Shorting activity, return predictability, and the information environment:
Evidence from the mandatory adoption of International Financial Reporting Standards[*]

Paul A. Griffin
University of California at Davis
pagriffin@ucdavis.edu
(530) 752-7372

Hyun A. Hong
University of California at Riverside
hyunh@ucr.edu
(901) 678-4569

Ivalina Kalcheva
University of California at Riverside
ivalina.kalcheva@ucr.edu
(901) 827-2325

Jeong-Bon Kim
University of Waterloo
jb6kim@uwaterloo.ca
(519) 781-3537

Version of: September 23, 2016

Abstract: This paper examines the effects of the mandatory adoption of International Financial Reporting Standards (IFRS) on the relation between shifts in the supply of and demand for shorting and stock return predictability in an international setting. We document that outward shifts in shorting demand, and, to a lesser extent, outward shifts in shorting supply, predict future negative returns, and that this predictability weakens significantly following mandatory IFRS adoption. We find that shorting is more informative for firm-months prior to earnings announcements, in line with the implications of mandatory IFRS adoption for private information revelation. Additionally, we find that short sellers' ability to interpret and analyze publicly available information is lower following mandatory IFRS adoption. Finally, we find that the effects of IFRS are stronger for firms in countries that require more accounting changes following IFRS adoption and for firms in countries with a strong rule of law. These results are robust to using alternative non-IFRS adoption samples and after controlling for other factors that might explain to our findings.

Keywords: equity lending market; short selling; mandatory IFRS; equity return predictability.

JEL classification: G12, G14, G24, M41

1. Introduction

A growing body of literature suggests that the forces of demand and supply in the equity lending market establish a means for capital markets to discover private information.[1] These forces capture constraints in the equity lending market, such as the quantity of lendable shares available and the cost of borrowing lendable shares, whose relaxation facilitates the incorporation of private information into equity prices (Miller, 1977). Cohen, Diether, and Malloy (2007; 2009) identify these forces as shifts in shorting demand and supply and theorize that outward (inward) shifts in shorting demand and shorting supply lead to negative (positive) future abnormal equity returns.[2] Demand shifts capture changes in informed trading or the additional market frictions and risks associated with shorting (Cohen et al., 2007). Supply shifts indicate the loosening or tightening of short sale constraints. Empirical evidence to date shows that the primary channel through which shorting activities affect future returns is an outward shift in shorting demand (Cohen et al., 2007; Diether, Lee, and Lerner, 2009). Outward shorting demand shifts reveal the existence of negative private information and lead to negative future abnormal returns.

This paper evaluates whether and how the relation between shifts in shorting demand and supply and stock return predictability might have changed in response to the mandatory adoption of International Financial Reporting Standards (IFRS) in 2005.[3] We exploit mandatory IFRS adoption as an information shock that potentially influences shorting behavior in the equity lending market.[4] How

---

[1] Section 2 identifies the key studies.

[2] Figure 1 shows a graphical representation of how these shifts affect returns. In Figure 1, outward demand shifts foretell negative future returns because they signal expected net benefits for investors from privately informed short trading. More investors bet on a price decrease despite the higher cost of betting. Outward supply shifts also foretell negative future returns because investors have access to more shortable shares at a lower cost. Thus, they can correct any equity pricing inefficiency (e.g., an optimistically-biased price) from short sales constraints in the previous period. See, also, footnote 5.

[3] This required several thousands of publicly-listed companies in more than 100 countries to prepare their financial statements in accordance with mandatory IFRS. The United States has yet to require mandatory adoption of IFRS.

[4] Similar to the prior studies, we do not claim a causal link between mandatory IFRS and outcomes in the equity lending market. Rather, we view our results as showing a response in the equity lending market that varies with the timing and attributes of the information shock from mandatory IFRS, but that could also vary with the timing and effects of related factors affecting lending market behavior. We identify those factors deemed important in the earlier work on the capital market effects of IFRS, such as enforcement and the rule of law. We test whether our IFRS results strengthen or weaken in the presence of those and other factors.

that behavior might have changed in response to IFRS remains equivocal, however, as arguments can be made for two different and opposing forms of shorting market response to IFRS. Namely, mandatory IFRS adoption enables investors to understand the firm in new ways versus the alternative view that the mandate reduces short sellers' opportunities to generate trading profits by crowding out their use of private information.

The first scenario adopts the view that the shock to firm-level information from mandatory IFRS adoption increases firms' financial reporting quality, improves the public information environment, and reduces investors' information-gathering costs (Daske, Hail, Leuz, and Verdi. 2008; Byard, Li, and Yu, 2011; Barth, Landsman, Lang, and Williams, 2012; Landsman, Maydew, and Thornock, 2012; Hong 2013; Hong, Hung and Lobo, 2014; Tan et al. 2011; Barth, Landsman, Young, and Zhuang, 2014). The availability of higher-quality, firm-level public information may also discourage private information gathering, reduce the likelihood that more informed investors profit at the expense of others, and consequently lower the return predictability (Verrecchia, 1982; Diamond, 1985). Ultimately, the asymmetry between more- and less-informed investors declines, thereby decreasing the advantage of the better-than-average group to gain by trading on their private information at the expense of the less-than-average group. Moreover, with more informed prices after mandatory IFRS adoption, the quantity of shortable shares should decrease because lending institutions reduce their supply of shortable shares when the marginal shorting fee exceeds the lower marginal benefit due to lower shorting demand. The overall implication is that we should observe a change in shorting behavior from the pre- to the post-IFRS adoption period to the extent that the public information benefits of IFRS reduce short sellers' ability to acquire and trade on private information. Under this scenario, we hypothesize a decrease in the informativeness of outward shorting demand and supply shifts for future stock returns in the post-IFRS adoption years.

The second scenario adopts the view that short sellers derive their advantage by extracting more precise information from public news (Engelberg, Reed, and Ringgenberg, 2012). In other words, to the extent that mandated IFRS enhances the precision of firm-level disclosure, the mandate

(in expectation) should increase the ability of outward shorting demand and supply shifts to predict negative future abnormal returns. IFRS adoption may, therefore, reveal new and additional insights through the private analysis of more, higher-quality, and less costly public financial information. This may increase short sellers' advantage to trade on private information and improve their profitability (Kim and Verrecchia, 1994, 1997; Loureiro and Taboada, 2015). The presence of new outside investors (e.g., new foreign investors) attracted to the firm by IFRS may also augment the information advantage of insiders through the new investors' response to firm announcements (Loureiro and Taboada, 2015). Together, these arguments suggest an increase in the informativeness of shorting demand and supply shifts for future stock returns in the post-IFRS adoption years.

A further argument in support of the second scenario relates to the principles-based nature of IFRS, which gives firms greater flexibility in making accounting choices. Some also contend that the fair-value emphasis of IFRS provides managers with more opportunity to engage in earnings management (De George, Li, and Shivakumar, 2015). In addition, the principles-based nature of IFRS may allow firms to optimize their accounting standards to local political and economic considerations. For example, according to Sunder (2007, p.9), a "Cartesian top-down design" for uniform accounting standards may result in suboptimal financial reporting. By exacerbating information asymmetries, the top-down design of IFRS may offer more profitable arbitrage opportunities for short sellers (also, Ball, 2006; Byard, Li, and Yu, 2011).

Ultimately, whether mandatory IFRS adoption increases or decreases the return predictability of shorting is an empirical question. The information channels based on demand and supply shifts in the shorting market described by Cohen et al. (2007; 2009) provide a theoretical framework for systematic analysis of this question.

<div align="center">INSERT FIGURE 1 ABOUT HERE</div>

We employ the Markit Security Finance (formerly Data Explorers) database to construct a large sample of international firms with data on the prices (i.e., loan fees) and quantities of stocks available

for shorting. Markit starts its coverage of shorting activity in 2002. To avoid confounding effects of the global financial crisis, we end our sample period in 2007. Markit sources their data from more than 100 institutional lenders around the world. Following the Cohen et al. (2007) methodology, we isolate shifts in shorting demand and supply based on price-quantity pairs (see also Figure 1).[5] We then use difference-in-differences analysis to compare changes in shifts in shorting supply and demand for mandatory IFRS adopters (the treatment group) with those for a benchmark sample (the control group). To increase the validity of our results (Li, 2010; DeFond et al., 2011, 2013), we run these analyses using three benchmark samples: (1) voluntary adopters in IFRS-adopting countries that adopted prior to 2005; (2) local GAAP firms in IFRS-adopting countries that did not adopt IFRS during our sample period; and (3) non-IFRS firms in non-adopting countries.[6] Our maximum combined sample of treatment and control firms (the treatment sample plus our third benchmark sample) comprises 246,764 firm-months over the pre-IFRS (2002–2004) and post-IFRS (2006–2007) periods for firms from 16 countries that mandated IFRS adoption in 2005 (12 European Union countries, Australia, Hong Kong, Switzerland, and the United Kingdom) and six that did not (Canada, Japan, Mexico, South Korea, Taiwan and the United States).

We find that the ability of outward shifts in shorting demand, and, to a lesser extent, outward shift in shorting supply, to predict future abnormal returns decreases significantly following

---

[5] A price-quantity pair identifies a combined movement in a shortable stock's loan price and quantity. Each combined movement is placed into one of the following four categories for a given interval of time: (i) stocks that experience an outward demand shift (an increase in both loan fee and loan amount), (ii) stocks that experience an inward demand shift (a decrease in both loan fee and loan amount), (iii) stocks that experience an outward supply shift (a decrease in loan fee and an increase in loan quality), and (iv) stocks that experience an inward supply shift (an increase in loan fee and a decrease in loan quantity). This approach assumes that an increase in the loan fee combined with an increase in the number of shares lent out represents an outward shift in shorting demand. The downward-sloping shorting demand curve representing all price-quantity pairs moves to the right. Similarly, a decrease in the loan fee combined with an increase in the number of shares lent out represents an outward shift in shorting supply. The upward-sloping supply curve representing all price-quantity pairs also moves to the right, as is the case for the supply of any item whose price decrease induces a quantity increase. Each of the four price-quantity pairs represents a separate channel on the demand or supply side that predicts the sign of next period's stock return.

[6] We provide evidence with three benchmark groups because each of the three benchmarks has some advantages and disadvantages. For example, voluntary adopters are subject to self-selection bias but have country-level institutional similarities with mandatory IFRS adopters. Using local GAAP firms in IFRS adopting countries which did not adopt IFRS during the sample period also suffer from self-selection bias but have the advantage that the external country-level environment is the same with the IFRS adopters. Non-IFRS adopters, used as a benchmark, control for contemporaneous effects but the inferences could be a result of cross-country differences.

mandatory IFRS adoption.[7] This result implies that while IFRS adoption facilitates the flow of information to the market, which makes the information environment more transparent, it also reduces the net benefit of acquiring private firm-level information. This makes short selling – informed trading based on negative private news – less profitable. We further find that the return predictability of outward shifts in shorting demand in the month prior to negative quarterly earnings announcements decreases following mandatory IFRS adoption, as it is during this month that short sellers presumably use their private information to trade on the expectation of a negative earnings announcement. These effects of mandatory IFRS adoption are more pronounced for firms with high accruals, which supports the view that short sellers' superior ability to generate profits by analyzing publicly available information such as the size of accruals is lower subsequent to IFRS adoption.

In additional analyses we test whether the change in the return predictability of shorting following mandatory IFRS adoption varies with country-level institutional characteristics. As a principles-based accounting regime, IFRS allows firms greater discretion over accounting decisions and thus the effects of mandatory IFRS adoption on firms' information environment may depend on country-level legal and regulatory institutions (Daske, Hail, Leuz, and Verdi 2008). Consistent with the main evidence on the equity market effects of mandatory IFRS adoption (Christensen et al., 2012, Daske et al., 2008; Li, 2010; Byard et al., 2011; DeFond et al., 2011; Ball, Li, and Shivakumar, 2015), we find that the negative effects of IFRS adoption on the return predictability of shorting are more pronounced for firms in countries with greater differences between domestic and IFRS accounting standards and for firms in countries with stronger legal enforcement, which ensures credible implementation of IFRS. [8]

---

[7] Loan fees, loan supply, and short interest are determined jointly in the market for borrowing stock (Reed, 2015). However, the approach taken by Cohen at al. (2007, 2009), i.e., identifying shifts in supply and demand of shorting, can distinguish the incremental contribution of each variable on returns when the variables are determined endogenously. Cohen et al. (2007) show that an increase in shorting demand leads to large, negative abnormal returns and Cohen et al. (2009) and Beneish et al. (2015) further show that decreases in supply have a much smaller impact on returns. Our results are consistent with the prior literature that the two main channels of information revelation in stock prices are outward shifts in demand and supply.

[8] Note that the increase in accounting quality and comparability documented in prior studies may not extrapolate to the equity lending market, where short sellers have significant private information and superior

Taken together, our results contribute to the literature on IFRS. We provide novel evidence that the profitability of short selling is lower following mandatory IFRS adoption, and that this effect varies in ways that one would expect given prior work on the capital market effects of IFRS. For example, we find a greater reduction in shorting profitability in countries with strong legal enforcement and in countries with more financial reporting changes across pre- and post-IFRS periods. We also identify the primary channel through which the reduction in private information revelation occurs, namely, a lower ability of outward shifts in shorting demand to predict negative future abnormal stock returns. However, recent papers suggest that the capital market effects of IFRS adoption arise not from IFRS adoption itself but from concurrent changes in corporate governance, reporting, regulation, and enforcement (Christensen, 2012; Christensen, Hail, and Leuz, 2013; Barth and Israeli, 2013; Christensen, Lee, Walker, and Zeng, 2015). We acknowledge that these concurrent institutional changes along with mandatory IFRS adoption also contribute to the observed change in the return predictability of shorting.

By examining how equity lending market behavior is affected by a change in the informativeness of short selling induced by mandatory IFRS adoption, we extend prior IFRS literature to a new context. In particular, we fill a gap in the literature by showing that the effect of IFRS depends on the informativeness of private information. In contrast, the majority of studies that examine the capital market effects of IFRS focus on the role of publicly available information.[9] The change in the

---

ability to analyze that information. As such, the new information in IFRS financial reports, and expectations about that information based, for example, on managers' or analysts' earnings or cash flow forecasts, may not be sufficient to crowd out short sellers' use of finer and timelier datasets. Further, even if we do find that a change in the return predictability of shorting following mandatory IFRS adoption locates more strongly in some environments (e.g., strong enforcement countries), this change could be confounded by other events or factors. Recent papers, for example, suggest that the effects of IFRS adoption arise not from IFRS adoption itself but from concurrent changes in corporate governance, reporting, regulation, and enforcement (Christensen, 2012; Christensen, Hail, and Leuz, 2013; Barth and Israeli, 2013; Christensen, Lee, Walker, and Zeng, 2015) or from the interaction between IFRS adoption and factors related to its implementation, such as the strength of legal enforcement. Other studies find that the positive economic consequences of IFRS adoption concentrate mosty in EU countries (Li, 2010; DeFond et al., 2011).

