) would suggest that disclosures made by more informed short sellers would lead to larger stock price reactions. Table 4 lists the most prolific short position disclosers in our sample. Most are hedge funds and asset managers rather than large sell-side firms. At the top of the list are Marshall Wace (a London-based hedge fund) and Blackrock (a multinational asset management firm based in New York), each with about 350 disclosures. Marshall Wace is involved in 10 of our 12 sample countries and discloses short positions at various times in 85 different firms. Among these top short sellers, the average disclosed short position ranges from 1.02% of shares outstanding for Lansdowne Partners to 0.40% of shares outstanding for Davidson Kempner.²⁶

To proxy for short-seller information, 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 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

²⁶ Average disclosed short positions can be close to the original, lower U.K. regulatory threshold of 0.25% if a short seller focuses on U.K. stocks and is active during the earlier part of the sample.

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.

We investigate this idea by measuring whether disclosures have a greater stock price effect if they come from disclosers with greater assets under management (*AUM*). Indications of a stronger negative signal should also affect the share price response to a disclosure. For example, the share price response might be stronger if the short position is a bigger fraction of the overall manager's portfolio. To investigate this, we regress event window stock returns on these and other discloser characteristics. We include as regressors *AUM* and *PositionSize*, which is the ratio of the size of the short position disclosed to the firm's *AUM*. The results are in Table 5.

Surprisingly, there is only weak support for these cross-sectional hypotheses. In particular, only *PositionSize* is significantly correlated with the cross section of abnormal returns, and only when abnormal returns are measured over the (0,2)-day window. Surprisingly, the effect is opposite of what one would expect: we find larger positions are associated with positive

announcement returns. Overall, we conclude that share price responses to disclosures are not reliably related to these discloser characteristics.

The modest, insignificant negative returns associated with a disclosure are somewhat surprising, given the evidence in other contexts on the information content of short selling. Perhaps the market cares only about the overall level of short interest and does not assign much importance to a large position by a single short seller. To investigate this possibility, and to investigate the response of other traders to a short position disclosure, we next look at the evolution of short interest around a disclosure.

4.3. 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 longer-run 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.

For this 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*,²⁷ percentile *Market capitalization*,

²⁷ 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.

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 6 presents summary statistics for the match criteria and short activity measures for both the disclosed group and the control group. At the date of initial disclosure, the average disclosed stock has short interest of 3.65% of shares outstanding, roughly 1.4 percentage points more than the control group.²⁸ The average disclosed stock also has slightly less than one open loan per million shares outstanding. Disclosed firms have a significantly higher percentage of lenders active than the control group, 47.49% versus 40.32%.

In our empirical setup, we conduct a difference-in-difference analysis. The first difference is between disclosed stocks and a matched sample of 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*, percentile *Market capitalization*, percentile *Share turnover*, and percentile *Change in short interest at settlement* over the past month (22 trading days).²⁹ The second difference is the change in the measured statistic over the given event window.

We start by looking at a daily measure of short interest from our data provider. *Short interest* in disclosed stocks does increase significantly, but nearly all of the increase is before the public disclosure. This result can be seen in Table 7. Compared with the matched sample of firms without disclosures, short interest increases by 0.22% of shares outstanding during the

²⁸ Short interest here is measured in trade time, adjusted for the three-day settlement lag.

²⁹ One potential concern is around the quality of these matches. We address this concern with a number of unreported tests. First, we add a second stage regression where our calculated differences-in-differences are regressed against the differences in our match characteristics. Second, we weight the observations in our analysis by the quality of the match as measured by the inverse of mean-squared error between the treatment and the control firm. Third, we perform subsample analyses in which we drop poor-quality matches from our analysis. In this third set of tests, we note the tradeoff between excluding poor-quality matches and the power of our tests. In general, these explorations show that the closeness of the match is not a significant driver of our results.

period from three days to one day before the announcement. Table 7 shows that the short interest declines are statistically indistinguishable from zero over the 10-day and 20-day intervals.

We next turn to the percentage of lenders actively lending a particular stock, or *Percentage 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 little change around the disclosure, suggesting that short sellers take large positions in stocks where there is ample lendable supply.

