The Invisible Hand of Short Selling:
Does Short Selling Discipline Earnings Manipulation?

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Abstract

We hypothesize that short selling has a disciplining role vis-à-vis managers of a firm that forces them to reduce earnings manipulation. Using firm-level short-selling data across 33 countries over a sample period from 2002 to 2009, we document a significantly negative relationship between the threat of short selling and earnings manipulation. Using an instrumental variable approach and focusing on exogenous events (cross-sectional and time-series regulatory and market restrictions), we offer evidence of a causal link between the two. Our findings suggest that short selling functions as an external governance mechanism to discipline managers.

Keywords: Short selling, earnings manipulation, international finance, governance.

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Introduction

The experience of the recent financial crisis has focused attention on the role of short selling. In general, short selling has been identified as a factor that contributes to market informational efficiency (e.g., Bris, Goetzmann, and Zhu, 2007, Boehmer, Jones, and Zhang, 2008, Boehmer and Wu 2010, Saffi and Sigurdsson, 2011). Simultaneously, however, short selling is also regarded as "dangerous" to the stability of the financial markets and is illegal in many countries.[1] Notably, the two seemingly conflicting views arise from the same intuition – i.e., short selling affects *only* the way information is incorporated into market prices but not the behavior of managers. Thus, short selling amplifies the reaction to existing information – which makes the market either more effective or overly sensitive – but does not affect managerial actions.

However, short selling may affect managers by acting as a disciplining mechanism in two ways. First, short sellers are incentivized to discover and attack misconduct of firms (e.g., Hirshleifer, Teoh, and Yu, 2011, Karpoff and Lu, 2010). Hence, their trading can negatively affect the stock price and effectively punish managers. Although existing investors who engage in the "Wall Street Walk" can also punish bad managers in a similar spirit (e.g., Maug, 1998, Kahn and Winton, 1998, Admati and Pfleiderer, 2009, Edmans, 2009, Edmans and Manso, 2011), short selling differs in that the intensity of the attack can increase with the severity of misconduct (Karpoff and Lu, 2010). By contrast, existing investors primarily sell to avoid or reduce losses, effectively limiting their sales to their existing stakes.[2] The more "fine-tuned" punishments of short selling allow the market to incorporate bad news more effectively into the price, which better disciplines managers.

For instance, managers may have incentives to manipulate accounting information. Short selling might directly reduce such incentives by punishing firms with dubious accounting, therefore *indirectly* improving the quality of information communicated to the market through its effects on managerial actions. An illustration of the power of short selling in punishing suspicious firms is the event in which short sellers targeted Sino-Forest, a Toronto-listed Chinese forestry company, in July 2011. The alleged problems of the company ranged from reporting excellent results from a joint venture that

[1] The concern is the potential of short selling being inherently speculative. In its Amendments to Regulation SHO, dated February 26, 2010, for instance, the SEC reveals regulators' concerns: "We believe it is appropriate at this time to adopt a short sale-related circuit breaker because, when triggered, it will prevent short selling, including potentially manipulative or abusive short selling, from driving down further the price of a security that has already experienced a significant intra-day price decline, and will facilitate the ability of long sellers to sell first upon such a decline." (http://www.sec.gov/rules/final/2010/34-61595.pdf.)

[2] Directors, officers, and large shareholders who own more than 10 percent of the company's stock are prohibited from short selling their own company (Section 16c of the Securities and Exchange Act of 1934). Consistently, the Wall Street Walk is typically modeled as a complete sale of existing shares (e.g., Admati and Pfleiderer 2009).

never went into operation to significantly exaggerating the income and assets on its accounting books. The short-selling attack was so devastating that the firm filed for bankruptcy in March of 2012.[3]

Second, because short selling improves price efficiency (Saffi and Sigurdsson, 2011) and because more information facilitates the use of more effective incentive-based contracts for the managers (e.g., Hart, 1983, Holmstrom, 1982, Nalebuff and Stiglitz, 1983, Schmidt, 1997, Raith, 2003), short selling should generally correlate to more efficient contracts. Overall, through enhanced punishment, improved price efficiency, and more efficient contracts, short selling should be associated with better alignment of managerial incentives and better information disclosure quality.

In this paper, we hypothesize that the above effects concur to originate a disciplining role of short selling vis-à-vis managers that forces them to reduce earnings manipulation. The alternative view is that some undesirable features of short selling, such as speculation (Khanna and Mathews, 2012) or predatory trading (Brunnermeier and Oehmke, 2013), may sufficiently dilute, if not overturn, this beneficial impact.[4] The focus on earnings manipulation has three advantages. First, earnings manipulation is one of the most tangible signs of distorted information and bad governance in many countries (e.g., Leuz, Nanha, and Wysocki, 2003). Second, short selling might directly impact manipulation behavior because firms are able to learn from the market (e.g., Chen, Goldstein, and Jiang, 2007, Edmans, Goldstein, and Jiang, 2011a, 2011b). Therefore, firms that engage in earnings manipulation offer a clear opportunity in which to test the disciplining role of short selling. Third, earnings manipulation has important normative and policy implications in many countries that have fallen under regulatory scrutiny, following Regulation Fair Disclosure and the Sarbanes-Oxley Actin the US (Dechow, Ge, and Schrand, 2010).

We focus on *ex ante* "short-selling potential" (SSP) as opposed to *ex post* actions taken by short sellers in response to observed earnings manipulation. Thus, we define discipline in terms of the potential downward pressure that the presence of short sellers may exercise on a firm's stock value if the news that hits the market does not meet market expectations. The main working hypothesis is that

[3] The initial report issued by the short seller, Muddy Water Research, in July 2001 is available at http://www.muddywatersresearch.com/research/tre/initiating-coverage-treto/. The case is not isolated. Indeed, in 2010 and 2011, short sellers started to attack a group of Chinese companies listed overseas that were suspected of dubious accounting and fraud – Sino-Forest is just one on this list. Another example is Orient Paper (NYSE: ONP), which was accused of having overstated its 2008 revenue by 27x and its 2009 revenue by 40x. According to a Financial Times article (April 10 of 2012) "Selling China companies short becomes complex", the consequence of the attacks has been substantial. For instance, the Bloomberg China Reverse Merger Index, which tracks 82 Chinese companies listed on a New York stock exchange, "tumbled 68 per cent from its peak at the start of 2010," with the average PE ratio of these companies reduced to 4.4 (compared to 15.3 for the S&P 500 firms). At least eight Chinese companies have had trading on their shares halted during the process. Overall, the evidence on short-sellers attacking firms with dubious reports is overwhelming.

[4] It is well observed in many sectors of the economy that the impact of punishments may not be as expected. Recent repeated game experiments, for instance, show that punishments in a noisy environment (e.g. in which some punishments may be interpreted as unfair or inconsistent) may not lead to full cooperation or social welfare improvement (e.g., Ambrus and Greiner 2012). In comparing corruption to taxation, Shleifer and Vishny (1993) point out that punishment may even trigger more distortions. But precisely because of these potential dilutions and distortions, it is important for researchers to know whether the disciplining effect can be detected or not in order to depict the full spectrum of the pros and cons of short selling.

SSP can discipline earnings manipulation by correlating to a higher degree of price efficiency and potential punishment. Our main proxy for SSP is the supply of shares that are available to be lent for short sale (hereafter, *Lendable*). This variable describes the supply side of short selling: an abundant supply of lendable shares reduces short-selling fees (Kaplan et al., 2013) and increase price efficiency in the global market (Saffi and Sigurdsson, 2011). Thus, higher lendable shares imply a higher *ex ante* effect of short selling. In addition, shareholders who are eager to monitor managers are less likely to lend shares to short sellers on a large scale because the ownership and voting rights of lendable shares will be transferred as a result of the short sale. This unique institutional feature makes the disciplining effect of lendable shares less likely to be spuriously correlated with that of internal monitoring.[5]

The spirit of our hypothesis and its relationship with the literature may be intuitively illustrated with a special type of earnings manipulation: misstatements.[6] Panel A of Figure 1 plots the annual intensity of short-selling attacks on firms with or without earnings misstatements in subgroups of firms sorted by news coverage, size, book-to-market ratio, and lagged stock returns, in which the intensity of a short-selling attack is proxied by the average value of the positive short-selling demand-shocks as identified by Cohen, Diether, and Malloy (2007). Appendix B provides more detailed definitions, whereas Panel B illustrates the extent to which short-selling potential disciplines manipulation incentives by plotting the probability of having future earnings misstatements for firms with SSP that is above or below the median (i.e., high or low *Lendable*) in each subgroup.

Two patterns are clear. First, short-selling attacks increase with earnings misstatements. This result is consistent with several recent findings (e.g., Karpoff and Lu, 2010, Hirshleifer, Teoh, and Yu, 2011) that short sellers attack suspicious firms. Second, and more importantly for us, a higher short-selling potential appears to reduce the incentives to misstate earnings.[7] This reflects the *ex ante* disciplining effect of short selling, which remains largely overlooked in the literature. The goal of our paper is to fill this economic gap.