[9] A large body of research provides evidence of the benefits of IFRS. Mandatory IFRS adoption enhanced financial reporting quality or transparency (EC Regulation No. 1606/2002; Ashbaugh and Pincus, 2001; Daske et al., 2008; Li, 2010; Landsman, Maydew, and Thornock, 2012), improved financial statement comparability across countries (Yip and Young, 2012; Brochet, Jagoliner, and Riedl, 2013; Wang, 2014), and reduced information asymmetry in the market. These benefits also improved stock liquidity and lowered the cost of

profitability of shorting in the equity lending market around mandatory IFRS adoption that we document also increases our understanding of the real effects of mandatory IFRS, which is an underexplored area of IFRS research (Leuz and Wysocki, 2015, 89).

The paper proceeds follows. Section 2 reviews the literature and discusses the hypotheses. Section 3 outlines our empirical design and the sample selection process. Section 4 presents the results. Section 5 summarizes additional analyses and sensitivity tests. Section 6 concludes.

2. Literature review and hypotheses development

2.1. Private information revelation and the shorting market

In a broad sense, observed stock prices reflect common information on market-wide and industry-wide events and activities, and firm-specific information such as earnings, default risk, and growth potential. Further, firm-specific information consists of both public information such as information contained in published financial statements and private information such as information that insiders may leak privately to investors in the shorting market. Morck, Yeung, and Yu (2000) show that in countries with poor private property right protections, observed stock prices co-move with each other, moving more closely with market-wide information than firm-specific information. Jin and Myers (2006), Ferreira and Laux (2007), and Gul, Kim, and Qiu (2010) further show that financial reporting opacity decreases the flow of firm-specific public information, thereby increasing stock price co-movement or synchronicity. Prior research (Fernandes and Ferreira, 2008; Dasgupta, Gan, and Gao, 2010; Kim and Shi, 2012) also shows that a firm's commitment to enhanced financial reporting (e.g., cross-listing its shares on a higher-quality disclosure regime, voluntary IFRS adoption) eases the flow of firm-specific information into stock prices and decreases stock price co-movement.

---

external financing (Daske, Hail, Leuz, and Verdi, 2008; Li 2010; Platikanova and Perramon, 2012; Hong, Hung, and Lobo, 2014). For an extensive reviews of the IFRS literature over the past decade (2005–2015), see De George, Li, and Shivakumar (2015) and Leuz and Wysocki (2015).

Did the IFRS mandate influence the flow of private information into the equity market? If so, how? To explore these questions we focus on shorting in the equity lending market, particularly, shifts in shorting demand and supply, because they represent unique channels through which short selling may reveal private information. For example, high, unexpected shorting demand for a stock may be viewed as an indication of a large amount of unfavorable private information about the firm's prospects (Cohen, Diether, and Malloy, 2007; 2009). The equity lending market offers a way to reveal this negative private information to outside investors. Relatedly, shorting supply constraints such as a short selling restriction can impede the flow of private negative information. This obliges investors with privileged access to negative private information to sit out of the market. Examining the relation between demand and supply shifts in the shorting market and future stock returns in an international setting provides us with a unique way to assess the impact of IFRS adoption on private information flows in the equity market. We also fill an important gap in the literature, which focuses mostly on the effects of mandatory IFRS adoption on public information flows and not private information flows.

Cohen, Diether, and Malloy (2007; 2009) identify these forces by focusing on exogenous shifts in shorting demand and supply, and theorize that outward (inward) shifts in shorting demand and shorting supply lead to negative (positive) future abnormal equity returns. Outward (inward) supply shifts indicate loosening (tightening) of short sale constraints, while demand shifts reflect either informed trading or the additional market frictions and risks associated with shorting (Cohen et al., 2007).[10] Empirical evidence to date is based on shorting activities in the U.S. equity market, a relatively frictionless and informationally transparent market, and shows that the primary channel through which shorting activities affect future returns is an outward shift in shorting demand; this outward demand shift reveals negative private information, which in turn leads to abnormally low

---

[10] See Figure 1 for a graphical representation. For example, outward demand shifts foretell future negative returns because they signal expected net benefits for investors from privately informed short trading. More investors bet on a price decrease despite the higher cost of betting. Outward supply shifts also foretell future negative returns because investors have access to more shortable shares at a lower cost. Thus, they can correct any equity pricing inefficiency (e.g., an optimistically-biased price) from short sales constraints in the previous period.

future returns (Cohen et al., 2007; Diether, Lee, and Lerner, 2009). In a related study examining the revelation of private information in the equity lending market, Beneish, Lee, and Nichols (2015) study the determinants of the level of lendable supply. They conclude that future stock returns are most predictably negative for special stocks, defined as those with high shorting costs, and stocks whose lendable supply is most constrained. Not surprisingly, they report negative future returns for special stocks (similar to our results in Table 4) for stocks with high loan fees (*Fee > 5%*). However, because they focus separately on levels of lending supply and levels of shorting costs and not changes in these variables, their approach has less ability to identify the channels of information related to the interaction of the supply and demand for shorting, making it more difficult to assess the impact of regulatory changes such as mandated IFRS.[11]

2.2. Mandatory IFRS adoption and private information flows

Substantial evidence shows that mandatory IFRS adoption improves the quality or precision of firm-specific public information by improving financial statement transparency (Byard et al., 2011; Barth, Landsman, Lang, and Williams, 2012; Landsman, Maydew, and Thornock, 2012; Barth, Landsman, Young, and Zhuang, 2014). The evidence further shows that this IFRS-induced, improved information quality facilitates the flow of firm-specific information to outside investors (in part, by lowering information processing costs), thereby reducing stock price co-movement and increasing firm-specific information content (Dasgupta et al., 2010; Kim and Shi, 2012). In this scenario, the mandatory IFRS adoption provides markets with new, more precise, and less costly information, with the overall effect of crowding out short sellers' use of private information, which may have been

---

[11] The identification of information channels based on shorting supply and demand is important for our research design. As Reed (2015, 98) notes: "The key challenge for empirical work in the area is distinguishing the incremental contribution of each [shorting] variable on returns or efficiency when the variables are determined jointly as the outcome of supply and demand in the equity lending market." Under the Cohen et al. (2007) framework, a lower supply of lendable shares (along with the same or a higher shorting cost) does not correct the mispricing as suggested by Beneish et al. (2015). Indeed, according to Cohen et al. (2007), a lower lending supply means that the shares potentially become even more overvalued leading to positive returns in the future (in the short run). Thus, regarding a supply restriction, Cohen et al. (2007) predict future positive returns for an inward supply shift, whereas Beneish et al. (2015) predict negative future returns.

profitable before the mandate. Accordingly, we predict that the return predictability of short selling will decrease following mandatory IFRS adoption.

On the other hand, if one views IFRS adoption as a mechanism whereby higher-quality firm-specific information becomes publicly available at no additional cost, thus enabling short sellers to better assess downside risk of future stock return, the preceding prediction will be reversed. That is, we expect the return predictability of short selling following mandatory IFRS adoption to increase. In support of this view, Kim and Verrecchia (1994; 1997) argue that low-frequency public disclosure of high-quality public information such as IFRS-based earnings announcements encourages "elite information processors" or informed traders such as short sellers to collect additional private information or to engage more intensely in the transformation of public information into value-relevant private information. In this second scenario, we therefore, predict that IFRS adoption will facilitate short sellers' ability to transform public information into private information to a greater degree. More particularly, we predict that the return predictability of short selling following mandatory IFRS adoption will decrease. Given the conflicting predictions above, the directional effect of mandatory IFRS adoption on return predictability is ultimately an empirical question. To provide empirical evidence on this unexplored issue, we propose and test the following main hypothesis (H1), stated in alternative form:

H1: The return predictability of shorting is lower in the post-IFRS adoption period than in the pre-IFRS adoption period for firms with IFRS adoption but not for a benchmark sample of non-IFRS adopter firms.

A third alternative considers the view that IFRS adoption might induce no change in short sellers' private information flow due to the relative unimportance of mandated IFRS for shorting decisions compared to the information that short sellers use, which could be finer and timelier than anticipated accounting report information and relate to non-accounting issues and events as well. Substantial evidence, however, suggests that shorting activities relate to private information about reported earnings and the disclosure of material news regarding that information, such as

management and analyst earnings forecasts, restatement disclosures, and reports of significant events (Christophe, Ferri, and Angel, 2004; Desai, Krishnamurthy, and Venkataramaran, 2006; Berkman, Dimitrov, Jain, Koch, Tice, 2009; Christensen, Drake, and Thornock, 2014; Drake, Meyers, Scholz, and Sharp, 2015)

2.3. Additional hypotheses conditional on firms' information environment

So far, we posit that mandatory IFRS adoption reduces the return predictability of private information for short selling. This change in return predictability, however, is likely to differ across features of the information environment of the IFRS-adopting countries, suggesting that the implied drop in shorting profitability associated with IFRS adoption may not be uniform across the countries studied. Prior studies document that the capital market effects of mandatory IFRS adoption depend on the strength of legal enforcement in place, which insures the credible implementation of IFRS. Consistently, we reason that the greater information quality related to mandatory IFRS adoption is contingent on implementation credibility and differences between domestic accounting standards and IFRS (Byard et al. 2011; DeFond et al. 2011; Hong et al. 2014). As such, we first condition H1 on the interaction of the strength of the enforcement environment and the number of accounting changes from pre- to post-IFRS financial reporting. We interact these factors based on the expectation of a greater reduction in short sellers' private information flow from IFRS adoption for firms with more accounting changes when those firms locate in countries with stronger legal enforcement versus when they reside in countries with weaker enforcement. Accordingly, we propose and test the following hypothesis in the alternative form.

H2a: The reduction in the return predictability of shorting from mandatory IFRS adoption is larger in countries with more accounting changes and stronger legal enforcement of those accounting changes.

A second test focuses on firms' information environment in the month preceding a quarterly earnings announcement with a negative surprise. We conduct this test because it identifies the source

of short sellers' informational advantage (and changes in that information around mandated IFRS adoption) as more likely than not related to the information in financial statements. Several studies support the view that shorting activities increase prior to negative earnings announcements (Christophe et al. 2004; Lasser et al. 2010). Adverse financial disclosures accompanying earnings announcements, such as restatement announcements and significant event disclosures also associate with increased shorting activity in anticipation of those announcements and, hence, the expectation of negative returns upon their announcement (Griffin, 2003; Desai, Krishnamurthy, and Venkataraman, 2006; Bhojraj and Swaminathan 2009). We, therefore, conduct a test of the change in the return predictability of shorting from pre- to post-IFRS adoption for those firm-month observations that experience a negative quarterly earnings surprise in the month prior to the announcement month versus those firm-month observations that do not experience a negative earnings surprise. As such, we test the following hypothesis in the alternative form.

H2b: The reduction in the return predictability of shorting from mandatory IFRS adoption is larger in the months prior to earnings announcements for firms with a negative earnings surprise versus a non-negative earnings surprise.

A third test conditions the reduction in the return predictability of shorting from mandatory IFRS adoption on the size of firms' accruals. Consistent with the prior literature on shorting, firms with high positive levels of accruals are attractive targets for short sellers, because these firms experience abnormally negative returns in the future (Richardson, 2003; Bhojraj and Swaminathan 2009; Hirshleifer, Teoh, and Yu, 2011). Pincus, Rajgopal, and Venkataraman (2007) also show that the return predictability of accruals occurs internationally, and in IFRS and non-IFRS-adopting countries. Given that this factor appears to explain return predictability and shorting activity internationally, we increase the power of our test by focusing only on those firm-month observations when short sellers most likely identify the extent and use of accruals by firms, namely, in the three months following fiscal year end. This is when the extent of accruals in the financial statements would become most clear to investors (since accruals for quarterly periods must be settled up in the fourth quarter). To

further increase the power of the test, we concentrate on the highest and lowest deciles of firm-month observations with accruals. Therefore, we test the following hypothesis in the alternative form.

H2c: The reduction in the return predictability of shorting from mandatory IFRS adoption in the three months following fiscal year end is larger for firms in the highest decile of accruals versus firms in the lowest decile of accruals.

Finally, we condition H1 on the Miller (1977) overvaluation hypothesis, which predicts a greater reduction in information flow for short selling from mandatory IFRS adoption in information environments with a greater reduction in the diversity of opinion. Absent regulatory change, Miller (1977) hypothesizes that differences of opinion among investors result in stock price overvaluation as long as some investors are short-sales constrained. The intuition is that security prices are determined by the consensus of opinion among participating investors. Therefore, the extent of overvaluation increases with greater disagreement among investors as long as some of the pessimistic investors are constrained from short-selling. This suggests that an underlying mechanism through which mandatory IFRS adoption decreases the profitable trading opportunities of short sellers could relate to an increase in the consensus of opinion, presumably, prompted by the capital market benefits of the mandate. Accordingly, we propose and test the following hypothesis in the alternative form.

H2d: The reduction in the return predictability of shorting from mandatory IFRS adoption is larger in information environments with a greater increase in investors' consensus of opinion.

3. Data and methodology

3.1. Data sources and sample selection

We collect our data on the price (loan fee) and the quantity of lendable shares for shorting (lending supply) from the Markit Security Finance database. Markit provides daily data on supply, demand, borrowing rates, and market shares from the global securities financing markets. The information contained in the Markit database includes quantity of stock borrowed in the market, quantity of stock borrowed from the institutions, quantity of stock made available by the institutions

in their lending program, number of days to cover the total quantity of stock borrowed in the market, and the cost to borrow the stock charged by the lenders from the prime brokers in the wholesale market.[12] This database also includes dividends, stock splits, and firm identifiers such as ISIN, SEDOL, and CUSIP. Markit gathers these data directly from leading industry practitioners, including prime brokers, custodians, asset managers, and hedge funds. We then merge our Markit dataset with COMPUSTAT Global and COMPUSTAT North America for the international firms and for the U.S. firms, respectively, based on Markit's ISIN code. Our data cover world-wide stock lending during the sample period of 2002–2004 for the pre-IFRS period and 2006-2007 for the post-IFRS period. Our time window is constrained by data coverage on stock lending from Data Explorers (now Markit Securities), which starts in 2002, and ends in 2007 in order to avoid the confounding effects of the global financial crisis in 2008. We exclude 2005, which is the transition year of mandatory IFRS adoption. We exclude Brazil, China, Indonesia, Malaysia, Greece, Ireland, Israel, New Zealand, Thailand, and the Philippines because the coverage by Markit is limited.[13] We require at least ten firms with short selling data to be included in our sample set. Finally, we require that a firm has at least one month of observations both in the pre-IFRS period and in the post-IFRS period, thus obtaining a balanced and consistent sample in the pre- and post-IFRS periods.

We employ DiD research methodology that compares changes in shorting demand and supply shifts among mandatory IFRS adopters (the treatment group) with three benchmark samples (the control group) to assure validity of our results (DeFond et al., 2011, 2013; Hong 2013; Hong et al. 2014). The three benchmark samples consist of: (1) local GAAP users in IFRS adopting countries, which do not adopt IFRS during our sample period, (2) voluntary adopters in IFRS adopting countries that adopt IFRS prior to 2005, and (3) firms in the non-IFRS adoption countries.

Our final dataset comprises a stock return-shorting activity sample of 246,764 firm-month observations. Of these, 49,873 and 160,615 firm-month shorting activity observations for mandatory

---

[12] Appendix A states the definition and calculation of these variables. The terms in each formula represent the data labels in the Markit Securities Finance Data dictionary, as of August 6, 2014.
[13] Inclusion of these countries do not qualitatively change our findings, which are reported in Table 3.