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, but this increase in borrowing does not affect share-borrowing costs. The buildup of the soon-to-be-disclosed position is probably the main source of the increase in short interest, as the increase in short interest is modest compared with the size of the average disclosed short position, which is 0.95% of shares outstanding, as reported in Table 1.

4.4. 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 U.K. 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). “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” (FSA FS09/4, 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 a first disclosure by a particular short seller in a given stock on a given date and zero otherwise. In other words, we exclude upticks, downticks, and closeouts. The explanatory variables of interest are lagged indicator variables indicating recent short position disclosures, often interacted with characteristics of these previous disclosers, such as their AUM, the size of their disclosed short position, and their location.³⁰ 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

³⁰ In instances where multiple disclosures occur in the pre-period, we aggregate across disclosures as follows. *AUM* is the natural logarithm of the sum of assets under management across disclosers. *PositionSize* is the sum of the disclosed short positions divided by the sum of AUM across disclosers. *MoneyCtr* is equal to one if any of the disclosers is headquartered in New York or London and equal to zero otherwise. *Centrality* is the maximum *Centrality* measure of the disclosers.

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 8, Panel A. 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 triples the probability of a disclosure on a given day from the baseline probability of 0.08% to 0.24%. A disclosure in the earlier period increases the disclosure probability by an additional 0.20%.

We then add *AUM* for the prior discloser interacted with the prior disclosure dummies; this estimation is Specification 2 in Table 8, Panel A. Follow-on short positions a week to a month later 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 2.77, so each increase of one standard deviation in *AUM* by a short position discloser is associated with an increase of 0.0008% to 0.0036% in the probability of a follow-on disclosure relative to the

baseline probability of 0.08%. In contrast, there is no statistical link between the initial discloser's position size (Specification 3) and follow-on shorting.

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 in Table 8, Panel A, 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 fairly weak. The full-sample coefficient estimate in specification 4 is marginally statistically significant for the $\{t-6, t-30\}$ lag but is economically small: a short position discloser located in New York or London increases the probability of a follow-on disclosure by only 0.01% over the baseline probability of 0.08%.

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 8, Panel A, 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 month. Recall that the centrality variable is defined as a quantile, so moving from one tail of the centrality distribution to the other increases the probability of a follow-on disclosure by 0.05%.

Finally, we examine how multiple disclosures in the same stock affect the results. We interact the number of originations occurring over the event window, *Multiple orig. count*, with the presence of a disclosure in the event window. The variable has a fairly strong interactive effect; an increase of one origination in the event window increases the probability of a disclosure today by 0.03%. For example, the probability of a follow-on disclosure in a stock with a single origination in the event window is 0.23% ($= 0.08\% + 0.12\% + 0.03\%$), while a stock with two originations in the event window has a probability of a follow-on disclosure of 0.26%,

an increase of 13%. This test shows that multiple short-seller initiations coincide with an increased probability of a follow-on disclosures.

Next, we examine the distance between pairs of short position disclosers in the same stock. If physical proximity facilitates information sharing between short sellers, we would expect to find that discloser pairs are relatively close together. To investigate this, 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 significantly closer to the original discloser.³¹ The results are in Table 8, Panel B. For example, we find that in the full sample, follow-on disclosers between 6 and 30 days after the initial disclosure are 1,848 miles away from the initial discloser, while the unconditional average distance between a pair of disclosers is 2,094 miles. The difference in these average distances is statistically significant. Similarly, 34.82% of follow-on disclosers between 6 and 30 days after the initial disclosure are within 100 miles of the initial discloser, whereas only 26.73% of discloser pairs are within 100 miles of one another unconditionally. We present this result for three temporal separations: day 0 (both disclosures happen on the same day), pairs that disclose 1 to 5 days apart, and pairs that disclose 6 to 30 days apart. There is no consistent pattern between disclosure timing and distance between the disclosers. Still, it is clear that disclosure sequences are characterized by significant geographic clustering.

Overall, our results suggest that there is herding in disclosure by short sellers. However, it is important to emphasize that we cannot rule out the natural explanation that multiple short

³¹ One potential concern is that disclosures may cluster within fund families, thus biasing our results. To address this concern, we require that a pair of funds is located more than zero miles apart. We repeat this analysis after excluding 100 out of 238,822 pairs where the distance was close to zero (less than 0.01 miles). None of the excluded pairs appear to belong to the same fund family. Results are quantitatively similar with or without these excluded pairs.

sellers independently receive similar information due to their geography or apply similar analyses, leading to approximately contemporaneous short positions. Furthermore, because we do not observe individual short positions before the disclosure regime is in place, these results cannot discern whether clustering in large short positions has changed because of the disclosure regime.