Although it is intuitive as an example, reported misstatements in earnings may reflect only the tip of the iceberg. To capture the full spectrum of earnings manipulation, we follow the literature (e.g.,

[5] The lack of voting rights is known to discourage institutional investors (e.g., Li et al., 2008). Later sections will explicitly show that lendable shares are supplied by shareholders who do *not* monitor affect manipulation. We also confirm our results by using the amount of shares that were actually sold short in the past (hereafter, *On Loan*).

[6] To perform this illustration, we collected news reports of earnings misstatements from *RavenPack* and matched them with the short-selling data that will be specified shortly. *RavenPack* is a leading global news database that collects real time firm news from *Dow Jones Newswires*, regional editions of the *Wall Street Journal*, and *Barron's*. Its collection begins in 2000 and covers more than 170,000 entities over 100 countries, representing over 98% of the investable global market. To avoid coverage bias, we require a firm to have at least 25 news releases per year. We then sort firms in the database into two equal groups according to *RavenPack* news coverage, size, book-to-market, and lagged stock returns as a preliminary method of controlling for firm heterogeneity.

[7] This effect is particularly strong for firms with more coverage from this database, smaller size, higher book-to-market ratios, and lower lagged return. The only exception is that large-sized firms appear to exhibit an opposite sign for the second effect, although its magnitude is dwarfed by that of smaller firms. Later sections will show that a proper control for important firm characteristics supports the two observations here.

Jones, 1991, Dechow, Sloan and Sweeney, 1995, Dechow and Dichev, 2002, Bhattachaya, Daouk, and Welker 2003, Francis, LaFond, Olsson, Schipper, 2005, Kothari, Leone, and Wasley, 2005, Dechow, Ge, and Schrand, 2010, Hirshleifer, Teoh, and Yu, 2011) and use accruals as the main proxy for earnings manipulation. We focus on this proxy because previous research shows that the market may fail to properly interpret the information content of accruals, which leads to overpricing patterns for firms with high accruals (e.g., Sloan 1996, Pincus, Rajgopal, and Venkatachalam 2007, Hirshleifer, Hou, and Teoh 2012). This effect is robust and is regarded by Fama and French (2008) to be one of the most pervasive anomalies in the financial market. To the extent that mispricing incentivizes firms to aggressively manage their accruals (e.g., Teoh, Welch, and Wong, 1998a,1998b, Gong, Louis, and Sun, 2008), accruals serve our goal of testing the disciplining effect of short selling on earnings manipulation well (i.e., SSP should reduce the inflated component of earnings and hence the overall level of accruals).[8] Of course, we examine a list of alternative earnings manipulation measures as additional robustness checks. Overall, after we match accruals with the dataset on worldwide short selling, we are left with a sample of 17,555 firms across 33 countries for the 2002-2009 period.

We begin by documenting a strong negative correlation between the short-selling potential of a stock and the degree of the firm's earnings manipulation, which has a statistically significant and economically relevant effect. One standard deviation higher short-selling potential is related to 13.1% lower manipulation in the overall sample. The negative correlation is robust to various sub-samples, including the U.S. sample, the non-U.S. sample, the sample from developed countries, and the sample from emerging countries. Additionally, the recent global financial crisis does not alter our results. The foregoing findings offer the first evidence in favor of the *ex ante* disciplining mechanism of short selling.

To tackle the issues of endogeneity and spurious correlation that are generated by the omission of potentially important variables, we implement a multi-pronged approach. First, we use the same method of Aggarwal et al. (2011) to perform Granger causality tests that address the issue of reverse causality and use alternative specifications that are based on either firm-fixed effects or on supply-side changes. This helps address the concerns of spurious correlation related to unobservable firm-specific characteristics. We find that reverse causality either is insignificant or the coefficient has a sign inconsistent with reverse causality and that omitted variables do not appear to be an issue. In all the alternative specifications, the causal link, that SSP *reduces* manipulation, is confirmed.

[8] Firms may also have incentives to deflate accruals from time to time. However, this manipulation leads to underpricing, which can be more easily exploited by arbitrageurs then overpricing, as noticed by Hirshleifer, Hou, and Teoh (2012). Thus, we focus primarily on the disciplining effect of short selling on the incentives of firms to overstate accruals.

Although the first set of tests suggests that lendable shares are not likely to be correlated with the omitted variables that may spuriously reduce manipulation, such as internal monitoring (which is also implied by the institutional design of the short-selling market as discussed), our second set of tests aim to show explicitly that lendable shares that were once supplied by shareholders who are not incentivized to monitor managers or trade on negative information reduce earnings manipulation. This type of lendable shares may come from passive institutional investors, such as Exchange Traded Funds (ETFs) that fully replicate benchmarks. On the one hand, unlike hedge funds or other active institutional investors, ETFs typically do not monitor firms or blow the whistle on corporate fraud (Dyck et al. 2012). Our own diagnostic tests – which will be discussed shortly – confirm that ETFs do not directly affect manipulation. This evidence is not surprising because the fees charged by these funds are low, making active monitoring or trading unlikely, if not impossible. On the other hand, in the last decade from 2001 to 2010, the ETF industry has experienced an astonishing 40% annual growth rate, which provides large exogenous variations to the amount of shares available for short selling. Indeed, a univariate regression shows that ETF ownership explains approximately 30% of the SSP variations in our sample. All these features suggest that ETF ownership, although unrelated to information and shareholder activism, continues to affect the supply of "ammunition" to short-sellers and the effectiveness of short selling as a disciplining mechanism as a result. Moreover, ETF ownership, while related to membership of a stock with an index, *the time series variations* of the ownership can only be attributed to uninformed investor flows as opposed to stock specific information. This makes ETF ownership an ideal instrument.

These properties allow us to extend the intuition of Hirshleifer et al. (2011) and use ETF ownership as an instrument for the part of SSP that is unrelated to manipulation.[9] We find that the instrumented short-selling potential significantly reduces earnings manipulation. When we directly link ETF ownership to manipulation, we find that ETF ownership does not reduce earnings manipulation when SSP is low or prohibited, which suggests that there is no other channel by which ETF ownership affects earnings manipulation except through its effect on short selling. Thus, tests based on the instrument further support causality between SSP and reduced manipulation, which is consistent with our working hypothesis.

Third, we consider an event-based approach that explores a series of cross-sectional policy restrictions that have exogenous effects on the ability to short sell, such as uptick restrictions, circuit breakers, and two regulatory "experiments" on short selling. Roughly speaking, uptick restrictions disallow short selling except on an uptick, and circuit breakers suspend trading when the stock price experiences wide excursions. Both regulations increase the cost of short selling. Accordingly, we find

[9] The difference is that Hirshleifer et al. (2011) use overall intuitional ownership to capture the overall impact of short selling, whereas we focus on one special type of passive institutional investors unrelated to manipulation.

that both regulations significantly reduce the *sensitivity* of manipulation to SSP. In particular, uptick rules reduce the disciplining effect of short selling on manipulation by 54.8%; the percentage effect for circuit breakers is 36.4%. These results provide further evidence for the causality from short selling to manipulation.

The two regulatory experiments include SEC Regulation SHO in the U.S. and the gradual introduction of (regulated) short selling in the Hong Kong Stock Exchange. The U.S. experiment began in 2005 and lasted until 2007. The SEC established a pilot program that exempted a third of the stocks in the Russell 3000 Index from price restrictions that were related to short selling. The choice of the stock was *purely random* across average daily trading volume levels within the NYSE, the NASDAQ, and the AMEX stock exchanges (e.g., Grullon, Michenaud, and Weston, 2012). We find compelling evidence that lifting short-selling restrictions – i.e., Regulation SHO – reduced earnings manipulation between 16% and 18%, on average, depending on the specifications.

In Hong Kong, short selling was prohibited until 1994, when the Hong Kong Stock Exchange introduced a pilot scheme of short selling to a list of 17 stocks. The list of stocks eligible for short selling was revisited haphazardly before 2001 and has been revisited on a regular quarterly basis since 2001. The variation in the number of stocks eligible for short selling saw enormous variations; the number of stocks eligible for short selling ranged from the initial 17 stocks to a peak of 325 in March 1998 to 150 in Feb 2002 (e.g., Chang, Cheng, and Yu, 2007). Similar to the results with Regulation SHO in the US, we find that stocks for which short selling has been allowed experience dramatic reductions in earnings manipulation.

Finally, we focus on the disciplining effect of market-wide short-selling potential, which is less affected by firm-specific spurious correlation and potential endogeneity. Market-wide SSP is defined as the (exogenously imposed) legality or feasibility of short selling (e.g., Charoenrook and Daouk, 2005, Bris, Goetzmann, and Zhu, 2007, Beber and Pagano, 2011), and we find that market-wide SSP strongly discourages earnings manipulation. For instance, in countries in which short selling is legal (feasible), earnings manipulation is 40.8% (32.7%) lower than in the countries in which it is banned (unfeasible).