IFRS adopters and non-IFRS adopters, respectively, during the sample period of 2002–2004 and 2006–2007. In addition to the sample of non-IFRS adopters (which we denote as the Worldwide benchmark sample), our sample includes firm-month shorting observations for two additional benchmark samples, namely, a sample of 12,290 firm-month observations of voluntary adopters in the countries that adopted mandated IFRS earlier than 2005 (the Voluntary adopter sample) and a sample of 23,986 observations of firms in countries adopting IFRS that remained on the pre-IFRS set of rules (the Local firm sample). These alternative samples offer a different way to compare the change in the return predictability of short selling following mandated IFRS for the treatment sample versus a sample not subject to the information shock of the mandated change.

Panel A of Table 1 presents the sample distributions of the treatment sample and the three benchmark samples that we use as control groups. Panel A, B, and C report sample distributions by country, industry, and year, respectively. Panel A shows that we have 1,338 firms and 49,873 firm-month observations for the mandatory IFRS adoption countries and that the United Kingdom has the largest number of firm-month observations (15,879) followed by France (9,479). The panel also shows that we have 310 firms and 12,290 firm-month observations for the voluntary adopters sample; 939 firms and 23,986 firm-month observations for the local firm sample; and 4,070 firms and 160, 615 firm-months for the worldwide benchmark sample. The United States has the highest number of firm-month observations (84,069) followed by Japan (64,785) in the non-IFRS adoption sample. [14]

Panel B of Table 1 presents the sample distribution by industry based on the Fama and French 48-industry classification. Our sample covers a wide range of industries; the most heavily represented is Business Services (17.76%), followed by Electrical Equipment (6.95%) and Construction Materials (6.93%), and Retail (6.63%) among the IFRS adoption countries. Business services (17.01%), Electrical Equipment (7.98%), and Retail (6.81%). Panel C of Table 1 presents the distribution of the

---

[14] Our results remain qualitatively the same when we exclude the Australian and U.K. observations. See Section 5.

sample observations by year and illustrates a monotonic increase over time in the number of firm-month observations for the treatment group of firms and for all three treatment groups.

<center>INSERT TABLE 1 ABOUT HERE</center>

3.2. Research design and summary statistics

Our research design requires measurements of lending supply and loan fee. First, we calculate lending supply as the value of a firm's stock held as short interest divided by the value of its shares outstanding as of the end of month t. Second, we calculate loan fee using data on the loan fee and the borrowed amount. Following industry convention, we categorize fees into two groups depending on whether the borrowers pledge cash. If cash is pledged, then the loan fee is the difference between the risk-free interest rate and the rate paid for the collateral. If non-cash is pledged, the fee is that which is directly negotiated between the borrower and the lender. This can be summarized as:

$$\text{Loan fee}_{n,i,t} = \begin{cases} \text{Fee}_{n,i,t} & \text{if noncash collateral} \\ \text{Riskfree rate}_{n,i,t} - \text{Rebate rate}_{n,i,t} & \text{if cash collateral} \end{cases} \tag{1}$$

where n denotes transaction, i stands for security, and t denotes the month in which the transaction appears in the Markit dataset. Loans can further be categorized into open- and fixed-term loans. Open-term loans can be renegotiated on a daily basis (we use the risk-free overnight rate as the fee), but fixed-term loans have predefined terms (we use linear interpolation of the risk-free rates for fixed-term loans as the fee). Third, we estimate the following regression of one-month ahead market-adjusted stock return on four indicators for shorting market demand and supply shifts (*DIN*, *DOUT*, *SIN*, and *SOUT*) based on lending supply and the loan fee formula above, an indicator for whether a firm is domiciled in a mandatory IFRS adoption country (*IFRS*), which we interact with *POST* and the demand and supply shift variables, and other controls.[15] The model is:

---

[15] In our regression model, we employ the interaction of the *IFRS* and *POST* dummies and country, year, and industry dummies (in lieu of firm dummies) to perform a difference-in-differences analysis. Since the IFRS effect in which we are interested is a country-level difference in accounting standard rather than a firm-level difference, our design provides a succinct and efficient difference-in-differences design to test the effect of mandatory IFRS adoption on inward and outward shifts of shorting supply and demand (i.e., *DIN, DOUT, SIN,* and *SOUT*). There is no need to include *POST* in the regression as a separate variable because *Year_Dummies*

<center>16</center>

$$RET_{t+1} = \alpha + \beta_1 DIN_t + \beta_2 DOUT_t + \beta_3 SIN_t + \beta_4 SOUT_t + \beta_5 IFRS*POST$$

$$+ IFRS*POST*(\beta_6 DIN_t + \beta_7 DOUT_t + \beta_8 SIN_t + \beta_9 SOUT_t)$$

$$+ \beta_{10} SIZE_t + \beta_{11} Book\text{-}to\text{-}Market_t + \beta_{12} r_{-1} + \beta_{13} r_{-12,2} + \beta_{14} Volume$$

$$+ \sum_x \beta_x \times Year\_Dummies + \sum_y \beta_y \times Month\_Dummies$$

$$+ \sum_n \beta_n \times Industry\_Dummies + \sum_m \beta_m \times Country\_Dummies + \varepsilon_{t+1} \qquad (2)$$

In the above model, t is an event-month index, RET is defined as the market-adjusted return in month t (raw return less the return on the market index in the firm's country of domicile), the shorting market variables are defined above, and the others are defined in Appendix A. See also Figure 1 for graphical illustration of (DIN, $DOUT$, SIN, and $SOUT$). Given Eq. (2), we expect a negative coefficient for $DOUT$, in that this variable reflects short sellers' information advantage from investors' increased demand for borrowing shares. We also expect a negative coefficient for $SOUT$ based on the following intuition. An increase in the shorting supply permits short sellers to correct previously upward biased stock price to converge back to fundamental value and thus predict future negative returns. H1 predicts that we should observe positive coefficients for $IFRS*POST*DOUT$ and $IFRS*POST*SOUT$, indicating that mandatory IFRS attenuates short sellers' advantage in predicting negative returns (represented by $DOUT$ and $SOUT$) in the shorting market. Specifically, the predictability of $DOUT$ decreases because short sellers' profitable opportunities decrease due to better public information flows that reach the market. The predictability of $SOUT$ decreases because other informed investors' active trading following mandatory IFRS adoption mitigates the upward pricing bias. Consistent with Cohen et al. (2007), we expect more (less) significant results for $DOUT$ ($SOUT$) and the coefficient for the interactions of $IFRS*POST*DOUT$ ($IFRS*POST*SOUT$), in part, because for $DOUT$ both the loan fee and the quantity of shares available for shorting increase over the prior

---

are included. Also there is no need to include *IFRS* as a separate because the accounting mandate, which is our main interest, is a country-level variable (for each IFRS adopting and non-IFRS adopting country) and Eq.(2) includes *Country_Dummies*.

month, whereas, for *SOUT,* only the loan fee increases, and the quantity available is more constrained.

Table 2 presents descriptive summary statistics for the variables in Eq. (2). The table reports that for the treatment group 7.8% and 7.56% firm-monthly observations experience inward and outward demand shocks, denoted by *DIN* and *DOUT*, respectively. Additionally, 5.96%, and 5.65% of firm-monthly observations experience inward and outward supply shocks, denoted by *SIN* and *SOUT*, respectively. [16] Additionally, 7.56%, and 5.65% firm-monthly observations experience outward demand and supply shocks, denoted by *DOUT* and *SOUT*, respectively. Thus, of the 49,872 firm-month observations in the IFRS adopter sample, 26.97% reflect a shorting demand or supply shift, whereas 73.03% do not. Similarly, for the worldwide benchmark sample, 49.04% reflect a shorting demand or supply shift, whereas 50.96% do not. The descriptive statistics for the other variables are largely consistent with those reported by Cohen et al. (2007).

INSERT TABLE 2 ABOUT HERE

4. Results

4.1. Effects of mandatory IFRS adoption on return predictability of shorting

Our primary hypothesis (H1) states that the return predictability of shorting is lower in the post-IFRS adoption period than in the pre-IFRS adoption period. Table 3 reports the results of regression in Eq. (2). In Table 3, column 1 shows the results for the treatment sample, while the last three columns report the results for the full sample where firms in the treatment sample are combined with firms in one of three benchmarks control samples. Across all columns, the coefficients associated with *DIN*, *DOUT*, *SIN*, and *SOUT* have the expected signs, consistent with Cohen et al. (2007). Specifically, the coefficients on *DIN* and *SIN* are positive and on *DOUT* and *SOUT* are negative. However, also consistent with the empirical evidence provided by Cohen et al. (2007), only the

---

[16] Different shorting constraints across countries may influence the distributional characteristics of returns to individual stocks and market indices (Bris, Goetzmann, and Zhu, 2007; Saffi and Sigurdsson, 2010; Boehmer et al., 2015).

coefficients on *DOUT* are significant at the 1% level across all four columns. For example, Column 2 shows that the average (one-month-ahead) abnormal return for stocks experiencing an outward shift in shorting demand (*DOUT*) is -0.51 percent ($t = -1.91$). Thus, similar to the U.S. results of Cohen et al. (2007), we find that shorting demand is an important predictor of future negative stock returns in the international setting as well.

We also provide evidence, although not overwhelming, that outward shifts in shorting supply predict future returns in the international setting. In Table 3, three of four columns, i.e., all except column 4, the coefficients on *SOUT* are negative and significant at the less than 5% level. For example, in column 2, the average (one-month-ahead) abnormal return for stocks experiencing an outward shift in shorting supply (*SOUT*) is -0.58 percent ($t = -1.87$). Therefore, in the international setting, we also show that outward shifts in shorting supply predict significantly negative average abnormal returns in the following month. Note the U.S. evidence provided by Cohen et al. (2007) is that only shorting demand, not shorting supply, predicts future returns. One plausible reason for this difference could be that the Cohen et al. (2007) dataset comes from only one lending institution while in our study data come from more than 100 lending institutions, which gives more statistical power to our tests. It is also possible that the U.S. equity lending market has less shorting supply constraints than the international market, and thus shorting demand is a dominant predictor of future return in the U.S.

We find that the coefficient on *DIN* and *SIN* are both insignificant across all four columns. This finding is consistent with the U.S. evidence of Cohen et al. (2007) that the inward shifts in shorting demand and supply have very limited predictive ability in the U.S. setting.

In sum, our results on *DOUT, SOUT, DIN,* and *SIN* in Table 3 indicate a significant negative association between *DOUT* and *SOUT* and one-month ahead abnormal stock returns and a positive association (although insignificant) between *DIN* and *SIN* and one-month ahead abnormal stock returns. Together, these results generally confirm the theoretical predictions of Cohen et al. (2007) in an international setting. While the findings by Cohen et al. (2007) in the U.S. are limited to the small

and opaque firms whose market capitalization is less than the NYSE median, our results are generalizable to all firms with different sizes in the international setting. Our results also suggest that non-U.S. foreign firms appear to suffer more from informational frictions relative to the U.S. firms.

INSERT TABLE 3 ABOUT HERE

We now turn our attention to the interaction terms between the indicators for shifts in shorting demand and supply and *IFRS*POST*. The coefficients on these triple interaction terms is of main interest. We also find that the return predictive ability of an outward shorting demand shift (*DOUT*) and supply shift (*SOUT*) drops significantly after mandatory IFRS adoption. That is, we observe significantly *positive* coefficients for the interaction terms *DOUT*IFRS*POST* across all four columns and for *SOUT*IFRS*POST* across three out of four columns. Thus, the one-month ahead negative abnormal returns from shorting decrease in the post-IFRS adoption period. The significant coefficients on *SOUT*IFRS*POST* are consistent with the interpretation that the supply of shortable shares are endogenously related to the shorting fee through the equity loan market (Reed, 2015). For example, since short selling fees, whose change is our proxy for shorting supply shift (e.g., *SOUT*), are determined by a range of factors including loan demand. Thus, Reed (2005) argues that "these costs may actually be an aggregate measure of arbitrageur demand, in other words, they may be a measure of arbitrageur agreement" (Reed 2015, 98). In short, the significantly positive coefficients on *DOUT*IFRS*POST* and *SOUT*IFRS*POST* supports H1 that return predictability of shorting and the associated shorting profitability is lower in the post-IFRS period than in the pre-IFRS period.

4.2. IFRS adoption, shorting fee and loan quantity

The literature indicates that the cost of shorting (e.g., the loan fee at *t*) is a strong predictor of negative returns in *t+1* and is a sufficient statistic for equity overpricing in the U.S. setting regardless of whether it is influenced by shifts in shorting demand or supply (Jones and Lamont, 2002). For example, Beneish, Lee, and Nichols (2015) study the determinants of the level of lendable supply and conclude that future stock returns are most predictably negative for "special" stocks, defined as those

with high shorting costs, and stocks whose lendable supply is most constrained. They report negative future returns for special stocks with high loan fees (Fee > 5%). Both "specialness" (e.g., high loan fee as captured by *(Fee > 5.0%)* and a high utilization rate (i.e., high lending quantity as represented by *Quantity*) have been documented to explain future returns (Beneish, Lee, and Nichols, 2015).

To place our results in the context of the prior literature, we examine whether the moderating effect of mandatory IFRS is driven by special stocks in the international setting. In Table 4 we introduce four variables to test this conjecture: *Fee > 5.0%, Quantity, ΔFee,* and *ΔQuantity*. By looking at whether *Fee > 5.0%, Quantity, ΔFee,* and *ΔQuantity* predict returns, we test whether the predicted negative coefficients for *DUOT* and *SOUT* are less informative about future returns for short positions with tighter shorting constraints, such as increased loan fees (Saffi and Sigurdsson, 2011) or increased or high levels of short interest (Asquith and Muelbrook, 1995; Desai, Ramesh, Thiagarajan, and Balachandran, 2002) following mandatory IFRS adoption.

Table 4 shows the regression results for the treatment sample. To see whether the IFRS effects are largely caused by shares with high lending fees we focus on the coefficient on *Fee > 5.0%*. The coefficients associated with *Fee > 5.0%* and the corresponding interaction with *IFRS* are not significant across all columns. This finding suggests that the reduced return predictability of an outward shift of shorting demand and supply following mandatory IFRS adoption is not driven by special stocks with loan fees greater than 5% at the end of month $t-1$.

Next we focus on short interest, *Quantity*, which is a popular proxy for short selling activities in the prior studies. As shown in column 2 of Table 4, the coefficient on *Quantity* is negative, as predicted, and significant. Moreover, the coefficient on *IFRS*Quantity* is positive and significant indicating that mandatory IFRS adoption decreases the informativeness of the short interest.

We next focus our attention on changes in *Fee > 5.0* (*ΔFee*) and changes in *Quantity* (*ΔQuantity*), rather than their levels and examine whether our findings become insignificant after controlling for the stock specialness (e.g., *Fee > 5.0*) and the short interest (e.g., *Quantity*). Our

analysis is performed using changes (versus levels) in shorting demand and supply which is important.[17] In column 4 of Table 4, the coefficients associated with *ΔFee* and *IFRS*ΔFee* are not significant. The coefficients associated with *ΔQuantity* and *IFRS* ΔQuantity* are significantly negative and positive, respectively, indicating that a high utilization rate explains future returns and that mandatory IFRS adoption decreases the return predictability of short interest. More importantly, As shown in column 4 of Table 4, we find that the coefficients on *DOUT*POST* and *SOUT*POST* are both positive and significant (0.0138 with $t = 2.44$; 0.0112 with $t = 2.02$, respectively). These significantly positive coefficients lend further support to our main finding that the return predictability of *DOUT* and *SOUT* diminish subsequent to IFRS adoption by showing that the finding is robust to inclusion of *Fee > 5.0%, Quantity, ΔFee,* and *ΔQuantity* in the regression model.