4.5. Results for Rights Issues

Recall that in the United Kingdom, the initial disclosure regime applies to financial stocks and to stocks undergoing rights issues. There are two reasons to look at rights issues separately. First, the announcement of a rights issue could affect the share price, and it is important to take this corporate news into account in measuring the incremental effect of a short position disclosure. Second, short sellers could have different incentives during a rights issue, so the disclosure rules could have a different effect in that environment. For instance, in a rights issue short sellers might benefit more from coordination, as they might be able to drive share prices below the rights exercise price or otherwise force the rights issue to fail. Thus, it is important to examine returns and trading during rights issues to see if this concern is justified.

We obtain a list of rights issues occurring during our sample period in our sample countries from Data Explorers and Thomson Reuters SDC Platinum. Of the 1,158 rights issues we obtain, 108 have the disclosure of a short position occurring within the window between the announcement and the completion date. There are also 251 rights issues subject to the disclosure requirements where there is no short position disclosure during the rights issue, and we also have a control sample of 799 rights issues that are not subject to the disclosure regime. Of the 359

rights issues subject to the disclosure regime, 158 are in the United Kingdom.³² In addition to the announcement and completion dates of the rights issue, the data include two measures of rights issue quality.³⁴ *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.

We start by examining the return pattern around disclosure announcements for stocks with rights issues. What effect should a short position disclosure have on stock returns during a rights issue? There are reasons to expect little effect. Some shareholders may not wish to exercise their rights, for example. When the stock goes ex-rights, these shareholders can sell their rights on the open market. Before this date, however, they might hedge the price risk associated with the value of the right by shorting the underlying shares. If these types of short positions are hedges rather than directional views on the company's fundamentals, we might expect returns to be unaffected by short position disclosures around the rights issue, since the disclosures are not conveying negative information to the market.³⁵

Second, after the ex-rights day, there may also be some relative-value trading between the rights and the shares, which could lead to disclosed short positions in the shares. Again, if market

³² Additionally, there are ten rights issues in U.K. financial firms that occur during the 2008–09 short-selling ban. Due to the small sample size, the confounding effects of the shorting ban, and the unusual macroeconomic events in this interval, we do not attempt to analyze these events.

On average, firms undergoing rights issues are similar in terms of market capitalization to the rest of the firms in our sample with the median rights issue firm at the 51st percentile of the distribution of market caps across all sample firms. Of the rights issues we examine, 94.9% are successfully completed. The mean (median) rights issue in our sample is 24.6% (17.6%) of the (pre-rights offering) shares outstanding. The average exercise price is 40.7% below the market share price on the rights issue announcement date.

³⁴ For rights issues for which we cannot identify the announcement date, we define the announcement date as the filing date. In the sample of rights issues for which we have both the announcement date and the filing date, these two dates coincide in 85% of the sample. 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.

³⁵ During the sample period, most issuers prohibit underwriters from taking a short position (or an economic equivalent) in the shares or rights in order to limit any downward price pressure from underwriter hedging. Investment banks often syndicate the risk to subunderwriters, including other banks, institutional shareholders, and hedge funds. Subunderwriters are also usually prohibited from taking a short position in the underlying shares or rights.

participants are aware that this type of trading is likely and does not reflect fundamentals, a short position disclosure during this time period would be less likely to move the share price.

However, there are also reasons to expect a strong effect of a disclosure on stock prices. Investors may be particularly concerned about asymmetric information during a rights issue, and a short position disclosure could indicate the presence of strongly negative private information.