This test is further refined on the sample of stocks that have ADRs listed in the U.S. Jain, Jain, McInish and McKenzie (2012) document that home country short-selling restrictions curtail short selling among the ADRs in the U.S. because of *regulatory reach*. Thus, market-level short-selling potential in the home countries of ADR firms should discourage manipulation, which is indeed what we find. In countries in which short selling is legal (feasible), earnings manipulation for ADR firms is 37.0% (27.8%) lower than in those countries in which it is banned (unfeasible). This result adds strength to the previous country-level tests because the need for ADR firms to abide by the same

regulations and disclosure rules of the U.S. helps control for country-level effects.[10] In general, our endogeneity tests postulate that short selling is one of the most important disciplining mechanisms to gauge incentives of international firms in the global market.

As the last step of our analysis, after establishing a causal relationship between short-selling potential and earnings manipulation, we conduct a series of robustness checks. The first robustness check confirms that the short-selling mechanism remains significant when we control directly for alternative disciplining channels. These are either explicit indicators of corporate governance (such as, for example, the quality of the firm's auditors, its accounting standards, and its corporate governance) or variables that describe the information environment and transparency of firms (such as analyst dispersion, stock liquidity, and news coverage).

The second robustness check examines alternative earnings manipulation proxies. We first test whether the short-selling potential reduces the persistence of earnings. In general, persistent (or "sustainable") earnings might be characteristic of good firms – in which case the role of short selling is non-existent – or arise when bad firms manipulate accounting numbers to mimic good firms (Dechow, Ge, and Schrand, 2010) – in which case a disciplining channel should reduce such behavior. These combined effects suggest that short-selling potential is expected to reduce the *average* level of earnings persistence, which is indeed confirmed in our tests.

Next, we use alternative proxies for earnings manipulation, including residual accruals from Jones (1991), residual accruals from Francis, La Fond, Olsson, and Schipper (2005), target beating on small positive forecasting profits (Degeorge, Patel, and Zeckhauser, 1999) and target beating on small positive past-earnings profits (Burgstahler and Dichev, 1997). These alternative proxies capture different facets of earnings manipulation. The first two proxies rely on the idea that firms' accrual process is related to managerial discretion and is also a function of firm fundamentals, such as sales growth, property, plants and equipment, and cash flows (past, present, and future). Thus, eliminating the impact of firm fundamentals from accruals allows residuals to better capture the role of managers in inflating earnings. The two target-beating measures capture the common practice for firms with unmanaged earnings just below the heuristic target of "zero" – firms with small losses or whose earnings are slightly below analyst forecasts – to intentionally manipulate earnings enough to report a small profit. Our results are robust to these alternative proxies.

The last test studies the effect of earnings manipulation on stock informativeness. Using the measure of stock price non-synchronicity as a proxy for price informativeness (Morck, Yeung, and Yu,

[10] In other words, detecting the disciplining impact of home-market SSP is more difficult for ADR firms because the impact has to survive all the potential monitoring and governance benefits that they may have by being exposed to U.S. regulations (e.g., Doidge, Karolyi, and Stulz 2004).

2000, Jin and Myers, 2006), we document a negative correlation between the accrual-based measure of earnings manipulation and stock-price informativeness. This confirms that earnings manipulation reduces price efficiency and that short selling – by lowering price manipulation – increases price efficiency.

Overall, these results offer evidence that shows a beneficial effect of the short-selling market on the corporate market. Our findings extend the implications of Hirshleifer, Teoh, and Yu (2011) in that they not only confirm the punishment impact of short selling vis-à-vis earnings manipulation, but also infer it as a leading characteristic of short selling, among all its desirable or undesirable features, in affecting corporate behavior. This has important normative implications because it shows that short selling – generally thought to be a source of the problem of deceptive market information – in fact contributes to the solution to the problem.

Our results contribute to different strands of the literature. First, we are the first – to the best of our knowledge – to investigate the effect of the short-selling market on earnings manipulation, in particular, and on managerial incentives, in general. More specifically, the standard short-selling literature links short sellers' activities to stock returns (Senchack and Starks, 1993, Asquith and Meulbroek, 1995, Aitken, Frino, McCorry, and Swan, 1998). For example, Cohen, Diether, and Malloy (2007) document the ability of short selling to predict future stock returns, which suggests that short sellers have access to private information. Such access to private information would of course affect stock market liquidity and efficiency (e.g., Bris, Goetzmann, and Zhu, 2007, Boehmer, Jones, and Zhang, 2008, Boehmer and Wu, 2010, Saffi and Sigurdsson, 2011). We contribute by directly linking short sellers' activity – specifically, the threat of their activity – to managerial behavior.

Second, we contribute to the corporate governance literature, which has generally studied the trade-off between "voice and exit" (Maug, 1998, Kahn and Winton, 1998, Faure-Grimaud and Gromb, 2004); in general, this stream of literature has focused on "voice" as the primary disciplining device. For example, hedge fund activism has been identified as an important source of governance (e.g., Brav et al., 2008, Clifford, 2008, Greenwood and Schor, 2009, Klein and Zur, 2009, 2011). More recently, Admati and Pfleiderer (2009), Edmans (2009), and Edmans and Manso (2011) show that following the "Wall Street Rule" is a governance mechanism in itself. We contribute by documenting that a similar disciplining effect is provided by short selling. Unlike the previously discussed governance mechanisms, however, the disciplining force of the short-selling channel arrives from the outside, i.e., from the external market, as opposed to the inside, i.e., from existing shareholders. Thus, the "invisible hand" of the market affects and disciplines firm behavior.

Third, our results contribute to the literature on the determinants of earnings management. The managerial incentives to manipulate financial statements have been shown to be related to firm-

specific characteristics, such as firm performance, debt, growth and investment, firm size (see DeFond and Park, 1997, Watts and Zimmerman, 1986, Nissim and Penman, 2001), financial reporting practices (Bart et al., 2008), investor protection (Leuz, Nanha, and Wysocki, 2003), audit quality (DeAngelo, 1981), capital market incentives on capital raising and the ability to meet earnings forecasts (Morsfield and Tan, 2006, Das and Zhang, 2006). Earnings management can also be affected by external factors such as capital requirement, political pressure, and tax regulation (Dechow, Ge, and Schrand, 2010). Our evidence of the short-selling potential provides another external channel to mitigate managers' incentive to manage accounting earnings.

Fourth, our results also contribute to the literature that relates shareholder composition to firm performance (e.g., Morck, Shleifer, and Vishny, 1988, Himmelberg, Hubbard, and Palia, 1999, Holderness, Kroszner, and Sheenan, 1999, Franks and Mayer, 2001, Franks, Mayer and Renneboog, 2001) and to international governance (e.g., Claessens et al., 2000, La Porta et al., 2002, Claessens and Laeven, 2003, Aggarwal et al., 2011, Laeven and Levine, 2008, Doidge, Karolyi, and Stulz, 2007). Although the literature focuses mostly on large/controlling shareholders with positive stakes, we are the first to show a positive role for investors with negative positions – short sellers.

Finally, our findings provide evidence that firms shape their behavior in reaction to the stock market, which suggests a feedback effect that was recently proposed in the literature (e.g., Chen, Goldstein, and Jiang, 2007, Edmans, Goldstein, and Jiang, 2011a, 2011b). Our contribution is to show that the awareness of the existence of a large group of short sellers ready to punish misbehaving managers can reduce such misbehavior.

II. A Stylized Model and Main Hypotheses

This section illustrates how an extension of Admati and Pfleiderer (2009) can be used to quantify the agency costs of firms and the disciplining effect of short selling. We refer to Appendix A for a more complete layout of the stylized model and present only the intuition and main hypotheses here.

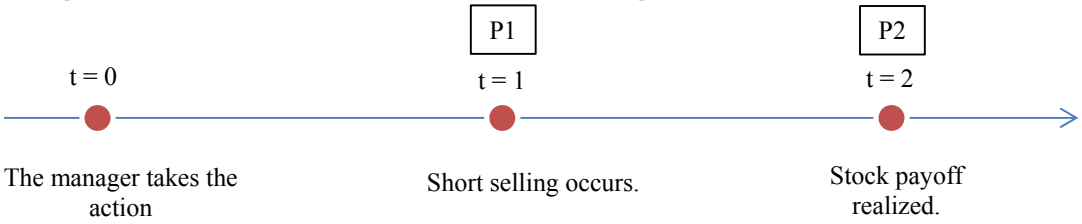
Consider the following three-period model. We will use the same notation of Admati and Pfleidered (2009). In period 0, the manager of the firm decides whether to take a "bad action" (e.g., manipulation) that could benefit him but damage shareholders' value. If the bad action is not taken, the value of the firm in period 2 is v, and the manager receives a payoff of $f_0 = \omega_1 P_1 + \omega_2 P_2$, where ω_1 and ω_2 are two constants and P_1 and P_2 denote the price of the firm in periods 1 and 2, respectively. If the bad action is taken, then the manager obtains a private benefit in addition to the normal payoff, and the value of the firm is reduced by $\tilde{\delta} > 0$. In period 0, the manager directly observes $\tilde{\delta}$, but investors only know the distribution of $\tilde{\delta}$ and whether the bad action is taken. The effective managerial payoff is

$f_0 = \omega_1 P_1 + \omega_2 v$ when no bad action is taken, which becomes $f_1 = \beta + \omega_1 P_1 + \omega_2 (v - \tilde{\delta})$ when the bad action is taken.