<div align="center">INSERT TABLE 4 ABOUT HERE</div>

4.3. Effect of IFRS adoption on shorting: Large increases in loan fees and shorting supply

Motivated by prior studies documenting that the size of shorting helps predict future stock returns, we examine whether the informational effects of mandatory IFRS are more prominent for stocks with large increases in loan fees and shorting supply. Desai et al. (2002) find that heavily-shorted firms experience significantly negative future abnormal returns, and that the magnitude of these negative returns increases with the level of short interest. To investigate the importance of large shifts, we supplement our baseline regression specification reported in Column (1) of Table 3 by introducing a three-way interaction of *DOUT* and *SOUT* with *POST* and three additional variables: (1) ΔFEE_{big}^{+}, a dummy variable that equals one if the increase in the loan fee for month t is greater than the 90th percentile, and 0 otherwise; (2) ΔFEE_{big}^{-}, a dummy variable that equals one if the increase in the loan fee for month t is lower than the 10th percentile, and 0 otherwise; and (3) $\Delta QUANTITY_{big}^{+}$, a dummy variable that equals one if the change in quantity of lending supply for month t is greater than the 90th percentile and 0 otherwise. These interactions allow us to examine

---

[17] Beneish, Lee, and Nichols (2015) focus separately on levels of lending supply and levels of shorting costs and not changes in these variables, their approach has less ability to identify the channels of information related to the interaction of the supply and demand for shorting.

whether the effects of mandatory IFRS captured by *DOUT*POST* and *SOUT*POST* are driven by stocks experiencing large outward shifts in shorting supply and large increases in loan fees.

Table 5 reports the results. Column 1 summarizes the results for ΔFEE_{big} and shows that the coefficient for *DOUT*POST*ΔFEE_{big},* does not have an expected positive coefficient consistent with a reduction in the return predictability of shorting that varies with ΔFEE_{big} in the post-IFRS period. In addition, the coefficient for *SOUT*POST*ΔFEE_{big}* is significantly negative, which is not consistent with a reduction in return predictability of shorting that varies with ΔFEE_{big} in the post-IFRS period. The results for *DOUT*POST*$\Delta QUANTITY_{big}$,* and *SOUT*POST*$\Delta QUANTITY_{big}$,* on the other hand, suggest a reduction in the return predictability of shorting that varies with $\Delta QUANTITY_{big}$ in the post-IFRS period. The negative coefficients for *DOUT*$\Delta QUANTITY_{big}$* and *SOUT*$\Delta QUANTITY_{big}$* subsume the coefficients for *DOUT* and *SOUT*, shown in Tables 3 and 4 to be significantly negative. As such, the informational effects of mandatory IFRS adoption are not more significant for stocks experiencing large increases in loan fees (column 1) but are more significant for stocks experiencing large increases in quantity (column 2). These results are, therefore, broadly consistent with Desai et al. (2002), who find significant return predictability for heavily shorted firms, which presumably, would have experienced an earlier increase in the quantity shares held as short interest.

INSERT TABLE 5 ABOUT HERE

4.4. Additional analyses

Implementation credibility and accounting differences

In developing our main hypothesis, we consider a possibility where the improved firm-level public disclosure associated with mandatory IFRS adoption can reduce the information asymmetry across well informed and less formed market participants, i.e., whether IFRS adoption facilitates leveling the playing field in the market by reducing the information advantage that well-informed investors like short sellers have over less informed investors, which in turn reduces the profitability of shorting. Prior studies find that the economic consequences of IFRS adoption critically depend on (1)

the differences between local GAAP and IFRS, and (2) whether mandated IFRS adoption is credibly implemented (Daske et al. 2008; Li 2010; Byard et al. 2011; DeFond et al. 2011). These suggest that the improved information environment from mandatory IFRS depends on country-level institutional characteristics (Byard et al., 2011; DeFond et al., 2011; Hong, 2013; Hong et al., 2014). This subsection presents additional analyses examining the role of country-level institutions on accounting differences and implementation credibility. We predict that mandatory IFRS results in a greater decrease in short sellers' profitability under the following conditions implied by the capital market benefits of IFRS, namely, in countries that reflect stronger implementation credibility as captured by the strictness of legal enforcement and require larger numbers of disclosure changes when switching from local GAAP to IFRS.

The implementation credibility is proxied by the law enforcement index designed by La Porta et al. (2008), which is a composite score of the strength of country-level law enforcement mechanisms including rule of law, risk of expropriation (e.g., confiscation or forced nationalization) by the government, likelihood of contract repudiation by the government, and the efficiency of the judiciary (La Porta et al. 1998), which represents the quality of enforcement of investors' legal rights. To proxy for the degree of accounting changes needed from before to after IFRS adoption in a country we use the indexes from Nobes (2001). The country-level index counts the number of additional disclosures required by IFRS relative to local GAAP and the number of inconsistencies between local GAAP and IFRS. Panel A of Table 6 reports the values of the rule of law and accounting change index for each country. The rule of law ranges from 6.14 for South Africa to 9.99 for Switzerland. The accounting change index ranges from two for South Africa to 20 for Austria and Germany.

We classify a firm in the strong (weak) implementation credibility partition if the rule of law index in its country is greater than (less than or equal to) the sample country median – 9.49. Then within each implementation credibility group, we classify a firm into the large (small) accounting change partition if the accounting change index in its country is greater than (less than or equal to) 15. Panel B of Table 6 presents four quadrants to which each country belongs. For example, firms

domiciled in Austria, Finland, and Switzerland are assigned to the north-west quadrant group where accounting change is large and implementation credibility is strong.

Panel C of Table 6 summarizes the regression results. First, similar to Tables 3 and 4, we observe mostly significantly negative coefficients for *DOUT* and *SOUT* and the coefficients for *DOUT*POST* and *SOUT*POST* are mainly positive and significant. The focus of Table 6, though, is whether the change in the return predictability of shorting, especially *DOUT*POST*, varies with implementation credibility and the number of accounting changes. We find that it does. Not only do columns 1 and 2 show positive coefficients for *DOUT*POST* but, also, the *DOUT*POST* coefficient for countries with a large number of disclosure changes (0.0689 with $t = 3.29$) far exceeds the *DOUT*POST* coefficient for countries with a small number of disclosure changes (0.0194 with t = 2.06).

Moreover, we find that the difference in the *DOUT*POST* coefficient for countries with high implementation credibility exceeds the difference in the same coefficient for countries with low implementation credibility (the difference in the difference of the coefficients). We also show that the difference in coefficients between columns 1 and 2 (0.0495 with $t = 2.31$) is significantly larger than the corresponding difference between columns 3 and 4 (-0.0057 with $t = -0.42$). This difference in differences of coefficients is positive and significant (0.0552 with $t = 2.48$). In short, the above results are consistent with H2a, suggesting that the impact of mandatory IFRS adoption on return predictability of an outward shift in shorting demand is greatest for firms in countries with large accounting changes and strong implementation credibility.

INSERT TABLE 6 ABOUT HERE

Effect of IFRS adoption on shorting conditional on negative earnings announcement months: Private informational advantage

Prior research suggests that short-selling abnormally increases prior negative earnings surprises since short sellers often have private access to this information (Christophe, Ferri, and Angel, 2002).

25

To confirm this result in the context of IFRS adoption, we estimate Eq. (2) over the month before an earnings announcement. To implement this test, we investigate whether *DOUT* and *SOUT* in the pre-announcement interval reflect the ability of short sellers to successfully anticipate the price effect of earnings announcements. Then, we examine whether the ability of short sellers to exploit private information before earnings announcement decreases following mandatory IFRS adoption. We predict a significant reduction in the association between *DOUT* in the month before a bad news earnings announcement and abnormal stock returns in the following month.

Table 7 documents the results. We define *Factor* as equal to one when unexpected stock returns at *t* defined as abnormal returns (*AR*) cumulated over (-1 days, +1 days) around the earning announcement date is less than 0. Specifically, we measure market reactions to earnings announcements by calculating daily abnormal returns around the earnings announcements date. *AR* is computed as the difference between actual return and the predicted return on day *t* during the earnings announcement window. We calculate the predicted return by using the estimated market model parameters from the single-factor market model for each country where daily raw returns are regressed onto a country's value-weighted market index returns over the estimation windows (-120 days, -10 days) prior to the earnings announcement date. A country's market index is based on the Morgan-Stanley World Market Index. Finally, we calculate cumulative absolute abnormal daily returns (*CAAR*) over the three-day window (-1 days, +1 days) relative to the annual earnings announcement date. We extract the annual earnings announcement date from the Institutional Brokers' Estimate System (I/B/E/S) Summary database.

Columns 1 and 2 of Table 7 show that the *DOUT* coefficients increase negatively in the earnings announcement months with bad news, as the coefficients for *DOUT*Factor* are significantly negative. We find, however, that the coefficients on *SOUT*FACTOR* are insignificant. We then estimate the coefficients for *DOUT*IFRS*POST*Factor* and *SOUT*IFRS*POST*Factor* to test whether the attenuation in *DOUT* and *SOUT* following IFRS adoption differs for shorting activity in the month before earnings announcement. We find that the coefficient on *DOUT*IFRS*Factor* is

positive and significant (0.05 with a $t = 2.67$), suggesting that the attenuation following IFRS adoption differs for shorting activity between firms with negative earnings news versus other types of news. Specifically, the significantly positive coefficient on *DOUT*IFRS*Factor* suggests that the shorting profitability of *DOUT* drops in the month before negative earnings surprises. For *SOUT*IFRS*POST*Factor,* on the other hand, shorting profitability does not change for negative earnings surprises in the pre-announcement month. Together, these findings are consistent with H2b, suggesting that mandatory IFRS lowers the profitability of shorting (similar to Table 4); this effect is equally or more pronounced in the month before a negative earnings surprise (Table 7). Table 7 also suggests that the IFRS-induced drop in short sellers' information advantage relates to private earnings information, as the negative earnings information one month before the announcement could not be public.[18]

<center>INSERT TABLE 7 ABOUT HERE</center>

IFRS and accrual anomaly: Public informational advantage

So far we provide evidence suggesting that IFRS adoption reduces private information advantage that short sellers have over other investors. Now we turn our attention to whether and how the profitability of shorting strategies based on the analysis of publicly available information changes subsequent to mandatory IFRS adoption. Our analysis focuses on the ability of short sellers to generate trading profits through the analysis of the accrual anomaly subsequent to the fiscal year end. By accrual anomaly, we refer to a phenomenon of stock prices overweighting the persistence of accruals relative to that of cash flows (Sloan,1996). This accrual anomaly is viewed as "a direct challenge to capital market efficiency with respect to accounting information" (Pincus, Rajgopal, and Venkatachalam, 2007, 170). More transparent and timely reporting of accruals can mitigate the potential for market mispricing of accounting information (*Ibid.*).

---

[18] Consistent with this result, Appendix B shows that both the demand of and supply for shorting declines after IFRS adoption.

Are the IFRS effects on lowering return predictability more pronounced for firms with the largest accrual versus their counterparts with the smallest accrual? We classify firm-month observations into deciles three months after the fiscal year end per country and year, and use two extreme deciles – the lowest decile versus the highest decile. Table 8 reports the results of regressions of one-month-ahead equity returns on the inward and outward shifts in shorting demand and supply before and after mandatory IFRS adoption conditional on a measure of accounting accruals. The results show that when firms have high levels of accruals, the return predictability of shorting declines. Specifically, the positive coefficient for *DOUT*POST* for firms in the highest decile of accruals exceeds positively ($p < 0.10$) the coefficient for *DOUT*POST* for firms in the lowest decile of accruals. We do not tabulate the equivalent results for *SOUT* because we do not observe a significant difference in the *SOUT*POST* coefficients for firms in the highest versus lowest decile of accruals.

We find that short sellers actively exploit the accrual anomaly in the pre-IFRS period, as reflected in the significantly negative coefficient on *DOUT* only in the highest accrual decile, but the IFRS mandate does mitigate their ability to do so, as reflected in the significantly positive coefficient on *DOUT*POST*. Taken together, the results in Table 8 are consistent with the prediction in H2c that the IFRS effects are stronger for firms with the largest accruals relative to those with the smallest accruals, and support the notion that short sellers' ability to exploit publicly available information for trading profits becomes weakened subsequent to the IFRS mandate.

INSERT TABLE 8 ABOUT HERE

Mechanism of reduced profitability of shorting following IFRS adoption: Consensus of opinion

Shorting costs, which can prevent stock prices from reflecting adverse information, are necessary but not sufficient to produce equity overpricing. Shorting costs can explain why a rational investor fails to short the overpriced security but cannot explain why anyone buys the overpriced security. To explain that, some investors must want to buy the overpriced stock. Thus, two things, shorting costs

and some investors with a downward sloping demand curve, are necessary for equity mispricing. Miller (1977) explains that differences of opinion among investors, in addition to binding short sale constraints, can lead to share price overvaluation, because the consensus of opinion among participating investors determines security prices. The extent of overvaluation increases with greater disagreement among investors because excluding the most pessimistic investors from a dispersed distribution increases the expected return of that distribution. This suggests that an underlying mechanism through which mandatory IFRS adoption decreases profitable trading opportunities of short sellers could relate to consensus of opinion.

To test this idea, we estimate Eq. (2) including a proxy for change in consensus of opinion (Miller, 1977; Berkman et al., 2009). We measure change in consensus of opinion ($\Delta Consensus$) as the change in the residual standard deviation estimated using the market model from the pre- to the post-IFRS periods times minus one. Table 9 presents the results. The main takeaway from this table is that the coefficients for *DOUT*POST*ΔConsensus* and *SOUT*POST*ΔConsensus* are positive and significant, indicating that the decrease in short sellers' profitability from IFRS adoption varies positively with the change in investors' consensus of opinion. This finding supports our contention that a decrease in the consensus of opinion from the pre- to the post-IFRS period provides an underlying mechanism to reduce the profitability of shorting following mandatory IFRS adoption. These results support our hypothesis, H2d.

<center>INSERT TABLE 9 ABOUT HERE</center>

5. Sensitivity tests

5.1. Splitting the sample on EU and non-EU countries

Prior studies argue that the IFRS effects relate to a few EU countries that strengthened law enforcement concurrent with the IFRS mandate (Christensen et al. 2015). In addition to the analysis in Table 3, we split our sample on EU and non-EU countries and estimate Eq. (2) separately for these two subsamples. Column 1 of Table 10 reports the results for the EU subsample and column 2 reports

<center>29</center>

the results for the non-EU subsample. These results show that our findings are qualitatively the same as those reported in Table 4 for both the EU subsample and the non-EU subsample, and the difference of the coefficients on DOUT between them is insignificant at the conventional level. These results support the view that mandatory IFRS adoption itself may drive the observed short selling effects in our study rather than other concurrent enforcement changes.