Empirically, we measure returns from the rights issue announcement date instead of from the short position disclosure date. 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.³⁶ Prior to February 10, 2009, U.K. rights issues had to remain open for at least 21 calendar days; U.K. 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 30.4 trading days. Abnormal returns are computed relative to the stock's one-digit 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 9.³⁷

Short position disclosures are not associated with bigger share price declines during the rights issue, consistent with the hedging explanation. For example, Specification 1 in Panel A shows that the cumulative abnormal return (CAR) over the (0,5)-day interval is -7.23% for rights issues where there is no short position disclosure and $-7.23\% + 1.27\% = -5.96\%$ for rights issues where a large short position is disclosed in this time interval. These CARs are statistically

³⁶ We calculate stock returns in the usual way. On the ex-rights day, returns are adjusted to include the value of the rights (now trading separately), and after the ex-rights day, returns are calculated on the shares alone, excluding the value of the rights.

³⁷ Our focus here is on the announcement date for rights issues, and in later results, we focus on the completion date of the rights issue. However, there is a third date between the two, the date on which trading goes from including the right to excluding the right. While this date may play a key role for the implementation of any trading strategy, we fail to find a significant difference in cumulative abnormal returns between disclosed and undisclosed rights issues over the (0,5)-day, (0,20)-day, or (0,Completion) intervals following the ex-rights date.

indistinguishable from each other. The statistical conclusions are the same over longer horizons, which are reported in Panels B and C. Specification 2 shows that the number of disclosers doesn't matter, either. The incremental return effect of each additional disclosing short seller beyond the first one is very close to (and statistically indistinguishable from) zero. We also control for the publicly available details of the rights issues to see if this is masking a disclosure effect. 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, and Panel C, Specification 3, has the results from announcement to completion of the rights issue. 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. There continues to be virtually no association between the number of short position disclosers and returns during the rights issue, consistent with our hedging interpretation.

In untabulated results, we also investigate whether short position disclosures are associated with a rights issue's failure to complete. On average, 95% of announced rights issues are completed. For rights issues that occur during the disclosure regime but are without a short position disclosure, 96% are complete. Similarly, if there is at least one disclosure, completion is also extremely likely, at 92%, and the two completion percentages are statistically indistinguishable ($p = 0.1545$). Thus, there is no evidence that the presence of a short position disclosure decreases the likelihood of completion.

Overall, there is no evidence that short sellers are pushing share prices down during a rights issue. To confirm this, we look at what happens after the rights issue is completed. If short sellers are temporarily manipulating the price downward during the rights issue, we would expect a reversal once the rights expire. Table 10, Panel A, 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, either with or without a short position disclosure. All of the post-completion abnormal returns are statistically indistinguishable from zero. Thus, the post-completion evidence provides no evidence of abusive shorting activity.

We can also assess whether the disclosure regime itself has an impact on returns around rights issues, as we have a sample of 799 rights issues that take place when there was no short position disclosure regime. This sample includes: 14 U.K. rights issues from January 10, 2008, to June 26, 2008; 76 French rights issues from January 10, 2008, to September 28, 2010; 29 Spanish rights issues from April 10, 2008, to April 14, 2010; and 680 rights issues in other European countries from January 9, 2008, to October 31, 2012. Table 10, Panel B, shows that the average 20-day CAR for these earlier rights issues is -3.41% , which is statistically indistinguishable from the average CAR of -3.51% for rights issues undertaken in the disclosure regime. The results are similar for 5-day CARs and for returns measured from announcement to completion. That is, rights issues are generally associated with 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.

5. Conclusion

Disclosure has become an important tool in short-sales regulation. For example, after the United Kingdom, France, and Spain promulgated rules forcing short sellers to disclose their positions starting in 2008, twenty-seven European Union countries adopted a similar disclosure regime. These rules require 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 SEC responds to Section 417 of the Dodd-Frank Act in the United States, which requires a study of “the feasibility, benefits, and costs of requiring reporting publicly, in real-time short-sale positions of publicly listed securities.” For example, in May 2011, the 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.

In this paper, we provide the first analysis of the regulatory regime that mandates the disclosure of large short positions in European stocks. We identify the effect of the change in the disclosure regime by making use of the staggered introduction of the disclosure rules across our sample of twelve countries. Overall, we find that the disclosure regime reduces short interest and the informativeness of prices, and there is some evidence that the reduction in informed trading by short sellers improves liquidity.