In this scenario, as predicted by Admati and Pfleiderer (2009), when the reduction in managerial payout due to the destroyed value of the firm (i.e., $\omega_2 \tilde{\delta}$) is small relative to his private benefit (β), the manager prefers to take the bad action. This is the genesis of the agency problem. As we show in Appendix A, any mechanism that makes the price of P_1 sensitive to the implementation of the bad action disciplines the manager and reduces the agency costs of the firm because the drop in P_1 reduces the managerial payoff, which (other things being equal) reduces the incentive for the manager to take the bad action in the first place. For example, the "Wall Street Walk" of block shareholders can discipline managers precisely because their exit sends a bad signal to the market that pushes down the price of P_1. Short selling provides a discipline mechanism similar in spirit. Indeed, as illustrated in the Sino-Forest example, short sellers have incentives to dig out negative information and to profit from it, which also suppresses the stock price of P_1.

However, short selling is likely to be a more effective disciplining channel than the "Wall Street Walk". To illustrate, we notice that when an informed investor exits, she sells all her shares at P_1 to avoid future losses. In this case, although the informed exit tells the market that the bad managerial action has been taken, the size of her exit does not provide additional information because it simply reflects the ownership that she has. By contrast, short sellers can leverage their position to take full advantage of their information. Indeed, as shown by Karpoff and Lu (2010), when short sellers attack misbehaving firms, the *amount* of short selling increases with the level of the severity of misconduct. Such flexibility relates the size of the action of the short seller to the severity of the misbehavior. This effectively "fine-tunes" the punishment and allows the market to learn more from the punishment, from its *presence* and also from its *magnitude.* For instance, an 8% short sell signals a worse condition of the firm than a 4% short sell. This additional knowledge will make the market price, and its corresponding disciplining effect, more effective. This intuition can be captured by using a variation of the model of Kyle (1985), which is detailed in Appendix A. The time convention is illustrated in Figure 2.

Figure 2: Timeline of the Model with Short Selling.



The main hypotheses derived from the model can be summarized by the following proposition:

Proposition 1: *The presence of the short seller disciplines firm managers.*

Appendix A provides the proof of this proposition. Overall, the proposition involves two main intuitions. First, short selling helps the market incorporate negative news and makes the price more informative (e.g., Saffi and Sigurdsson, 2011). Second, short sellers push down the stock price of the first period (P_1) when the bad action is taken by the manager. This reduces the payoffs that the manager can obtain from the bad action and lowers his incentive to take the bad action in the first place.

Thus, the key assumption of the model is that short sellers are able to discover and attack the bad actions of the manager, whereas the key prediction is that such a potential, which we have labeled "short-selling potential", disciplines managers. These two elements constitute the general relationship between short sellers and managers in our model. Note that the two elements imply two sets of "causalities" between short selling and manipulation. The first suggests that manipulation attracts short selling, whereas the second implies that short selling discourages manipulation. To the extent that the short-selling channel, as with any other disciplining mechanisms, is unlikely to be perfect, we expect both causalities to be observable in practice. The most intuitive way to describe them is to revisit the two patterns depicted in Figure 1.

One potential objection to Figure 1 is that these patterns may arise simply because of the lack of proper control. Thus, before any further discussion, we validate the two panels of the figure by presenting two firm-level regressions in Table 1. The first (panel regression) describes how short sellers attack firms with reported earnings misstatements. Here, the variables of interest are earnings misstatements in a given year ($Earnings\ Misstatement_{i,t}$), a dummy variable indicating whether a firm has news reports on earnings misstatements, and the corresponding short-selling attack ($Short\ Seller\ Attack_{i,t}$) that is proxied by the positive demand shock measure (*DOUT*) of Cohen, Diether, and Malloy (2007). For brevity, we leave the explanations of the list of control variables to later sections (Section III and Appendix B provide their detailed definitions). The second probit regression of the table addresses the reverse question of how short-selling potential may affect the incentives for manipulation. There, we regress the *next-year* probability of the reported earnings misstatements ($Prob(Earnings\ Misstatement)_{i,t+1}$) on our main empirical proxy of short-selling potential (i.e., *Lendable*).

Thus, consistent with Figure 1, earnings misstatements attract more short-selling attacks even after we control for firm characteristics that are typically regarded as important. The coefficient of 0.023 is positive and significant. Likewise, the notion that short-selling potential reduces the incentives to engage in earnings misstatements is also confirmed, and the coefficient between SSP and the

probability of future misstatement (-0.657) is negative and significant. Of course, news reports of manipulation may only be the tip of the iceberg; thus, we conservatively interpret Table 1 and Figure 1 as providing anecdotal rather than systematic evidence. Nevertheless, these results illustrate how the two opposite effects – manipulation attracting short selling and short-selling potential reducing future manipulation – may co-exist in our model and also in the data.

The fact that short sellers attack as they observe *realized* manipulation describes the *ex post* actions of short sellers. The fact that short-selling potential reduces future manipulation describes the *ex ante* effect of short selling to *prevent* some type of manipulation from occurring. Although we will focus on the second effect, it is notable that the freedom for short sellers to attack the bad managerial action directly impacts the effectiveness of the second disciplining channel. In other words, the *ex ante* disciplining effect builds upon the flexibility and capacity of *ex post* actions that short sellers can take. If the latter effect is subject to constraints and/or costs, then the disciplining effect (the former effect) should decline. This leads to a corollary of our main prediction:

Corollary 1: *The disciplining effect of short selling declines in short-selling costs.*

We refer to Appendix A for the proof. This corollary implies that we can use exogenous constraints or costs imposed by regulators to short sellers as empirical restrictions to test the efficiency of the short-selling disciplining mechanism. We will use this intuition to address the endogeneity issue in later sections.

III. Data, Variables Construction and Preliminary Evidence

We now describe the sources of our data and the construction of our main variables, and we provide some preliminary evidence.

A. Data Sample and Sources

The sample covers the period between 2002 and 2009. We start with all publicly listed companies worldwide for which we have accounting and stock market information from Datastream/WorldScope. This sample is then matched with short-selling information data from Data Explorers and with data on institutional investors' stock holdings from FactSet/LionShares.

More specifically, we obtain equity lending data from Data Explorers, a research company that collects equity- and bond-lending data directly from the securities lending desks at the world's leading financial institutions. Information detailed at the stock level is available from May 2002 to December 2009. In particular, the dataset provides unique information on the value of shares that are on loan to short sellers and also on the value of shares that are available to be lent to short sellers; both sets of

information are important for the purpose of this paper. A more detailed description of the data can be found in Saffi and Sigurdsson (2011) and Jain, Jain, McInish, and McKenzie (2012).

The data on institutional investor ownership are from the FactSet/LionShares database, which provides portfolio holdings for institutional investors worldwide. Ferreira and Matos (2008) provide a more detailed description. Because institutional ownership represented over 40% of the total world stock market capitalization during our sample period, we control for it in all our regressions to highlight the effects of short selling. We also obtain ETF ownership of stocks from this database, which we use later as an instrument to explain lending supply in the short-selling market.

We combine Datastream data with the short selling and institutional holdings data using SEDOL and ISIN codes for non-U.S. firms. We use CUSIP to merge short-selling data with U.S. security data from Datastream. As discussed above, the final sample includes approximately 17,555 stocks in 33 countries. As shown in Appendix C, the sample includes 3,637 non-U.S. firms and 1,193 U.S. firms in year 2002. The number grows to 7,878 for non-U.S. firms and 4,031 for U.S. firms in December 2009.

B. Main Variables

Consistent with the literature, we use "accruals" as the main proxy for earnings manipulation (*Accruals*). This variable represents one of the most widely observed practices of the earnings manipulation literature (Jones, 1991, Dechow, Sloan and Sweeney, 1995, Dechow and Dichev, 2002, Bhattachaya, Daouk, and Welker, 2003, Francis, LaFond, Olsson, and Schipper, 2005, Kothari, Leone, and Wasley, 2005, Dechow, Ge, and Schrand, 2010). High levels of accruals are known to be associated with abnormal returns (e.g., Fama and French, 2008, Hirshleifer, Hou, and Teoh, 2011) and inflated earnings.