We repeat the analysis in Table 3 after restricting the IFRS-adopter sample to (1) the four countries with concurrent enforcement changes as identified in Christensen et al. (2013) (Finland, Germany, Norway, and the U.K.) and (2) the other countries without concurrent enforcement changes. Columns 3 and 4 of Table 10 show results qualitatively the same as those reported in Table 4, except that the coefficient for *DOUT*IFRS*POST* is insignificant for the four EU countries with concurrent enforcement changes. One explanation for this weaker result is that the U.K. is among the EU countries that required fewer accounting changes and is characterized as having weak implementation credibility and also represents the largest sample size among these countries. This is consistent with our Table 6 results showing insignificant effects of IFRS when the number of accounting changes is small. This suggests that our results are not unique to the four EU countries with concurrent enforcement changes only. Also, we repeat Table 3 with IFRS-adopters in developed economies, i.e., Canada and Japan, with the U.S. as an alternative benchmark (non-adoption) sample. Column 5 of Table 10 indicates that the results in Table 4 are robust to the use of this alternative benchmark sample.

<div align="center">INSERT TABLE 10 ABOUT HERE</div>

5.2. Other robustness tests

Including firm-fixed effects. The literature indicates that "short selling fees are driven by endogenously determined relationships which include loan demand. These costs may actually be an aggregate measure of arbitrageur demand. In other words, they may be a measure of arbitrageur agreement. This idea suggests that a more complete view of endogeneity in the equity loan market

might identify short selling demand as one of the only exogenously determined variables in the equilibrium relationship." (Reed, 2015, 98). Beneish et al. (2015) demonstrate that the shorting supply is a function of firm characteristics. Our research design is based on the *change* of shorting demand and supply as in Cohen et al. (2007), and thus is relatively free from the endogeneity issue (Reed, 2015). Nevertheless, to address this endogeneity issue, we include firm-fixed effects into our main regression model in Eq. (2), then re-estimate the fixed effects regression. Column 6 of Table 10 shows our main results are robust to firm-fixed effects, which supports the notion that our results are unlikely to be confounded by potential endogeneity in the equity lending market or by time-invariant unobserved (and thus omitted) variables.

Time trend. To address the concern that a time trend may affect our results, we compare changes in shorting profitability in treatment countries against those in the benchmark countries by using a placebo adoption year. We randomly assign the IFRS adoption year to the treatment countries and re-estimate Eq. (2). Column 7 of Table 10 indicates that the coefficient for *DOUT*IFRS*POST* is insignificant at conventional levels. This suggests that time trends are unlikely to drive the reduced profitability of short sellers following mandatory IFRS adoption.

Share price volatility. We consider the possibility that shorting varies directly with share price volatility. For example, by using the global dataset on equity lending collected from several custodians by Data Explorer (now owned by Markit) from January 2004 and June 2006, Saffi and Sigurdsson (2010) document that stocks with limited lending supply and high borrowing fees (e.g., inward shift of shorting supply) respond more slowly to market shocks. To address this concern, we include *VIX* in Eq. (2) as an additional control variable. *VIX* denotes the implied volatility of the S&P 500 as proxied by the Chicago Board of Options VIX Index. Column 8 of Table 10 indicates that the coefficient on *DOUT*IFRS*POST* is mostly significant with an expected sign at conventional levels. This suggests that the observed change in short sellers' profitability in our main analysis is unlikely to be affected by market volatility.

Institutional ownership. We investigate institutional ownership as a proxy for shorting constraints (Asquith, Pathak, and Ritter, 2005; Nagel, 2005). We did not include institutional ownership in Eq. (2) because we use a more direct measure of costs such as loan fee. Nevertheless, Column 9 of Table 10 reports the results after adding institutional ownership, as an additional proxy for shorting supply, to Eq. (2). As shown in column 10, the results are qualitatively identical to our main results reported earlier.

Subsamples of lending fee and shorting quantity. We examine *DOUT* and *SOUT* for various sub-samples of lending fee and shorting quantity (defined in Appendix A) to check for a reduction in shorting demand and supply in the post-IFRS adoption years. To this end, we estimate various regressions of the change in short demand or the change in shorting supply on *IFRS*POST* and other controls, with an expectation of a negative coefficient for *IFRS*POST*. We summarize the key results in Appendix B. In the post-IFRS period, shorting demand falls significantly across all cases (first four columns) and shorting supply also falls significantly across all cases (last four columns). The reduced profitability of short sellers following mandatory IFRS adoption relates not only to a drop in future stock returns on average, but also to a decline in the demand for and supply of shortable securities. We view the latter as inward movements of the shorting demand or supply curves.

Indirect costs. Do the indirect risks and costs of shorting affect the reduced profitability of shorting following mandatory IFRS adoption? When it is costly to short a stock, we should see larger returns from shorting to cover the associated costs. To test this idea, we identify high-cost stocks at the end of month t-2, and then calculate the month t returns to shorting these stocks in month t-1. Untabulated results show that when the costs of shorting are high (*Fee >5%*), the returns from shorting the stock are large. Specifically, we find that the combined effect of borrowing at an even higher cost at month t-2 and shorting in month t-1 earns -5.78% average abnormal return in month t. This return significantly exceeds the return of -2.31% from an outward demand shift (*DOUT*) based on the overall sample.

32

Arbitrage risk. This risk arises from short sellers taking a large position in a single stock, thus, exposing them to significant idiosyncratic risk.[19] Consistent with prior studies (Mendenhall, 2004; Lam and Wei, 2011; Hung, Li, and Wang, 2015), we construct the arbitrage risk factor (*ArbitrageRisk*) and create a triple interaction between *DOUT, IFRS*, and *ArbitrageRisk* (*DOUT*IFRS*ArbitrageRisk)*. We then repeat our main regression analysis using Eq. (2) after including this triple interaction term. In untabulated results, we find that the coefficient for *DOUT*IFRS*ArbitrageRisk* is insignificant, indicating that arbitrage risk is unlikely to drive the observed decrease in the profitability from a demand shift-based trading strategy following mandatory IFRS adoption.

Recall risk. Markit Security Finance does not provide data on recall risk. However, D'Avolio (2002) finds that recall risk is scarce (only two percent of stocks are subject to recall risk in his sample). He also finds that stock-level recall risk is high when trading volume is high for these stocks. We exploit this idea by creating a triple interaction between *DOUT, IFRS,* and an indicator for stock volume greater than the 80th percentile (*Volume$_{high}$*DOUT*IFRS*). We then re-estimate Eq. (2) including this triple interaction term. Untabulated results show that the coefficient on *Volume$_{high}$*DOUT*IFRS* is insignificant, which suggests that recall risk is unlikely to drive the decrease in the shorting profitability from a demand shift-based trading strategy following mandatory IFRS adoption.

---

[19] We examine two aspects of limits-to-arbitrage: arbitrage risk and transaction costs. We measure arbitrage risk as idiosyncratic stock return volatility to capture the component of a stock's risk that cannot be hedged. Idiosyncratic stock return volatility (*IVOL*) is the standard deviation of residual values from the time-series market model: $R_{it} = \beta_0 + \beta_1 RM_t + \varepsilon_{it}$, where R_{it} is the daily stock return and RM_t is the daily value-weighted market index return, which is estimated during the pre-IFRS period. We use three measures to proxy for transaction costs: stock price, Amihud (2002) illiquidity, and dollar trading volume. Stock price (*PRICE*) equals the average daily closing price (in U.S. dollars) during the pre-IFRS period. Amihud (2002) illiquidity (*AMIHUD*) is the mean value of absolute daily returns divided by daily dollar trading volume (in millions of US dollars) during the pre-IFRS period. Dollar trading volume (*DVOL*) equals the average daily dollar trading volume (in millions of U.S. dollars) during the pre-IFRS period. Since the four measures of limits-to-arbitrage are highly correlated, we calculate an aggregate measure using principal component analysis (Hung et al. 2015, 26).

6. Conclusion

This paper investigates an important implication of the prior research on the capital market effects of IFRS, which concludes that mandatory IFRS improves financial reporting quality and transparency and reduces the information gathering costs of outside investors. If valid, those findings imply that the investment strategies of skilled traders with superior analytical ability should become less profitable. We test this proposition in the setting of international equity lending markets. Given that many countries mandated IFRS adoption during our sample period, we predict that the profitability of equity shorting declines following adoption of the new standards. We use the framework of Cohen et al. (2007) to identify the information channels through which the shorting market acts as a mechanism for private information revelation. We then introduce mandatory IFRS as an information shock and using a variety of empirical specifications show that IFRS adoption is associated with a significant diminution in the ability of shifts in shorting demand and supply to predict one-month ahead negative abnormal stock returns.

We further show that the reduction in shorting profitability varies in predictable ways at the country level. We predict and find that the firms most affected by shorting profitability are domiciled in countries with higher levels of legal enforcement and with higher overall measures of the number of disclosure changes from local GAAP to mandatory IFRS. We also predict and find that the reduction in shorting profitability occurs in earnings announcement months with a negative surprise, is greater negatively for firms with more accounting accruals, and more pronounced for firms subject to an increase in the consensus of opinion of investors following IFRS adoption. These additional tests further support the notion that the positive information shock of mandatory IFRS decreases the efficacy of the security lending market as an important mechanism for private information revelation. Measures of aggregate lending market activity demand and supply and the cost of lending also

decrease following IFRS adoption, suggesting that a drop in return predictability of shorting may also occurred for the macro economy as well as for shorted stocks on the average.[20]

While our results are robust to a wide array of alternative specifications and controls, we also acknowledge that recent studies introduce alternative explanations to the mainstream view that mandatory IFRS adoption produced positive capital market benefits. These studies mainly focus on correlated, omitted regulatory changes that may have affected market liquidity, particularly in Europe. As an archival study, we are naturally disadvantaged by not knowing the counterfactuals of what would have occurred in the equity lending market but for mandatory IFRS adoption and, also, but for other related events and initiatives that might have occurred. Nonetheless, we contribute uniquely and significantly to the IFRS literature by documenting the existence of theoretically predicted outcomes in an unstudied market setting, namely, the international equity lending market.

---

[20] Appendix B shows a drop in all the demand and supply measures, which implies that shorting drops at the macro level from the pre- to the post-period.

References

Amihud, Y. 2002. Illiquidity and stock returns: Cross-section and time-series effects. *Journal of Financial Markets* 5(1): 31-56.

Arora, N., S. Richardson, and İ. Tuna. 2014. Asset reliability and security prices: evidence from credit markets. *Review of Accounting Studies* 19(1): 363-395.

Ashbaugh, H., and M. Pincus. 2001. Domestic accounting standards, international accounting standards, and the predictability of earnings. *Journal of Accounting Research* 39(3): 417-434.

Asquith, P., and L. Meulbroek. 1995. An empirical investigation of short interest: Working paper, Harvard Business School.

Asquith, P., P. A. Pathak, and J. R. Ritter. 2005. Short interest, institutional ownership, and stock returns. *Journal of Financial Economics* 78(2): 243-276.

Ball, R. 2006. International Financial Reporting Standards (IFRS): Pros and cons for investors. *Accounting and business research* 36(sup1): 5-27.

Ball, R. A. Y., X. I. Li, and L. Shivakumar. 2015. Contractibility and transparency of financial statement information prepared under IFRS: Evidence from debt contracts around IFRS adoption. *Journal of Accounting Research* 53(5): 915-963.

Barth, M.E., and Israel, D., 2013. Disentangling mandatory IFRS reporting and changes in enforcement. *Journal of Accounting and Economics*, 56, 178-188.

Barth, M. E., W. R. Landsman, M. Lang, and C. Williams. 2012. Are IFRS-based and US GAAP-based accounting amounts comparable? *Journal of Accounting and Economics* 54(1): 68-93.

Barth, M.E., Landsman, W.R., Young, D., and Zhuang, Z., 2014. Relevance of differences between net income based on IFRS and domestic standards for European firms. *Journal of Business Finance and Accounting* 43, 297–327

Beneish, M. D., C. M. Lee, and D. Nichols. 2015. In short supply: Short-sellers and stock returns. *Journal of Accounting and Economics* 60(2): 33-57.

Berkman, H., V. Dimitrov, P. C. Jain, P. D. Koch, and S. Tice. 2009. Sell on the news: Differences of opinion, short-sales constraints, and returns around earnings announcements. *Journal of Financial Economics* 92(3): 376-399.

Berndt, A., and A. Ostrovnaya. 2014. Do equity markets favor credit market news over options market news? *Quarterly Journal of Finance* 04(02): 1450006.

Boehmer, E., Z. R. Huszár, Y. Wang, and X. Zhang. 2015. Are shorts equally informed? A global perspective. *A Global Perspective (April 28, 2015)*.

Bris, A., W. N. Goetzmann, and N. Zhu. 2007. Efficiency and the bear: Short sales and markets around the world. *The Journal of Finance* 62(3): 1029-1079.

Brochet, F., A. D. Jagolinzer, and E. J. Riedl. 2013. Mandatory IFRS adoption and financial statement comparability. *Contemporary Accounting Research* 30(4): 1373-1400.

Bushman, R. M., J. D. Piotroski, and A. J. Smith. 2004. What determines corporate transparency? *Journal of Accounting Research* 42(2): 207-252.

Byard, D., Y. Li, and Y. Yu. 2011. The effect of mandatory IFRS adoption on financial analysts' information environment. *Journal of Accounting Research* 49(1): 69-96.

Cascino, S., and J. Gassen. 2015. What drives the comparability effect of mandatory IFRS adoption? *Review of Accounting Studies* 20(1): 242-282.

Christensen, H. B. 2012. Why do firms rarely adopt IFRS voluntarily? Academics find significant benefits and the costs appear to be low. *Review of Accounting Studies* 17(3): 518-525.

Christensen, H. B., L. Hail, and C. Leuz. 2013. Mandatory IFRS reporting and changes in enforcement. *Journal of Accounting and Economics* 56(2): 147-177.

Christensen, H. B., E. Lee, M. Walker, and C. Zeng. 2015. Incentives or standards: What determines accounting quality changes around IFRS adoption? *European Accounting Review* 24(1): 31-61.

Christensen, T. E., M. S. Drake, and J. R. Thornock. 2014. Optimistic reporting and pessimistic investing: Do pro forma earnings disclosures attract short sellers? *Contemporary Accounting Research* 31(1): 67-102.

Christophe, S. E., M. G. Ferri, and J. J. Angel. 2004. Short-selling prior to earnings announcements. *The Journal of Finance* 59(4): 1845-1875.

Cohen, L., K. Diether, and C. Malloy. 2013. Misvaluing innovation. *The Review of Financial Studies* 26(3): 635-666.

Cohen, L., K. B. Diether, and C. J. Malloy. 2007. Supply and demand shifts in the shorting market. *The Journal of Finance* 62(5): 2061-2096.

———. 2009. Shorting demand and predictability of returns. *Journal of Investment Management* 7(1): 36-52.

D'Avolio, G. 2002. The market for borrowing stock. *Journal of Financial Economics* 66(2–3): 271-306.

Dasgupta, S., J. Gan, and N. Gao. 2010. Transparency, price informativeness, and stock return synchronicity: Theory and evidence. *Journal of Financial and Quantitative Analysis* 45(05): 1189-1220.

Daske, H., L. Hail, C. Leuz, and R. Verdi. 2008. Mandatory IFRS reporting around the world: Early evidence on the economic consequences. *Journal of Accounting Research* 46(5): 1085-1142.