We characterize the disclosers and the disclosures, stock price behavior around the disclosure, and equity lending market effects. Our results indicate that, in many respects,

disclosures have little impact on trading and share prices. First of all, we find no abnormal return immediately following disclosed short positions. Furthermore, we find little evidence that the level of short interest increases in response to disclosure. Among stocks with rights issues, we find that disclosed rights issues have virtually the same returns as their non-disclosed counterparts. Furthermore, we see no evidence of manipulative short selling because there are no price reversals in either the overall sample or in the subsample of rights issues.

We do 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. However, there is no increase in short interest after the first disclosure. While these two results seem at odds, one possible explanation is that at the time of the first disclosure, the follow-on already has a substantial but undisclosed short position, and thus it only takes a small increase in the follow-on short position to cross the disclosure threshold. Even if this follow-on behavior is caused by the disclosure regime, our results suggest that the new rules do not dramatically affect the behavior of share prices.

While most of our results are consistent with a standard theoretical model where the disclosure regime discourages some informed short sellers from taking positions, there are some results that could inform future theoretical work. For example, the small stock price effects in response to disclosures are consistent with earlier results that find modest share price responses to the publication of short interest, but these results are hard to reconcile with a standard theory of informed shorting. Similarly, disclosures could cluster in time because multiple short sellers independently receive a correlated negative signal, or because they explicitly share negative

private information. Perhaps a new theory can be developed that could distinguish empirically between these two explanations.

Our work also has implications for regulatory policy toward short selling around equity offerings. Abusive shorting during secondary equity offerings has long been a concern of regulators. Regulation M in the United States limits shorting during a secondary equity offering, for example. In a recent release (DP09/1), the U.K. FSA suggested that disclosure could serve as an alternative to shorting restrictions, and it ultimately decided (in FS09/4) that it would not ban shorting (including shorting by underwriters) during equity issuances. Overall, our evidence suggests that there are no economically meaningful negative consequences to the disclosure regime during rights issues.

While there appear to be no serious unintended consequences, the European Union regulations are clearly discouraging some short sellers. It is possible that some abusive shorting is being deterred, but our evidence suggests only that informed shorting is being deterred. Prices are less informative as a result, though liquidity appears to be somewhat improved. Overall, it is not at all clear whether short position disclosure regulation is a net benefit for European equity markets.

References

- Abreu, D., and M. K. Brunnermeier. 2002. Synchronization risk and delayed arbitrage. *Journal of Financial Economics* 66:341–60.
- Aggarwal, R. K., and G. Wu. 2006. Stock market manipulations. *Journal of Business* 79:1915–53.
- Aitken, M. J., A. Frino, M. S. McCorry, and P. L. Swan. 1998. Short sales are almost instantaneously bad news: Evidence from the Australian Stock Exchange. *Journal of Finance* 53:2205–23.
- Alexander, G. J., and M. A. Peterson. 2008. The effect of price tests on trader behavior and market quality: An analysis of Reg SHO. *Journal of Financial Markets* 11:84–111.
- Allen, F., and D. Gale. 1992. Stock-price manipulation. *Review of Financial Studies* 5:503–29.
- Amihud, Y. 2002. Illiquidity and stock returns: Cross-section and time-series effects. *Journal of Financial Markets* 5:31–56.
- Asquith, P., P. A. Pathak, and J. R. Ritter. 2005. Short interest, institutional ownership, and stock returns. *Journal of Financial Economics* 78:243–76.
- Attari, M., A. S. Mello, and M. E. Ruckes. 2005. Arbitraging arbitrageurs. *Journal of Finance* 60:2471–511.
- Battalio, R. H., and P. H. Schultz. 2011. Regulatory uncertainty and market liquidity: The 2008 short sale ban's impact on equity option markets. *Journal of Finance* 66:2013–53.
- Beber, A., and M. Pagano. 2013. Short-selling bans around the world: Evidence from the 2007–09 crisis. *Journal of Finance* 68:343–81.
- Berkman, H., and M. McKenzie. 2012. Earnings announcements: Good news for institutional investors and short sellers. *Financial Review* 47:91–113.
- Bertrand, M., E. Duflo, and S. Mullainathan. 2004. How much should we trust differences-in-differences estimates? *Quarterly Journal of Economics* 119:249–75.
- Blau, B. M., B. F. Van Ness, R. A. Van Ness, and R. A. Wood. 2010. Short selling during extreme market movements. *Journal of Trading* 5:14–27.