Accruals are defined as scaled accruals calculated from balance sheet and income statement information. In particular, $Accruals = ((\Delta CA - \Delta Cash) - (\Delta CL - \Delta SD - \Delta TP) - DP)/LagTA$, where ΔCA is the change in current asset, $\Delta Cash$ is the change in cash and equivalents, ΔCL is the change in current liability, ΔSD is the change in short-term debt included in the current liabilities, ΔTP is the change in income tax payable, DP is the depreciation and amortization expenses, and $LagTA$ is the total assets of the firm in the previous accounting year.

In the robustness checks, we also consider a set of alternative proxies of earnings manipulation. In particular, we use residual accruals from Jones (1991), residual accruals from Francis, LaFond, Olsson, and Schipper (2005), target beating on small positive forecasting profits (Degeorge, Patel, and Zeckhauser, 1999), and target beating on small positive past-earnings profits (Burgstahler and Dichev, 1997). A more detailed definition of these variables is provided in Section VI and in Appendix B.

We define our main measure of short-selling potential (SSP) as *Lendable.* This is the annual average fraction of shares of a firm that are available (to be lent) to short sellers. We follow Equation (4) of Saffi and Sigurdsson (2011) to compute the ratios between the values of shares supplied to the short-selling market (as reported by Data Explorers) and the market capitalizations of the stock (as reported by Datastream), and then we define the average of the monthly ratios as the annual *Lendable* ratio. In addition, we define a SSP proxy based on shares lent (*On Loan*), which is the annual average fraction of shares of a firm lent out (or short interest). We use the annual frequency mainly because earnings manipulation variables are defined annually. We also use country-level short-selling potential variables following Charoenrook and Daouk (2005), including the legality of short selling (*Legality*), the feasibility of short selling (*Feasibility*), put option trading (*Put Option*), and feasibility or put option (*F or P*). These country-level variables are defined later.

Our control variables are the logarithm of firm size (*Size*), the logarithm of book-to-market ratio (*BM*), financial leverage (*Leverage*), the logarithm of annual stock return (*Return*), stock return volatility (*STD*), American Depository Receipts (*ADR*), MSCI country index membership (*MSCI*), the number of analysts following (*Analyst*), closely held ownership (*CH*), and institutional ownership (*IO*). Institutional ownership is the aggregate equity holdings by domestic and foreign institutional investors as a percentage of the total number of outstanding shares. Similarly, we also construct ETF ownership (*ETF*), which is defined as the percentage of the total number of outstanding shares that are invested by ETFs. A detailed definition of all these variables is provided in Appendix B.

Table 2 presents the summary statistics for the main variables. Panel A reports the number of observations as well as the mean, median and standard deviation of the variables and the decile (90% and 10%) and quartile (75% and 25%) distribution of the variables. Panel B reports the correlation coefficients among the main variables. We consider both the Spearman correlation index and the Pearson index. The former is reported in the upper right part of the table, whereas the former is reported in the bottom left part of the table.

We can see that both our dependent variable (*Accruals*) and our independent variables (*Lendable* and *On Load*) have reasonable variations. For example, the mean of *Accruals* in our sample is equal to -0.036, which is comparable to a mean of -0.021 in Bhattachaya, Daouk, and Welker (2003) in a sample of 34 countries from 1984 to 1998. The slight decrease in accruals is consistent with evidence that more conservative accounting standards have been applied around the world in recent years. The mean (6.7%) of *Lendable* is also close to the mean (8.0%) of the lending supply variable in Saffi and Sigurdsson (2011). The remaining difference comes from the requirement that firms must have valid earnings-manipulation variables to be included in our sample. Our results are robust whether we include or exclude the firms for which no shares are available to be sold short (i.e., zero lendable).

Panel B illustrates that there is a negative correlation between accruals and short-selling potential, which suggests a disciplining effect of short selling on earnings manipulation. For example, the Pearson (Spearman) correlation coefficient between *Accruals* and *Lendable* is -0.037 (-0.061), and its absolute magnitude is the third (second) largest among Pearson (Spearman) correlation coefficients between other control variables and accruals. Although this result provides preliminary evidence of such a correlation, the correlation remains contemporaneous and may be spurious because of the absence of control variables. Thus, the next step of the analysis is to examine the relationship in a multivariate framework.

IV. Short-selling potential and earnings manipulation: Initial evidence

The following regression provides a baseline for our multivariate analyses:

$$Accruals_{i,t+1} = \alpha + \beta_1 \times SSP_{i,t} + \beta_2 \times X_{i,t} + \varepsilon_{i,t}, \quad (1)$$

where $SSP_{i,t}$ refers to the two proxies of short-selling potential, *Lendable* and *On Loan*, and $X_{i,t}$ refers to a list of control variables, including firm size (*Size*), book-to-market ratio (*BM*), financial leverage (*Leverage*), annual stock return (*Return*), stock return volatility (*STD*), American Depository Receipts (*ADR*), MSCI country index membership (*MSCI*), number of analysts following (*Analyst*), closely held ownership (*CH*), and institutional ownership (*IO*). We also include industry-, country-, and year-fixed effects and cluster the standard error at the firm level. All the control variables and our main SSP variables of focus are as of the previous year.

The results are reported in Table 3. In Panel A, short-selling potential is proxied by lendable shares (*Lendable*), whereas in Panel B, short-selling potential measure is proxied by shares on loan (*On Loan*). We consider different samples, such as the "Ex.Zeros" sample, which only includes firms with non-zero short-selling values. The "NUS" sample refers to firms from non-U.S. countries. The "DEV" sample refers to firms from developed countries, whereas the "EMG" sample refers to firms from emerging countries. The "Ex.GFC" sample excludes the period of the global financial crisis (2007 to 2008).

The results show a strong negative correlation between short-selling potential and earnings manipulation, which holds across different specifications and is both statistically significant and economically relevant. One standard deviation higher short-selling potential is related to 13.1% (14.9% and 10.5%) lower manipulation in the overall sample (the U.S. and the rest of the world) in the case of

Lendable.[11] The analogous numbers in the case of *On Loan* are 6.1% (3.7% and 9.1%). It is also notable that if we focus on the sample that excludes the crisis period, the results remain identical, which suggests that the disciplining role did not concentrate during the crisis period.

The parameters of other variables are consistent with the existing literature on manipulation. For example, large-sized firms have aggressive accruals because of income-increasing accounting method choices (Watts and Zimmerman, 1986). Being listed in the U.S. market (i.e., *ADR*) is negatively and significantly associated with a firm's accruals, which is consistent with the bonding hypothesis that posits that cross-listings on the U.S. stock exchanges strengthen outside investor protection (Hail and Leuz, 2009). These results provide consistent multivariate evidence that a higher level of short-selling potential might help reduce earnings manipulation in the future.

V. Endogeneity Issues

The previous results, although favorable to our disciplining hypothesis, may continue to be subject to endogeneity. We address this issue through a multi-pronged approach. First, we focus on the issue of spurious correlation because of the omission of relevant firm-specific information. Second, we employ an instrumental variable specification. Third, we provide a series of events in which short selling is exogenously determined. Finally, we extend the disciplining effect test from firm-specific SSP to market-wide SSP and apply the test on a sample of ADR firms.

A. Alternative Specifications

We begin with the three following alternative ways of addressing the concern that short-selling potential may be spuriously related to certain unobservable firm-specific characteristics: the Granger causality test, firm-fixed effects, and difference-in-difference tests. We consider both proxies (*Lendable* and *On Loan*) for short-selling potential.

Panel A of Table 4 tabulates the results for the Granger causality tests, whereas panels B and C present the tests with firm-fixed effects and difference-in-difference specifications, respectively. More specifically, in panel A, Models (1) and (3) regress accruals on (lagged) *Lendable* and *On Loan* with lagged accruals as the control. Models (2) and (4) regress *Lendable* and *On Loan* on (lagged) accruals with the lagged short-selling variable as the control.

The Granger causality test shows that SSP reduces accruals (Models (1) and (3)) in line with our prediction. In the reverse direction, accruals significantly increase active short selling (*On Loan*)

[11] The economic impact is computed as the regression coefficient multiplied by the one-standard deviation change in *Lendable*, which is scaled by the absolute value of the mean of accruals in the sample. If we scale it by the standard deviation of accruals, the corresponding values are 5.0% (5.7% and 4.0%).

(Models (4)), which is consistent with the results of Hirshleifer, Teoh, and Yu (2011) that high accruals attract short sellers, and is also consistent with the results presented in our Table 1. However, in Model (3) of Panel A, accruals do not significantly affect *Lendable,* which suggests that this variable is more exogenous to manipulation.