De George, E. T., X. Li, and L. Shivakumar. 2016. A review of the IFRS adoption literature. *Review of Accounting Studies* 10.1007/s11142-016-9363-1journal article: 1-107.

Dechow, P. M., A. P. Hutton, L. Meulbroek, and R. G. Sloan. 2001. Short-sellers, fundamental analysis, and stock returns. *Journal of Financial Economics* 61(1): 77-106.

DeFond, M., X. Hu, M. Hung, and S. Li. 2011. The impact of mandatory IFRS adoption on foreign mutual fund ownership: The role of comparability. *Journal of Accounting and Economics* 51(3): 240-258.

Desai, H., S. Krishnamurthy, and K. Venkataraman. 2006. Do short sellers target firms with poor earnings quality? Evidence from earnings restatements. *Review of Accounting Studies* 11(1): 71-90.

Desai, H., K. Ramesh, S. Thiagarajan, and B. Balachandran. 2002. An investigation of the informational role of short interest in the Nasdaq market. *The Journal of Finance* 57: 2263-2287.

Diamond, D., 1985. Optimal release of information by firms. *The Journal of Finance* 40, 1071-1094.

Diether, K. B., K.-H. Lee, and I. M. Werner. 2009. Short-sale strategies and return predictability. *Review of financial Studies* 22(2): 575-607.

Drake, M., L. Rees, and E. Swanson. 2011. Should investors follow the prophets or the bears? Evidence on the use of public information by analysts and short sellers. *The Accounting Review* 86: 101-130.

Drake, M. S., L. A. Myers, S. Scholz, and N. Y. Sharp. 2015. Short selling around restatement announcements: When do bears pounce? *Journal of Accounting, Auditing & Finance* 30(2): 218-245.

Engelberg, J., Reed, A., and Ringgenberg, M., 2012. How are shorts informed? Short-selling, news, and information processing. *Journal of Financial Economics* 105, 260–278

Fernandes, N., and M. A. Ferreira. 2008. Does international cross-listing improve the information environment. *Journal of Financial Economics* 88(2): 216-244.

Ferreira, M. A., and P. A. Laux. 2007. Corporate governance, idiosyncratic risk, and information flow. *The Journal of Finance* 62(2): 951-989.

Griffin, P. A. 2003. A League of Their Own? Financial Analysts' Responses to Restatements and Corrective Disclosures. *Journal of Accounting, Auditing & Finance* 18 (4):479-517.

Gul, F. A., J.-B. Kim, and A. A. Qiu. 2010. Ownership concentration, foreign shareholding, audit quality, and stock price synchronicity: Evidence from China. *Journal of Financial Economics* 95(3): 425-442.

Hirshleifer, D., S. Teoh, and J. Yu. 2011. Short arbitrage, return asymmetry, and the accrual anomaly. *Review of financial Studies* 24: 2429-2461.

Hong, H. A. 2013. Does mandatory adoption of International Financial Reporting Standards decrease

the voting premium for dual-class shares? *The Accounting Review* 88(4): 1289-1325.

Hong, H. A., M. Hung, and G. J. Lobo. 2014. The impact of mandatory IFRS adoption on IPOs in global capital markets. *The Accounting Review* 89(4): 1365-1397.

Hung, M., X. Li, and S. Wang. 2014. Post-earnings-announcement drift in global markets: Evidence from an information shock. *Review of financial Studies* 10.1093/rfs/hhu092.

Jin, L., and S. C. Myers. 2006. R2 around the world: New theory and new tests. *Journal of Financial Economics* 79(2): 257-292.

Jones, C. M., and O. A. Lamont. 2002. Short-sale constraints and stock returns. *Journal of Financial Economics* 66(2–3): 207-239.

Karpoff, J., and X. Lou. 2010. Short sellers and financial misconduct. *The Journal of Finance* 65: 1879-1913.

Kim, J.-B., & Shi, H., 2012. IFRS reporting, firm-specific information flows, and institutional environments: International evidence. *Review of Accounting Studies*, 17(3), 474-517.

Kim, O., Verrecchia, R.E., 1994. Market liquidity and volume around earnings announcements. *Journal of Accounting and Economics* 17, 41-67.

Kim, O., Verrecchia, R.E., 1997. Pre-announcement and event-period private information. *Journal of Accounting and Economics* 24, 395-419.

La Porta, R., F. Lopez-de-Silanes, A. Shleifer, and R. W. Vishny. 1998. Law and Finance. *Journal of Political Economy* 106(6): 1113–1155.

Landsman, W.R., Maydew, E.L., and Thornock, J.R., 2012. The information content of annual earnings announcements and mandatory adoption of IFRS. *Journal of Accounting and Economics* 53, 34–54.

Lasser, D., X. Wang, and Y. Zhang. 2010. The effect of short selling on market reactions to earnings announcements. *Contemporary Accounting Research* 27 609-638.

Leuz, C., D. Nanda, and P. D. Wysocki. 2003. Earnings management and investor protection: an international comparison. *Journal of Financial Economics* 69(3): 505-527.

Leuz, C., and P. Wysocki. 2015. The economics of disclosure and financial reporting regulation: Evidence and suggestions for future research, Booth Working Paper Series No. 16-03. December.

Li, N., 2010. Negotiated measurement rules in debt contracts. Journal of Accounting Research 48, 1103–1144.

Loureiro, G., and A. G. Taboada. 2015. Do improvements in the information environment enhance insiders' ability to learn from outsiders? *Journal of Accounting Research* 53(4): 863-905.

Miller, E.M. 1977. Risk, uncertainty and divergence of opinion. *Journal of Finance* 32, 1151–1168.

Morck, R., B. Yeung, and W. Yu, 2000. The information content of stock markets: why do emerging markets have synchronous stock price movements? *Journal of Financial Economics* 58 (1-2), 215-260.

Nobes, C. (2001). *GAAP 2001:* A *Survey of National Accounting Rules Benchmarked against International Accounting Standards*).

Pășcan, I.-D. 2015. Measuring the effects of IFRS adoption on accounting quality: A review. *Procedia Economics and Finance* 32: 580-587.

Platikanova, P., and J. Perramon. 2012. Economic consequences of the first-time IFRS introduction in Europe. *Spanish Journal of Finance and Accounting / Revista Española de Financiación y Contabilidad* 41(156): 497-519.

Reed, A. V. 2007. Costly short selling and stock price adjustment to earnings announcements. Working Paper, University of North Carolina. Also available from ProQuest. Paper AAI3073047. http://repository.upenn.edu/dissertations/AAI3073047.

———. 2015. Connecting supply, short-sellers and stock returns: Research challenges. *Journal of Accounting and Economics* 60(2–3): 97-103.

Richardson, S. 2003. Earnings quality and short sellers. *Accounting Horizons* 17: 49.

Saffi, P. A., and K. Sigurdsson. 2010. Price efficiency and short selling. *Review of financial Studies* 24(3): 822-852.

Song, C. J., W. B. Thomas, and H. Yi. 2010. Value relevance of FAS No. 157 fair value hierarchy information and the impact of corporate governance mechanisms. *The Accounting Review* 85(4): 1375-1410.

Sunder, S. 2007. Uniform financial reporting standards: Reconsidering the top-down push. *The CPA Journal* 77: 6-9.

Tan, H., S. Wang, and M. Welker. 2011. Foreign analysts following and forecast accuracy around mandatory IFRS adoptions. Journal of Accounting Research, 49(5): 1307-1357.

Verrecchia, R.E., 1982. Information acquisition in a noisy rational expectations economy. *Econometrica* 50 (6), 1415-1430.

Wang, C. 2014. Accounting standards harmonization and financial statement comparability: Evidence from transnational information transfer. *Journal of Accounting Research* 52(4): 955-992.

Yip, R. W., and D. Young. 2012. Does mandatory IFRS adoption improve information comparability? *The Accounting Review* 87(5): 1767-1789.

Appendix A
Variable definitions

IFRS and Shorting Variables
IFRS = A dummy variable that takes a value of one for mandatory IFRS adopters, otherwise zero.
POST = A dummy variable that takes a value of one for the post-IFRS period, 2006 and afterwards, otherwise zero.
DIN = A dummy variable equal to one if the stock experienced an inward demand shift last month stocks, e.g., the stocks' loan fee decrease and loan quantity decrease.
DOUT = A dummy variable equal to one if the stock experienced an outward demand shift last month stocks, e.g., the stocks' loan fee increase and loan quantity increase.
SIN = A dummy variable equal to one if the stock experienced an inward supply shift last month stocks, e.g., the stocks' loan fee increase and loan quantity decrease.
SOUT = A dummy variable equal to one if the stock experienced an outward supply shift last month stocks, e.g., the stocks' loan fee decrease and loan quantity increase.
Firm-level control variables
Size = The natural log of a firm's total market capitalization (in millions of US$).
Book-to-Market = The ratio of the book value of equity at the end of the year to market value of equity.
r_{-1} = Stock return at month t-1.
$r_{-12,-2}$ = Stock return from month t-12 to t-2.
Volume = Average daily exchange-adjusted share turnover during the previous 6 months.
Fee > 5.0% = A dummy variable equal to 1 if the loan fee is greater than 5.0% and zero otherwise.
Quantity = The fraction of shares outstanding on loan by the lender at the end of month t-1.
Fee = The average securities lending fee for current loan transactions.
ΔConsensus= The change in the standard deviation estimated using the market model from the pre-IFRS period to the post-IFRS period, multiplied by -1.
Institutional ownership = The ratio of the shares held by institutional investors and the total shares outstanding.
Country-level control variables
Law Enforcement = an index based on the mean score of three legal enforcement variables reported in La Porta et al. (1998) and used in Leuz et al. (2003). The three variables are (1) efficiency of the judicial system, which assesses the efficiency and integrity of the legal environment (2) rule of law, which assesses the rule and order tradition in a country, and (3) corruption, that assesses the corruption in government. The index ranges from 0 to 10, with higher scores for greater law enforcement.
Accounting change = Summary score of how many disclosures are additionally required by IFRS compared to domestic GAAP from GAAP 2001 (*Survey of National Accounting Rules Benchmarked against International Accounting Standards*). Higher values indicate that more additional disclosures are required by IFRS relative to local GAAP.
Shorting Supply
Active Lendable Value = Lendable value adjusted to remove lendable that is not being actively made available for lending.
Total Return to Lendable = The revenue from the securities lending and reinvestment for this security scaled by the group's lendable assets.
Shorting Demand
Balance Value = Total value of stock on loan.
Balance Quantity = Total quantity of stock on loan.
SL Tenure = The weighted average number of days from start date to present for all transactions.
SL Fee = The highest securities lending fee for current loan transactions.
VWAF = Value weighted average fee for all current trades.
Number of Transactions = Number of transactions with a start date on the most recent business day.
Calculations for shorting demand and supply shifts
Fee = (*SL Fee High* + *SL Fee Low*)/2.
ΔFee = Change in *Fee* from the previous month.
SIR = Total Balance Value / (common shares outstanding x stock price).
ΔSIR = Change in SIR from the prior month.
DIN = 1 if *ΔFee* < 0 and *ΔSIR* < 0.
DOUT = 1 if *ΔFee* > 0 and *ΔSIR* > 0.
SIN = 1 if *ΔFee* > 0 and *ΔSIR* < 0.
SOUT = 1 if *ΔFee* < 0 and *ΔSIR* > 0.
If *DIN*, *DOUT*, *SIN*, or *SOUT* ≠ 1, then 0.
* Names and definitions as stated by Markit in Securities Finance in *Data_Feed_Sept_2013-2014-08-06.xls*.

Appendix B
Changes in shorting demand and supply: Evidence from IFRS adoption

This appendix presents results of a regression analysis on the change in shorting supply and demand following mandatory IFRS adoption in the year 2005. The samples include a maximum of 246,764 firm-month observations, including 86,149 firm-years in the mandatory IFRS adoption countries and 160,615 firm-years in the non-mandatory IFRS adoption countries during 2002–2007 (excluding 2005). 2002–2004 is defined as the pre-adoption period, and 2006–2007 is defined as the post-adoption period. *t*-statistics in parentheses are based on robust standard errors clustered by firm. ***, **, and * indicate significance at 0.01, 0.05, and 0.10 two-tailed level, respectively. See Appendix A for variable definitions.

	Shorting Demand						Shorting Supply	
	Balance Value	Balance Quantity	SL Tenure	SL Fee	VWAF	Number of Transactions	Active Lendable Value	Total Return to Lendable
IFRS*POST	-1.1501*	-4.4671*	-29.1951**	-33.6324***	-38.9432***	-0.1902*	-73.9870	-95.5700***
	(-1.83)	(-1.93)	(-2.61)	(-5.26)	(-3.88)	(-1.98)	(-0.93)	(-6.32)
Size	0.5819	-3.5289**	-18.4239**	-33.6185***	-32.7053***	0.0346***	100.0812***	-24.8304***
	(0.60)	(-2.50)	(-2.14)	(-4.67)	(-4.01)	(4.37)	(3.56)	(-6.01)
Book-to-Market	-4.1422***	-12.6436***	-22.4481**	-72.4413***	-62.3014***	-0.0035	26.3129	-75.9682***
	(-3.96)	(-3.36)	(-2.14)	(-6.37)	(-5.06)	(-0.21)	(0.79)	(-5.26)
r_{-1}	-1.9076	-4.6891	0.8147	-19.0546**	-17.0449**	0.0047	3.3640	-17.7803**
	(-1.21)	(-1.46)	(0.12)	(-2.57)	(-2.51)	(0.30)	(0.13)	(-2.44)
r_{-12,-2}	-1.6430***	-3.5487***	-3.2577	-13.1615***	-15.2848***	-0.0164***	3.5926	-20.4406***
	(-3.75)	(-3.21)	(-1.29)	(-3.24)	(-8.14)	(-3.10)	(0.19)	(-5.01)
Volume	4.3489***	3.4432***	2.5820*	8.8741***	8.2415***	0.0700***	-12.7844	19.8813***
	(18.56)	(11.95)	(1.81)	(5.91)	(6.06)	(103.80)	(-1.37)	(22.91)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2 (OLS model)	0.13	0.09	0.33	0.25	0.29	0.45	0.33	0.21
N	210,488	210,488	179,267	101,012	157,511	138,947	210,488	179,267

Figure 1. Shifts in shorting demand and supply (adapted from Cohen et al. (2009)

	Predict positive future returns. *Inward shift in supply (SIN)* $+\Delta$Fee, $-\Delta$Q	Predict negative future returns. *Outward shift in demand (DOUT)* $+\Delta$Fee, $+\Delta$Q
Loan fee (Fee)	Predict positive future returns. *Inward shift in demand (DIN)* $-\Delta$Fee, $-\Delta$Q	Predict negative future returns. *Outward shift in supply (SOUT)* $-\Delta$Fee, $+\Delta$Q

Quantity of loan (Q)

Table 1
Sample distribution

This table presents the sample distribution by country, industry and year. The sample includes 246,764 firm-month observations, including 86,149 firm-years in the mandatory IFRS adoption countries and 160,615 firm-years in the non-mandatory IFRS adoption countries during 2002–2007 (excluding 2005). 2002–2004 is defined as the pre-adoption period, and 2006–2007 is defined as the post-adoption period.

Panel A. Sample distribution by country

	Mandatory IFRS adopters		Voluntary adopters		Local firms	
	No. of firms	No. of firm-months	No. of firms	No. of firm-months	No. of firms	No. of firm-months
IFRS adoption countries						
Australia	72	1,943	7	275	467	10,896
Austria	8	324	15	598	2	48
Belgium	38	1,214	12	501	3	73
Denmark	30	980	12	482	5	66
Finland	64	2,319	7	343	1	14
France	266	9,479	26	1,021	46	705
Germany	140	5,077	131	4,959	18	639
Hong Kong	18	522	15	529	213	6,834
Italy	93	3,587	1	43	1	7
Norway	33	1,195	2	55	8	187
Portugal	9	323	1	21	0	0
South Africa	39	1,198	12	505	3	44
Spain	43	1,708	1	41	6	132
Sweden	82	2,974	1	50	11	145
Switzerland	31	1,151	65	2,789	22	787
U.K.	372	15,879	2	78	133	3,409
Total	1,338	49,873	310	12,290	939	23,986

	Worldwide benchmark sample	
Non-IFRS adoption countries	No. of firms	No. of firm-months
Canada	83	1,879
Japan	1,579	64,785
Mexico	20	812
South Korea	92	3,566
Taiwan	172	5,504
U.S.	2,124	84,069
Total	4,070	160,615

Panel B: Sample distribution by industry

Fama-French 48 Industry (number)	Freq.	Percentage
Agriculture (1)	1,164	0.47
Aircraft (24)	1,214	0.49
Alcoholic Beverages (4)	2,143	0.87
Apparel (10)	4,166	1.69
Automobiles and Trucks (23)	6,849	2.78
Business Services (34)	43,825	17.76
Business Supplies (38)	4,461	1.81
Candy and Soda (3)	1,220	0.49
Coal (##)	9,391	3.81
Chemicals (14)	536	0.22
Computers (35)	9,669	3.92
Construction Materials (17)	17,098	6.93
Consumer Goods (9)	5,883	2.38
Defense (26)	357	0.14

Electrical Equipment (22)	17,155	6.95
Electronic Equipment (36)	5,195	2.11
Fabricated Products (20)	848	0.34
Food Products (2)	7,346	2.98
Machinery (21)	14,022	5.68
Measuring and Control Equipment (37)	4,871	1.97
Medical Equipment (12)	6,653	2.7
Miscellaneous (48)	2,053	0.83
Nonmetallic Mining (28)	3,364	1.36
Personal Services (33)	363	0.15
Petroleum and Natural Gas (30)	7,544	3.06
Pharmaceutical Products (13)	11,503	4.66
Precious Metals (27)	2,279	0.92
Printing and Publishing (8)	2,828	1.15
Recreational Products (6)	2,979	1.21
Restaurants, Hotel, Motel (43)	5,429	2.2
Retail (42)	16,367	6.63
Rubber and Plastic Products (15)	2,890	1.17
Ship Building, Railroad Equipment (25)	827	0.34
Shipping Containers (39)	1,442	0.58
Steel Works, Etc. (19)	6,845	2.77
Textiles (16)	2,419	0.98
Tobacco Products (5)	452	0.18
Wholesale (41)	13,114	5.31
Total	246,764	100

Panel C: Sample distribution by year

Fiscal year	Freq.	Percentage
Mandatory IFRS adopters		
2002	1,479	2.97
2003	8,058	16.16
2004	12,658	25.38
2006	14,415	28.9
2007	13,263	26.59
Total	49,873	100
Voluntary adopters		
2002	359	2.92
2003	2,255	18.35
2004	3,325	27.05
2006	3,327	27.07
2007	3,024	24.61
Total	12,290	100
Local firms		
2002	418	1.74
2003	2,725	11.36
2004	6,385	26.62
2006	7,216	30.08
2007	7,242	30.19
Total	23,986	100
Worldwide benchmark sample		
2002	4,362	2.72
2003	29,493	18.36
2004	43,333	26.98
2006	43,154	26.87
2007	40,273	25.07
Total	160,615	100

Table 2
Descriptive statistics

This table reports descriptive statistics for the full sample. The sample includes 246,764 firm-month observations, including 86,149 firm-years in the mandatory IFRS adoption countries and 160,615 firm-years in the non-mandatory IFRS adoption countries during 2002–2007 (excluding 2005). 2002–2004 is defined as the pre-adoption period, and 2006–2007 is defined as the post-adoption period. See Appendix A for variable definitions.

		Treatment	*Benchmark*		
Variable		*Mandatory IFRS adopters*	*Voluntary adopter sample*	*Local firms without IFRS adoption*	*Worldwide benchmark Sample*
Short selling demand and supply variable					
DIN	Mean	0.0780	0.0876	0.0511	0.1423
	Median	0.0000	0.0000	0.0000	0.0000
	Std. Dev.	0.2681	0.2828	0.2202	0.3493
DOUT	Mean	0.0756	0.0886	0.0471	0.1393
	Median	0.0000	0.0000	0.0000	0.0000
	Std. Dev.	0.2643	0.2842	0.2119	0.3462
SIN	Mean	0.0596	0.0563	0.0293	0.1045
	Median	0.0000	0.0000	0.0000	0.0000
	Std. Dev.	0.2368	0.2305	0.1687	0.3060
SOUT	Mean	0.0565	0.0541	0.0263	0.1043
	Median	0.0000	0.0000	0.0000	0.0000
	Std. Dev.	0.2310	0.2262	0.1601	0.3056
Firm-level control					
Size	Mean	6.6798	7.1666	5.9451	5.5450
	Median	6.5984	7.0772	5.8932	5.2621
	Std. Dev.	1.3235	1.6208	1.2669	3.2692
Book-to-Market	Mean	0.5659	0.6981	0.6807	0.7218
	Median	0.4246	0.5643	0.7150	0.6903
	Std. Dev.	0.3918	0.4396	0.4055	0.8166
r_{-1}	Mean	0.0138	0.0164	0.0187	0.0118
	Median	0.0069	0.0095	0.0062	0.0044
	Std. Dev.	0.1023	0.1055	0.1223	0.1094
$r_{-12,-2}$	Mean	0.1939	0.2292	0.2429	0.1908
	Median	0.1274	0.1538	0.1277	0.1033
	Std. Dev.	0.4737	0.5243	0.5814	0.4861
Volume	Mean	0.0029	0.0029	0.0025	0.9460
	Median	0.0021	0.0022	0.0018	0.2532
	Std. Dev.	0.0028	0.0025	0.0024	1.3937
Quantity	Mean	0.5555	0.4765	0.1369	1.7551
	Median	0.0000	0.0000	0.0000	0.0000
	Std. Dev.	2.2896	1.7689	0.6887	4.9589
Fee > 5.0%	Mean	0.3856	0.4156	0.2649	0.4922
	Median	0.0000	0.0000	0.0000	0.0000
	Std. Dev.	0.4867	0.4928	0.4413	0.4999
ΔQuantity	Mean	-0.0138	-0.0129	-0.0150	-0.0083
	Median	0.0000	0.0000	0.0000	0.0000
	Std. Dev.	1.5035	1.6878	0.5326	3.1734
Δ(Fee > 5.0%)	Mean	0.5599	-0.1462	-0.1151	-0.5047
	Median	0.0000	0.0000	0.0000	0.0000
	Std. Dev.	2.1447	78.1456	2.2838	84.8751

Table 3
Supply and demand shifts of short selling: Evidence from mandatory IFRS adoption

This table summarizes regressions of future market-adjusted abnormal returns on the inward and outward shifts in shorting demand and supply for all firm-month observations before and after mandatory IFRS adoption. The maximum regression sample includes 246,764 firm-month observations, including 49,873 firm-years in the mandatory IFRS adoption countries during 2002–2007 (excluding 2005). 2002–2004 is defined as the pre-adoption period, and 2006–2007 is defined as the post-adoption period. t-statistics in parentheses are based on robust standard errors clustered by firm. ***, **, and * indicate significance at 0.01, 0.05, and 0.10 two-tailed level, respectively. See Appendix A for variable definitions.

Estimate	Pred. sign	Treatment sample only	Estimate	Treatment sample plus voluntary adopters as Benchmark Sample	Treatment sample plus local firms without IFRS adoption as Benchmark Sample	Treatment sample plus worldwide Benchmark Sample
Sample		(1)		(2)	(3)	(4)
Short selling demand and supply variable:						
DIN	+	0.0031	DIN	0.0025	0.0024	0.0025
		(0.83)		(0.92)	(0.87)	(0.90)
DOUT	–	-0.0095**	DOUT	-0.0051*	-0.0051*	-0.0016***
		(-2.46)		(-1.91)	(-1.73)	(-3.14)
SIN	+	0.0070	SIN	0.0051	0.0053**	-0.0005
		(1.49)		(1.63)	(2.55)	(-0.25)
SOUT	–	-0.0097*	SOUT	-0.0058*	-0.0104**	-0.0024
		(-2.10)		(-1.87)	(-2.70)	(-0.73)
POST	+	0.0068	IFRS*POST	-0.0003	-0.0026	-0.0082
		(1.03)		(-0.17)	(-0.62)	(-1.05)
DIN *POST	–	-0.0028	DIN*IFRS *POST	-0.0022	-0.0011	-0.0041
		(-0.83)		(-0.62)	(-0.34)	(-1.07)
DOUT*POST	+	0.0140**	DOUT*IFRS*POST	0.0091***	0.0094**	0.0063*
		(2.31)		(2.61)	(2.31)	(1.71)
SIN*POST	–	-0.0089	SIN*IFRS*POST	-0.0070*	-0.0062	-0.0031
		(-1.65)		(-1.85)	(-1.71)	(-0.80)
SOUT*POST	+	0.0136**	SOUT*IFRS*POST	0.0092**	0.0141**	0.0048
		(2.94)		(2.49)	(2.58)	(0.79)
Firm-level controls:						
Size		0.0005*	Size	0.0007**	0.0005*	0.0017**
		(1.93)		(2.03)	(1.72)	(2.34)
Book-to-Market		0.0058***	Book-to-Market	0.0060***	0.0065***	0.0070***
		(10.80)		(7.98)	(11.69)	(12.18)
r_{-1}		0.0264	r_{-1}	0.0193***	0.0309**	-0.0168
		(1.68)		(3.06)	(2.21)	(-0.61)
$r_{-12,-2}$		0.0035**	$r_{-12,-2}$	0.0045***	0.0043*	-0.0057*
		(2.38)		(3.04)	(1.94)	(-1.78)
Volume		-0.4559**	Volume	-0.5063***	-0.5071**	-0.0009***
		(-2.15)		(-3.83)	(-2.78)	(-11.09)
Country fixed effects		Yes	Country fixed effects	Yes	Yes	Yes
Industry fixed effects		Yes	Industry fixed effects	Yes	Yes	Yes
Year & Month fixed effects		Yes	Year & Month fixed effects	Yes	Yes	Yes
Adj. R^2 (OLS model)		0.06	Adj. R^2 (OLS model)	0.06	0.05	0.06
N		49,873	N	62,163	73,859	210,488

Table 4
Effect of IFRS adoption on shorting: Shorting fee and loan quantity

This table summarizes regressions of future market-adjusted abnormal returns on the inward and outward shifts in shorting demand and supply for all firm-month observations before and after mandatory IFRS adoption, conditional on shorting fee and loan quantity. Shorting fee is calculated as the average of high and low loan fees at the end of month t-1. Loan quantity is calculated as the fraction of shares outstanding on loan by the lender at the end of month t-1. t-statistics in parentheses are based on robust standard errors clustered by firm. ***, **, and * indicate significance at 0.01, 0.05, and 0.10 two-tailed level, respectively. See Appendix A for variable definitions.

Estimate	Pred. sign	(1)	(2)	(3)	(4)
DIN	+			-0.0049	0.0006
				(-0.78)	(0.18)
DOUT	–			-0.0132***	-0.0100**
				(-3.23)	(-2.86)
SIN	+			0	0.0038
				(-0.00)	-0.79
SOUT	–			-0.0184***	-0.0111**
				(-3.77)	(-2.61)
POST		0.007	0.0071	0.0071	0.0073
		(1.04)	(1.07)	(1.07)	(1.12)
DIN*POST	–			-0.0003	-0.0041
				(-0.06)	(-1.12)
DOUT*POST	+			0.0127*	0.0138**
				(1.98)	(2.44)
SIN*POST	–			-0.0075	-0.0071
				(-1.15)	(-1.34)
SOUT*POST	+			0.0165**	0.0112*
				(2.74)	(2.02)
Fee > 5.0%		0.0023	0.0028	0.0072	
		(1.05)	(1.19)	(1.58)	
IFRS*(Fee > 5.0%)		0.0012	0.0007	-0.0019	
		(0.47)	(0.29)	(-0.52)	
Quantity			-0.0002***		
			(-8.96)		
IFRS*Quantity			0.0001**		
			(2.83)		
ΔFee					-0.0002
					(-0.40)
IFRS*ΔFee					-0.0004
					(-0.66)
ΔQuantity					-0.0002***
					(-12.32)
IFRS*ΔQuantity					0.0001**
					(2.37)
Firm-level controls		Yes	Yes	Yes	Yes
Country fixed effects		Yes	Yes	Yes	Yes
Industry fixed effects		Yes	Yes	Yes	Yes
Year & Month fixed effects		Yes	Yes	Yes	Yes
Adj. R^2 (OLS model)		0.08	0.08	0.09	0.09
N		49,873	62,163	73,859	210,488

Table 5
Effect of IFRS adoption on short selling: Large shifts in quantity and high loan fees

This table summarizes regressions of future market-adjusted abnormal returns on the inward and outward shifts in shorting demand and supply for all firm-month observations before and after mandatory IFRS adoption, conditional on the large shifts in quantity and high loan fees. $\Delta FEE_{big}{}^{+}$ is a dummy variable that equals one if the increase in the loan fee for month t is greater than the 90th percentile, and 0 otherwise. $\Delta FEE_{big}{}^{-}$ is a dummy variable that equals one if the increase in the loan fee for month t is lower than the 10th percentile, and 0 otherwise. $\Delta QUANTITY_{big}{}^{+}$ is a dummy variable that equals one if the change in quantity on loan for month t is greater than the 90th percentile and 0 otherwise. We include in the analysis variables for large shifts in shorting quantity and high loan fees.. t-statistics in parentheses are based on robust standard errors clustered by firm. ***, **, and * indicate significance at 0.01, 0.05, and 0.10 two-tailed level, respectively. See Appendix A for variable definitions.