Models (5) and (6) show the results of the baseline regression with firm-fixed effects, which aims to control for spurious correlations between SSP and accruals that may be generated by missing firm characteristics. The results confirm the previous results and display a strong negative correlation between earnings manipulation and short-selling potential. One standard deviation higher SSP is related to 7.8% (14.0%) lower manipulation in the case of *Lendable* (*On Loan*). Although we focus only on the overall sample in the interest of brevity, the (unreported) results in the sub-samples are both qualitatively and quantitatively similar.

The last column (Model (7)) focuses on the effects of changes in SSP on changes in accruals and with changes in other firm-level variables as a control. More specifically, we follow Cohen, Diether, and Malloy (2007) to construct a variable, *SOUT*, to describe the positive supply shocks in the short selling market. Because positive shocks from the supply side relax short sale constraints, SOUT provides an exogenous proxy for the changes in SSP in the content of our tests. The results clearly show that a (net) positive supply shock reduces manipulation, and a one standard deviation higher *SOUT* is related to 5.3% lower accruals.

It is notable that the effects of the CH and IO on manipulation are insignificant in both fixed-effect and difference-in-difference tests. Similar results can be found if we do not include SSP in the regression. Thus, SSP has more power in reducing manipulation in these tests than the two types of ownership, which suggests that the impact of SSP is unlikely to come from the latter. Our tests thus also exclude the concern that SSP spuriously represents the power of certain shareholders – such as institutional investors – who both monitor managers and supply lendable shares to short sellers.

Indeed, we have argued that the institutional design of the short-selling market makes it implausible for shareholders who actively monitor managers to supply lendable shares to short sellers on a large scale because the voting rights and the effective ownership of the lendable shares will be transferred away from the lender during the short-selling period, which contradicts both the incentives and the ability of the lender to be an effective monitor. Our tests are completely consistent with this institutional feature. The remaining question is whether there are shareholders who do not monitor but who are willing to lend shares to short sellers that can subsequently discipline managers through the invisible hand of short selling. We perform this task in the next section.

B. An Instrumental Variable Approach

We argue that ETF ownership fits well into the economic role described above. Thus, following Hirshleifer et al. (2011), ETF ownership can be used as an instrument to pin down the disciplining power of SSP that is unrelated to manipulation in the first place. Indeed, on the one hand, ETFs are among the main contributors to the short-selling market, making shares available that can then be used by short sellers.[12] On the other hand, ETFs are not typically concerned with the active control of the managers of the firm because ETFs are typically passive investors who are not concerned with activism or firm information. Moreover, ETF ownership, while related to membership of a stock with an index, *the time series variations* of the ownership can only be attributed to uninformed investor flows as opposed to stock specific information.

This makes the fraction of stock ownership by ETFs an ideal instrument because it meets both the exclusion restriction (it is unrelated to earnings manipulation except through the short-selling market) and the inclusion restriction (ETFs make shares available to short sellers). Moreover, the exogenous high growth rate of the ETF industry in the past decade suggests that the instrument is likely to be powerful.

Thus, we regress our earnings management measure (*Accruals*) on ETF ownership (*ETF*)-instrumented SSP and firm-level control variables (*X*) and industry-, country-, and year-fixed effects:

$$Stage\ 1: SSP_{i,t} = \alpha + \beta_1 ETF_{i,t} + \beta_2 X_{i,t} + \varepsilon_{i,t},$$

$$Stage\ 2: Accruals_{i,t+1} = \alpha + \beta_1 Predicted\ SSP_{i,t} + \beta_2 X_{i,t} + \varepsilon_{i,t} \quad (2).$$

$SSP_{i,t}$ refers to short-selling potential and $X_{i,t}$ includes the same list of control variables as before.

The results are tabulated in Table 5. Models (1) and (3) regress short-selling variables on ETF ownership. The *t*-statistics shown in parentheses are based on standard errors adjusted for heteroskedasticity and firm-level clustering. If we focus on the first-stage regressions, we observe that short-selling potential is strongly positively related to the fraction of ETF ownership. The t-statistic is always above 5. This translates into an F-test of above 25, which is well above the threshold of weak exogeneity provided by Staiger and Stock (1997). The effect is also economically significant. One standard deviation higher ETF ownership is related to a 26.5% (36.0%) higher short-selling potential if the proxy has been built using lendable shares (shares on loan), suggesting that ETFs are indeed a major supplier to the short-selling market.

The second-stage regression (Models (2) and (4)) shows a strong negative correlation between instrumented short-selling potential and earnings manipulation. One standard deviation higher

[12] ETFs are bound by rules related to securities lending similar to those governing traditional mutual funds. For instance, in Europe, ETF providers can lend up to 80 percent of their basket of securities to a third party to generate revenues. Interested readers may refer to the 2011 IMF "Global Financial Stability Report" for more information about how ETFs may contribute to the short-selling market.

instrumented lendable-shares-based (shares lent-based) SSP is correlated with 24.1% (18.8%) lower manipulation. Note that in all the regressions, we control for institutional ownership of firms. Thus, we also exclude the possibility of the spurious correlation that might arise when ETF ownership proxies for the monitoring role that institutional investors often play, which further confirms our findings in the previous table. In unreported tests, we further orthogonalize ETF ownership with respect to institutional ownership and a list of attention and liquidity variables, such as analysts following (*Analyst*), news coverage (*NewsCoverage*), and Amihud's (2002) illiquidity measure (*Illiquidity*), and the results remain identical.

It is not surprising that the tests using ETF ownership as an instrument are robust. As we have argued, the features of the ETF industry (i.e., low cost, passive, index tracker, etc.) imply that ETFs do not directly affect managerial behavior. Although this implication is widely supported (e.g., Dyck et al., 2012, show that ETFs do not blow the whistle on corporate fraud, although short sellers do), we provide one more piece of evidence that is closer in spirit to our tests, i.e., we examine the effect of ETF ownership (*ETF*) on accruals when short selling is constrained. If supplying lendable shares to the short selling market is the *only* channel through which ETFs can indirectly affect mangers, we should expect ETF ownership (*ETF*) to have an insignificant effect on accruals when short selling is constrained. By contrast, if ETFs can affect mangers directly or indirectly through some *other* channels that are independent of short selling, then such an impact should be observed regardless of how low the level of SSP may be.

Therefore, in Models (5) and (6), we examine the effect of ETF ownership (*ETF*) on accruals on the subsample of the stocks for which short selling is prohibited. With this group of stocks, we observe that *ETF* is clearly uncorrelated with accruals. Models (7) and (8) rework the regression on the subsample of the stocks for which short selling is allowed in the market but unfeasible at the stock level – when *Lendable* or *On Loan* is above 0 but below 0.5% (although relaxing the unbound to 1% does not change the results). The results show no direct link between ETF ownership and accruals. To complete our diagnostics, we also investigate whether the impact of SSP diminishes when ETF ownership is limited. Thus, the last two models regress accruals on SSP, which follows the main specification of the previous table conditioned on low ETF ownership. We see that the disciplining effect of short selling is not attenuated. Thus, short selling is a necessary condition for ETFs to impact managerial behavior, although ETFs are not a necessary condition for SSP to affect manipulation. The latter result is reasonable because other (passive) institutional investors, such as pension funds and insurance companies, may be willing to lend shares to short sellers too. However, the important message is that ETFs provide the "ammunition" that was initially not related to manipulation for the

short sellers to discipline managers. Thus, ETFs are a good instrument to depict the causal effect of short selling on earnings manipulation by managers.

C. An Event-based Approach

After presenting firm-level evidence, we now shift to an event-based approach and explore the following series of policy "events" that have exogenously affected the ability to short sell: uptick restrictions, circuit breakers, and the U.S. and Hong Kong experiments on short selling. The advantage of this approach is that these policy events can create shocks and variations in short-selling costs that are orthogonal to firm-specific spurious correlation and endogeneity. Our working hypothesis relies on Corollary 1, which shows that policies imposing a lower short-selling cost will generally help the market to establish a more effective short-selling disciplining mechanism.

C.1. Uptick Rules and Circuit Breakers

We start with uptick rules and circuit breakers restrictions. The up-tick rule submits short selling to a "tick test", in which short sales may be enacted above the last trade price or at the last trade price if the last trade price is higher than the most recent trade at a different price.[13] The rationale for this rule is to slow down market downturns. However, its indirect effect is to make short selling more difficult. Given that this rule applies to many countries, this represents a cross-sectional restriction that exogenously penalizes short selling (e.g., Jain, Jain, McInish, and McKenzie, 2012).

A second set of rules that is intended to reduce market crashes – but in fact only inhibits short selling – is related to the existence of circuit-breakers. Circuit breakers halt and temporarily suspend trading when the stock price experiences a certain wide excursion (e.g., 10%). The goal is to avoid irrational herding and give time for investors to ponder their decisions. However, by imposing restrictions on large price drops, circuit breakers effectively increase the frictions and costs of short selling. Both in the case of uptick rules and in the case of circuit breakers, we have collected information for the regulations across different countries and then tested the link between earnings manipulation and SSP conditioning on the existence of either type of regulation.

More specifically, Models (1) and (2) of Table 6 apply the previous regressions between a firm's earnings management measure (*Accruals*) and short-selling potential (SSP) in terms of lendable shares (*Lendable*) to stocks in the markets without and with uptick restrictions, respectively. The next column (*Diff*) reports the difference between the two sensitivity parameters of *Accruals* with respect to SSP,

[13] In the US, this test was introduced in 1938. In particular, Rule 10a-1 of the Securities Exchange Act 1934 allows short sales to occur only at an uptick or a zero uptick (also known as a "zero-plus tick") for publicly listed stocks. In other words, short sales are permitted only at above the last trade price or at the last trade price if the last trade price is higher than the most recent trade at a different price. Short sales are prohibited at a price that is either below the last reported price ("minus tick") or at the last reported price if that price is lower than the last reported different price ("zero-minus tick").

i.e., Model (1) sensitivity minus Model (2) sensitivity, on the one hand, and the p-value of the difference, on the other. Models (3) and (4) apply similar regressions to stocks in the markets without and with circuit breakers, respectively. The next column (*Diff*) reports the difference between the two sensitivity parameters of *Accrual*s with respect to SSP, i.e., Model (3) sensitivity minus Model (4) sensitivity, on the one hand, and the p-value of the difference, on the other.

The results show that although SSP disciplines manipulations in each subsample, both uptick rules and circuit breakers reduce its impact. The difference is statistically significant. In particular, uptick rules reduce the sensitivity of manipulation to SSP by 54.8%, whereas circuit breakers reduce it by 36.4%. These results provide further evidence of the causality from short selling to manipulation.

C.2. The U.S. Experiment and the Hong Kong Experiment

Next, we focus on two regulatory experiments, i.e., the changes in short-sale price restrictions under Regulation SHO (2005-2007) and the introduction of regulated short selling into the Hong Kong Stock Exchange (1994-2005).

In the U.S. experiment, the SEC established a pilot program to exempt a third of the stocks in the Russell 3000 Index from uptick rules and other price restrictions (see Grullon, Michenaud, and Weston, 2012).[14] Stocks were chosen at random. As described in SEC Release No. 50104, the regulator "sorted the securities into three groups – Amex, NASDAQ, and NYSE – and ranked the securities in each group by average daily dollar volume over the year prior to the issuance of the order from highest to lowest for the period. In each group, we then selected every third stock from the remaining stocks."[15] Thus, the SEC effectively generated a randomized experiment that we can use to assess whether a relief in short-selling restrictions, which exogenously enhances short selling, translates into more effective disciplining. We therefore relate manipulation to an indicator of whether the restrictions have been lifted for the specific stock. The testing period is from 2001 to 2007, in which the announcement year 2004 of Regulation SHO is removed from the sample.

The impact of the experiment is presented in Panel A of Table 7. Models (1) and (2) regress $Accruals_{i,t+1}$ on *US SHO*, a dummy variable which takes the value of one if the stock is during the year a SHO pilot firm and zero otherwise, a list of control variables and firm- and year-fixed effects. The difference between the two models is that we cluster the errors at the firm level in Model (1) and at the industry-level in Model (2). The results clearly show that lifting the restrictions links the group

[14] The regulation was announced in 2004 and implemented in 2005. Because firms may have started reducing manipulation immediately after the announcement of the policy, the important change in manipulation for our purposes is from 2003 to 2005, not from 2004 to 2005.
[15] The details are available at http://www.sec.gov/rules/other/34-50104.htm.

of pilot firms to a lower level of *Accruals*. Exemption from the restrictions is related to an 18.1% lower level of manipulation.[16]

To further illustrate the effect of the regulation on the actions of individual firms, in Models (3) and (4), we consider the change in accruals induced by the regulation, as measured by the difference between the 3-year average value of *Accruals* after the regulation and that before the regulation, and link it to the *US SHO* dummy. The control variables are also similarly expressed as changes. The cross-sectional regression clearly shows that firms in the pilot list *reduce* their earnings manipulation, and being included in the pilot group correlates with firms reducing manipulation by 15.8%. This test and the previous tests (although different in nature) generate the same message, i.e., lifting short-selling restrictions reduces earnings manipulation. Significantly, the random nature of the experiment makes it impossible for any spurious cross-sectional correlation to dominate the negative correlation.

The Hong Kong Stock Exchange provides a different experiment in which short selling was gradually introduced into the market (see Chang, Cheng, and Yu, 2007). The most interesting feature of this experiment is that the list of firms eligible for short selling changes over time, which creates both time-series and cross-sectional variations in terms of short-selling restrictions for firms listed in Hong Kong. Stocks were added at the discretion of the regulator as a function of "changing market conditions"; after February 12, 2001, stocks were added on a quarterly basis according to a set of criteria mainly based on market capitalization, turnover, index membership, and having derivative contracts written on shares.[17] Although these selection conditions make the experiment less clean than the SHO experiment, the selection remains unlikely to create spurious correlation because all the relevant variables are explicitly controlled for. Moreover, the use of firm-fixed effects helps reduce the effects of firm-specific characteristics that are not controlled for that may have led to the introduction of short selling.

The effect of the regulated phase-in of short selling on manipulation is examined in Panel B of Table 7. The analyses are similar to the U.S. case, except that we use a different dummy variable ($HK\ SS_{i,t}$) to capture the eligibility of a stock for short selling in Hong Kong. A variation of the test relies on a second dummy variable ($\Delta HK\ SS_{i,t}$) that refers to the inclusion (exclusion) of a firm in

[16] We compute the magnitude for the dummy variable by dividing the coefficient of *US SHO* by the absolute value of the mean of accruals in the U.S. sample.

[17] The following types of stocks were chosen: all constituent stocks of indices that are the underlying indices of equity index products traded on the Exchange; all constituent stocks of indices which are the underlying indices of equity index products traded on HKFE; all underlying stocks of stock options traded on the Exchange; all underlying stocks of Stock Futures Contracts traded on the Hong Kong Futures Exchange; stocks that maintain a public float capitalization of not less than HK$1 billion for either (i) a period of 60 consecutive trading days during which dealings in such stocks
have not been suspended; or (ii) a period of no more than 70 consecutive trading days comprising 60 trading days during which dealings in such stocks have not been suspended; stocks with market capitalization of not less than HK$1 billion and an aggregate turnover during the preceding 12 months to market capitalization ratio of not less than 40%; and the tracker Fund of Hong Kong and other Exchange Traded Funds approved by the Board in consultation with the Commission.

(from) the eligible list. The results are consistent with the results from the U.S. regulation. Stocks for which short selling has been allowed experience a reduction in earnings manipulation by 89.6% (89.6%) in the specification based on levels (changes).[18] Thus, although different in nature, the Hong Kong experiment led to a similar conclusion as the US experiment because it showed that short selling is important in curbing the incentives for earnings manipulation.

D. Market-wide Events: A Cross-country Experiment of Regulatory Reach

Following the spirit of the event-based approach, our last endogeneity test examines how market-wide short-selling potential – as an extension to firm-specific short-selling potential – reduces manipulation. The main intuition is that short sale potential at the country level also affects the informational efficiency of the market. For instance, Bris, Goetzmann, and Zhu (2007) document that in markets that allow short sales, negative information may be incorporated into price more effectively. Beber and Pagano (2011) further note that short-selling bans were detrimental to liquidity and failed to support prices. Based on these observations, we expect country-level short-selling potential to exhibit a similar role to firm-level short-selling potential, i.e., it will enhance the market disciplining mechanism with respect to managers and force them to reduce earnings manipulation. However, because country-level short-selling potential is largely exogenous to individual firms, tests on the relationship between market-wide SSP and earnings manipulation can further alleviate suspicion of spurious correlation and potential endogeneity that may arise from firm-level tests.

We therefore regress firm accruals on market-wide short-selling potential (MKT_SSP) using a panel specification with firm-level control variables (X), country-level control variables (C), and industry-, country-, and year-fixed effects over an extended sample period from 1990 to 2009:

$$Accruals_{i,t+1} = \alpha + \beta_1 MKT\_SSP_{i,t} + \beta_2 X_{i,t} + \beta_2 C_{i,t} + \varepsilon_{i,t}, \quad (3)$$

where $MKT\_SSP_{i,t}$ refers to the intensity/existence of short-selling potential at the country level. We consider alternative proxies for it. These are dummies that take a value of one if short selling is legal (*Legality*), if short selling is feasible (*Feasibility*), if put option trading is allowed (*Put Option*), and if short selling is feasible or if put option trading is allowed (*F or P*). These variables are constructed following Charoenrook and Daouk (2005); we also refer to Bris, Goetzmann, and Zhu (2007) and Beber and Pagano (2011) for more recent periods. For each country, we rebalance the variables annually for the period from 1990 to 2009, although the majority of the regulatory changes in short-selling restrictions occur over the period 1990-2000. The difference between legality and feasibility is that the latter requires trading to be both legal and feasible, i.e., there is an existing institutional

[18] We divide the coefficient of *HK SS* ($\Delta HK\ SS$) by the mean of accruals in Hong Kong to obtain the magnitude.

infrastructure supporting short selling, the low cost of short selling, and the availability of market makers willing to trade on short positions.