		Regression	
	Pred. sign	(1)	(2)
DIN	+	-0.0000	-0.0001
		(-0.01)	(-0.04)
DOUT	–	-0.0101*	0.0059
		(-1.88)	(1.24)
SIN	+	-0.0009	-0.0010
		(-0.40)	(-0.47)
SOUT	–	-0.0155***	0.0025
		(-4.72)	(0.54)
DOUT*$\Delta FEE_{big}{}^{+}$		-0.0023	
		(-0.30)	
SOUT*$\Delta FEE_{big}{}^{-}$		0.0057	
		(0.87)	
DOUT*$\Delta QUANTITY_{big}{}^{+}$			-0.0258***
			(-3.97)
SOUT*$\Delta QUANTITY_{big}{}^{+}$			-0.0199***
			(-5.40)
POST		0.0061	0.0064
		(0.97)	(1.01)
DOUT*POST	+	0.0149**	-0.0047
		(2.80)	(-0.60)
SOUT*POST	+	0.0191***	-0.0043
		(4.24)	(-0.80)
DOUT*POST*$\Delta FEE_{big}{}^{+}$	+	-0.0073	
		(-0.72)	
SOUT*POST*$\Delta FEE_{big}{}^{-}$	+	-0.0176*	
		(-1.85)	
DOUT*POST *$\Delta QUANTITY_{big}{}^{+}$	+		0.0283***
			(4.30)
SOUT*POST*$\Delta QUANTITY_{big}{}^{+}$	+		0.0252***
			(4.58)
Firm-level controls		Yes	Yes
Country fixed effects		Yes	Yes
Industry fixed effects		Yes	Yes
Year & Month fixed effects		Yes	Yes
Adj. R^2 (OLS model)		0.09	0.09
N		49,873	49,873

Table 6
Effects of implementation credibility and accounting differences

This table summarizes regressions of future market-adjusted abnormal returns on the inward and outward shifts in shorting demand and supply for all firm-month observations before and after mandatory IFRS adoption, conditional on the differences between local GAAP and IFRS, and the strength of legal enforcement. Panel A reports descriptive statistics for the country-level conditioning variables. Panel B reports the analysis for the sub-samples conditioned on the enforcement and the differences between local GAAP and IFRS. The continuous conditioning variables are transformed to binary variables based on the sample country median values. *t*-statistics in parentheses are based on robust standard errors clustered by firm. ***, **, and * indicate significance at 0.01, 0.05, and 0.10 two-tailed level, respectively. See Appendix A for variable definitions.

Panel A: Country-level indexes of rule of law enforcement and accounting change for IFRS adoption countries

Country	Rule of law enforcement	Accounting change
Australia	9.5	13
Austria	9.7	20
Belgium	9.65	15
Denmark	9.75	13
Finland	9.71	19
France	8.96	19
Germany	9.48	20
Hong Kong	8.83	8
Italy	8.4	19
Norway	9.9	5
Portugal	7.91	12
South Africa	6.14	2
Spain	7.99	22
Sweden	9.75	11
Switzerland	9.99	17
U.K.	9.48	15

Panel B: Two-by-two frequency table of the treatment sample by implementation credibility and accounting changes

	Strong implementation credibility (Rule of law > 9.49)	*Weak implementation credibility* (Rule of law ≤ 9.49)
Large accounting change *(*accounting change > 15)	Austria, Finland, Switzerland	France, Germany, Italy, Spain
Small accounting change (accounting change ≤ 15)	Australia, Belgium, Denmark, Norway, Sweden	Hong Kong, Portugal, South Africa, U.K.

Panel C: Regression analysis of shorting selling profitability

Dependent variable = Underpricing	Pred. sign	(1) Strong credibility	(2)	(3) Weak credibility	(4)
		Large accounting change	*Small accounting change*	*Large accounting change*	*Small accounting change*
DIN	+	0.0068***	-0.0050	0.0050	-0.0012
		(3.03)	(-0.80)	(0.76)	(-0.77)
DOUT	–	-0.0390***	-0.0149*	-0.0018	-0.0132***
		(-2.74)	(-1.81)	(-0.31)	(-6.60)
SIN	+	0.0191***	0.0047	-0.0011	-0.0022***
		(2.99)	(0.80)	(-0.31)	(-6.03)
SOUT	–	-0.0124	-0.0421**	-0.0045	-0.0117***
		(-0.48)	(-2.34)	(-0.26)	(-34.59)
POST		-0.0104	0.0106	0.0140	-0.0008
		(-0.94)	(0.44)	(0.98)	(-0.62)
DOUT*POST	+	0.0689***	0.0194**	0.0079	0.0136***
		(3.29)	(2.06)	(0.74)	(4.98)
Test of diff (large-small)	+	0.0495***		-0.0057	
		(2.31)		(-0.42)	
Test of diff-in-diffs (strong-weak)	+		0.0552***		
			(2.48)		
SOUT*POST	+	0.0222	0.0320*	0.0131	0.0170***
		(0.57)	(1.67)	(0.74)	(6.53)
Firm-level controls		Yes	Yes	Yes	Yes
Country fixed effects		Yes	Yes	Yes	Yes
Industry fixed effects		Yes	Yes	Yes	Yes
Year & Month fixed effects		Yes	Yes	Yes	Yes
Adj. R^2 (OLS model)		0.18	0.04	0.06	0.12
N		3,794	8,306	19,851	17,922

Table 7
Effect of IFRS adoption on shorting conditional on month before quarterly earnings announcement

This table summarizes regressions of future equity returns on the inward and outward shifts in shorting demand and supply for all firm-month observations before and after mandatory IFRS adoption. We condition the analysis on the month of an earnings announcement with a negative earnings surprise (*Factor*) to isolate the source of short sellers' profitability. *Factor* equals 1 when unexpected earnings at *t* is less than 0, otherwise zero. 2002–2004 is defined as the pre-adoption period, and 2006–2007 is defined as the post-adoption period. *t*-statistics in parentheses are based on robust standard errors clustered by firm. ***, **, and * indicate significance at 0.01, 0.05, and 0.10 two-tailed level, respectively. See Appendix A for variable definitions.

Variable	Pred. sign	*Factor = Indicator for the month prior to an earnings announcement with bad news*	
DIN	+	0.0086	0.0075
		(1.21)	(0.68)
DOUT	–	-0.0046	-0.0037
		(-0.84)	(-0.68)
SIN	+	-0.0046	-0.0030
		(-0.87)	(-0.57)
SOUT	–	-0.0166**	-0.0203*
		(-2.21)	(-1.69)
Factor		-0.0622***	-0.0540***
		(-19.75)	(-11.50)
DOUT*Factor		-0.0222**	-0.0488***
		(-2.33)	(-3.17)
SOUT*Factor		0.0106	-0.0066
		(1.04)	(-0.37)
IFRS*POST			-0.0117**
			(-2.34)
DOUT* IFRS*POST			0.0011
			(0.08)
SOUT* IFRS*POST			0.0070
			(0.47)
IFRS*POST *Factor			-0.0169***
			(-2.90)
DOUT* IFRS*POST *Factor			0.0500***
			(2.67)
SOUT* IFRS*POST *Factor			0.0297
			(1.37)
Firm-level controls		Yes	Yes
Country fixed effects		Yes	Yes
Industry fixed effects		Yes	Yes
Year & Month fixed effects		Yes	Yes
Adj. R^2 (OLS model)		0.12	0.13
N		8,907	8,907

Table 8
Effect of IFRS adoption on shorting conditional on the accrual anomaly (Pincus et al., 2007)

This table summarizes regressions of future equity returns on the inward and outward shifts in shorting demand and supply for all firm-month observations before and after mandatory IFRS adoption, conditional on the size of accruals. The accrual is measured as the total accruals divided by the absolute value of operating cash flows. The accrual is calculated as (Δinventory + Δaccounts receivable + Δother current assets) - (Δaccounts payable + Δother current liabilities + depreciation expense). The operating cash flows are calculated as net income before extraordinary items – total accruals. The samples are split on the size of accruals into deciles per fiscal year and country, and this table reports the results of our main analysis in the extreme two deciles of accruals. The dependent variable is the country-adjusted abnormal return. t-statistics in parentheses are based on robust standard errors clustered by firm. ***, **, and * indicate significance at 0.01, 0.05, and 0.10 two-tailed level, respectively. See Appendix A for variable definitions.

		Size of Accrual	
Variable	Pred. sign	The lowest decile (1)	The highest decile (2)
DIN	+	0.0101	0.0019
		(1.41)	(0.44)
DOUT	–	-0.0090	-0.0287***
		(-1.30)	(-3.77)
SIN	+	-0.0010	0.0105
		(-0.19)	(1.01)
SOUT	–	-0.0081	0.0030
		(-0.59)	(0.25)
POST	+	0.0146	0.0021
		(1.58)	(0.21)
DOUT*POST	+	0.0128	0.0231*
		(1.06)	(2.12)
Diff.		0.0103*	
		(1.87)	
SOUT*POST	+	0.0120	-0.0079
		(0.84)	(-0.41)
Firm-level controls		Yes	Yes
Country fixed effects		Yes	Yes
Industry fixed effects		Yes	Yes
Year & Month fixed effects		Yes	Yes
Adj. R^2 (OLS model)		0.06	0.08
N		4,793	4,799

Table 9
Effect of IFRS adoption on shorting conditional on changes in differences of opinion (Miller 1977)

This table summarizes regressions of future equity returns on the inward and outward shifts in shorting demand and supply for all firm-month observations before and after mandatory IFRS adoption. We condition the analysis on investors' increase in consensus (*ΔConsensus*), which is measured as the change in the residual standard deviation estimated using the market model from the pre- to the post-IFRS periods times minus one, around IFRS adoption. 2002–2004 is defined as the pre-adoption period, and 2006–2007 is defined as the post-adoption period. *t*-statistics in parentheses are based on robust standard errors clustered by firm. ***, **, and * indicate significance at 0.01, 0.05, and 0.10 two-tailed level, respectively. See Appendix A for variable definitions.

Variable	Pred. sign	(1)	(2)
DIN	+	-0.0025	0.0002
		(-0.86)	(0.06)
DOUT	-	-0.0059**	-0.0066
		(-2.27)	(-1.13)
SIN	+	-0.0006	-0.0006
		(-0.29)	(-0.30)
SOUT	-	0.0032	0.0060
		(1.02)	(1.13)
ΔConsensus		0.0062***	0.0062***
		(4.90)	(5.20)
*DOUT*ΔConsensus*		0.0025	-0.0077
		(0.61)	(-0.96)
*SOUT*ΔConsensus*		-0.0087**	-0.0257***
		(-2.83)	(-3.56)
DOUT POST*			0.0016
			(0.19)
SOUT POST*			-0.0044
			(-0.83)
DOUT POST *ΔConsensus*	+		0.0199*
			(1.99)
SOUT POST *ΔConsensus*	+		0.0277***
			(4.51)
Firm-level controls		Yes	Yes
Country fixed effects		Yes	Yes
Industry fixed effects		Yes	Yes
Year & Month fixed effects		Yes	Yes
Adj. R^2 (OLS model)		0.02	0.06
N		49,873	49,873

Table 10
Sensitivity Tests

This table summarizes regressions of future equity returns on the inward and outward shifts in shorting demand and supply for all firm-month observations before and after mandatory IFRS adoption. The samples are split on EU membership, countries with/without concurrent enforcement changes, and a benchmark sample of Canadian, Japanese, and U.S. firms only (Panel A) and regressions with controls for firm fixed effects, with *POST* defined as a pseudo adoption year, with a control for market volatility (VIX), and with a control for institutional ownership (Panel B). 2002–2004 is defined as the pre-adoption period, and 2006–2007 is defined as the post-adoption period. *t*-statistics in parentheses are based on robust standard errors clustered by firm. ***, **, and * indicate significance at 0.01, 0.05, and 0.10 two-tailed level, respectively. See Appendix A for variable definitions.

Panel A. Alternative countries

Variable	Pred. sign	(1) EU	(2) Non-EU	(3) Treatment countries with concurrent enforcement changes in Christensen et al. (2013)	(4) Treatment countries without concurrent enforcement changes in Christensen et al. (2013)	(5) Canadian, Japanese, and U.S. benchmark firms
DIN	+	0.0016	0.0013	0.0016	0.0012	0.0020
		(1.59)	(0.34)	(0.49)	(0.35)	(0.73)
DOUT	–	-0.0025***	-0.0023*	-0.0025***	-0.0025**	-0.0027***
		(-2.59)	(-2.03)	(-3.66)	(-2.82)	(-7.28)
SIN	+	-0.0018*	-0.0031*	-0.0021	-0.0029	-0.0014
		(-1.77)	(-2.07)	(-1.03)	(-1.66)	(-0.62)
SOUT	–	-0.0032***	-0.0035	-0.0028	-0.0040	-0.0032
		(-3.01)	(-0.86)	(-0.81)	(-1.03)	(-1.02)
IFRS*POST		-0.0093***	0.0003	-0.0150	-0.0041	-0.0073
		(-6.66)	(0.05)	(-1.34)	(-0.52)	(-0.90)
DIN* IFRS*POST	–	-0.0047*	0.0095	-0.0050	0.0007	-0.0042
		(-1.71)	(0.85)	(-1.32)	(0.16)	(-1.18)
DOUT* IFRS*POST	+	0.0061**	0.0157**	0.0046	0.0125***	0.0064*
		(2.26)	(2.96)	(0.77)	(4.24)	(1.75)
Diff.		0.0096		0.0079		
		(0.35)		(0.06)		
SIN* IFRS*POST	–	-0.0036	0.0154**	-0.0026	0.0029	-0.0033
		(-1.30)	(2.31)	(-0.45)	(1.06)	(-0.92)
SOUT* IFRS*POST	+	0.0056**	-0.0131	0.0076	0.0045	0.0042
		(2.27)	(-1.30)	(1.31)	(0.56)	(0.77)
Firm-level controls		Yes	Yes	Yes	Yes	Yes
Country fixed effects		Yes	Yes	Yes	Yes	Yes
Industry fixed effects		Yes	Yes	Yes	Yes	Yes
Year & Month fixed effects		Yes	Yes	Yes	Yes	Yes
Adj. R^2 (OLS model)		0.05	0.06	0.06	0.05	0.06
N		205,998	165,429	185,085	235,891	200,606

Panel B. Other tests

Independent variable	Pred. sign	(6) Including firm-fixed effects	(7) Pseudo adoption year	(8) After controlling market volatility	(9) After controlling institutional ownership
DIN	+	-0.0027	0.0016	0.0022	0.0017
		(-0.71)	(0.56)	(0.81)	(0.70)
DOUT	–	-0.0132***	-0.0021**	-0.0028**	-0.0026***
		(-7.73)	(-2.50)	(-2.21)	(-4.60)
SIN	+	-0.0104**	-0.0018	-0.0018	-0.0020
		(-2.63)	(-0.83)	(-1.03)	(-1.22)
SOUT	–	-0.0183**	-0.0030	-0.0022	-0.0033
		(-2.73)	(-0.84)	(-0.66)	(-1.23)
*IFRS*POST*		-0.0318	-0.0095	-0.0088	-0.0076
		(-0.96)	(-1.20)	(-1.05)	(-1.08)
DIN IFRS*POST*	–	-0.0050	-0.0023	-0.0054	-0.0038
		(-0.96)	(-0.73)	(-1.44)	(-0.97)
DOUT IFRS*POST*	+	0.0215***	0.0000	0.0077*	0.0063*
		(3.10)	(0.01)	(2.05)	(1.86)
SIN IFRS*POST*	–	-0.0065*	-0.0002	-0.0033	-0.0034
		(-1.88)	(-0.05)	(-1.02)	(-1.01)
SOUT IFRS*POST*	+	0.0192***	0.0015	0.0042	0.0049
		(4.43)	(0.25)	(0.85)	(0.87)
VIX				0.0033	
				(1.08)	
Institutional ownership					0.0018
					(0.36)
Firm-level controls		Yes	Yes	Yes	Yes
Country fixed effects		No	Yes	Yes	Yes
Industry fixed effects		No	Yes	Yes	Yes
Year & Month fixed effects		Yes	Yes	Yes	Yes
Adj. R^2 (OLS model)		0.25	0.05	0.06	0.09
N		210,488	210,488	210,488	210,488