In addition to firm characteristics ($X_{i,t}$), it is important to control for a set of country-specific variables ($C_{i,t}$) in the above regression to avoid any potential spurious correlation between country-level SSP and these variables, which include a degree of market segmentation of the country (*SEG*), the anti-director index (*ADRI*), the market capitalization-to-GDP ratio (*MVGDP*), the standard deviation of GDP growth (*STDGDPG*), the future stock market return (*MKTReturn*), the future S&P sovereign credit rating (*MKTCreditRating*), and lagged accruals (*Lagged Accruals*). The inclusion of future stock market return, future S&P sovereign credit rating, and lagged accruals allows us to control for the possibility that the regulatory change of short selling may be driven by regulators' expectations about market conditions and perceived improvement of the corporate governance environment. The construction of these variables is detailed in Appendix B. We recall here that the degree of market segmentation is defined as the weighted sum of local-global industry valuation differentials that is based on Bekaert et al. (2011).

Models (1) to (8) in Table 8 demonstrate that there is a strong negative correlation between market-level short-selling potential and manipulation. This correlation holds across all the different specifications and is economically significant. For example, in the fully fledged specifications (Models (5) to (8)), in countries in which short selling is legal (feasible), earnings manipulation is 40.8% (32.7%) lower than in the countries in which it is banned (unfeasible). Additionally, in countries in which put options, arguably an indirect way of short selling, are permitted, manipulation is 38.1% lower than in the countries in which short sales are banned (unfeasible). The feasibility of either a direct short sale or an indirect short sale through put options yields a 46.3% reduction in accruals. These results provide further support for the disciplining hypothesis.

The disciplining effect of market-wide SSP is further tested on the sample of ADR firms. This sample is particularly interesting because of the nature of the ADR market. Indeed, all the ADR firms are exposed to the U.S. regulatory environment, which is known to promote firm value and corporate governance (e.g., Doidge, Karolyi, and Stulz, 2004). If U.S. regulation is perfectly enforced, the link between a firm's manipulation incentives and its *home-country* characteristics should be completely suppressed. Nonetheless, Jain, Jain, McInish, and McKenzie (2012) document that home country short-selling restrictions impact short selling in the ADRs because of *regulatory reach*, thus imposing exogenous constraints on short selling ADR firms in the U.S. In this case, detection of the disciplining role of home-market SSP on ADR firms confirms the existence of *regulatory reach* in affecting short-selling potential and also reveals that the effect of short selling on manipulation survives any additional governance improvements that ADR firms might experience in the U.S. market. This result

adds power to the previous country-level test and suggests that short selling is among the most important disciplining mechanisms for international firms in the global market.

We therefore re-estimate panel regressions within the ADR stocks. The results, reported in Models (9) to (16) of Table 8, confirm the previous results and display a strong negative correlation between market-level short-selling potential and manipulation. If we consider the fully fledged specification, we observe that manipulation is 37.0% (27.8%) lower in countries in which short selling is legal (feasible) than in the countries in which it is banned (unfeasible). In countries in which put options are allowed, manipulation is 55.6% lower than in the countries in which they are banned (unfeasible). Additionally, the feasibility of either a direct short selling or an indirect short selling through put options generates an 87.0% reduction in accruals. These results support the disciplining hypothesis.

In general, these results confirm the previous results on short-selling potential and firm manipulation. More importantly, they allow us to provide a causal interpretation that suggests a channel of impact from short-selling potential to earnings manipulation.

VI. Robustness Checks

One remaining concern is whether short-selling potential spuriously proxies for other alternative channels. Likewise, one may also ask whether the short selling disciplining mechanism applies to only one particular type of manipulation (i.e., accruals) or to many different types of earnings manipulation. We address these questions in this section. In addition, we also explore the effect of earnings manipulation on the informativeness of stocks to provide additional economic intuitions. Although all the results are robust to the use of either *Lendable* or *On Loan,* we will focus on our main short-selling potential proxy of *Lendable* for brevity.

A. Controlling for Alternative Disciplining Channels

We first consider alternative disciplining channels, including the quality of the auditors of the firm, the quality of the accounting standards of the firm, the firm's quality of corporate governance (as defined by the ISS index), the transparency of the firm (dispersion of analysts or stock liquidity), and press coverage by news agencies. All these either provide alternative means of disciplining managers or improving the ability of the market to know about them. For example, the quality of governance has been used by Doidge, Karolyi, and Stulz (2007) and represents the standard metric of governance based on the by-laws and statute of the firm. Additionally, transparency – either through better accounting standards (IAS), better auditors or by lower dispersion of their forecasts – helps uninformed shareholders be more aware.

More specifically, in Table 9, we regress a firm's earnings management on short-selling potential, alternative disciplining channels (*ADC*), and firm-level control variables and industry-, country-, and year-fixed effects on the full samples, where ADC includes Big N auditor (*BigN*), international accounting standards (*IAS*), ISS corporate governance index (*ISS*), Amihud's (2002) illiquidity (*Amihud*), analyst dispersion (*Disp*), and news coverage (*NewsCoverage*). Among the proxies, *BigN* and *IAS* are dummy variables. A higher value for all these variables typically indicates better governance, except for *Amihud* and *Disp*, for which a lower value helps mitigate bad managerial incentives.

Panel A reports the base regression results. In Panel B, *SSP* is further instrumented on ETF ownership (*ETF*) following Table 5. The disciplining role of short-selling potential is confirmed even in the presence of alternative disciplining channels. Indeed, across all the different specifications and after instrumentation, short-selling potential is negatively related to earnings management with a similar economic magnitude and statistical significance as reported before. This finding confirms that short selling provides an independent disciplining mechanism, in addition to such alternative governance channels, which is the result that we observed in the ADR test.

B. Alternative Definitions of Short-selling Potential and Earnings Persistence

Next, we examine how short-selling potential disciplines alternative earnings manipulation proxies.

B.1. Short-selling potential and Earnings Persistence

The first alternative earnings manipulation proxy we consider is earnings persistence. As Dechow, Ge, and Schrand (2010) have shown, pretending to be capable of generating "sustainable" earnings is another motivation for a firm to adopt earnings manipulation (in addition to the desire of inflating earnings captured by our accruals variable) because superior business fundamentals may lead to sustainable earnings. By contrast, in the absence of manipulation, earnings will be less stable except for perhaps the very best group of firms in the economy. Although short selling should not affect firms with truly superior fundamentals, it reduces the incentives for bad firms to mimic good firms by manipulating earnings sustainability. We therefore expect that short-selling potential will reduce earnings persistence.

This intuition can be tested by regressing various measures of the firm's future earnings on the lagged value and the interaction with short-selling potential. More specifically, we estimate:

$$ECA_{i,t+1} = \alpha + \beta_1 SSP_{i,t} + \beta_2 SSP_{i,t} \times ECA_{i,t} + \beta_3 ECA_{i,t} + \beta_4 X_{i,t} + \beta_5 X_{i,t} \times ECA_{i,t} + \varepsilon_{i,t} \quad (4),$$

where SSP refers to short-selling potential; ECA is earnings, cash flows, or accruals; and $X_{i,t}$ is a vector of control variables as specified above. We include industry-, country-, and year-fixed effects when applicable and perform the analysis on the full sample and subsamples.

Panel A of Table 10 reports the base specification, whereas Panel B reports the instrumented one. The results show a strong positive autocorrelation with profitability over time, particularly for earnings and the cash flow component of earnings. This finding suggests that firms typically manipulate the cash flow component of earnings to achieve "sustainable" earnings. However, the interaction with *SSP* shows that in the presence of a strong short-selling potential, the persistence of earnings becomes lower. In models (4) and (7), for instance, a one percent increase in short-selling potential reduces the autocorrelation of cash flows and earnings by 0.55% and 0.31%, respectively. These results confirm that short-selling potential reduces accruals as well as the incentives to generate (false) earnings persistence.

B.2. Alternative Earning Management Measures

Two additional types of earnings manipulation are widely used in the literature to proxy for managerial distortion. First, several studies propose the use of various adjustments to compute the residuals of accruals that are more likely to reflect the role of managers in distorting earnings-related information (i.e., Jones, 1991, Francis, La Fond, Olsson, and Schipper, 2005) because accruals are related to revenue growth, property, plant and equipment (PPE), and past, present, and future cash flows. Second, the literature also uses "target-beating measures" (e.g., Burgstahler and Dichev, 1997, Degeorge, Patel, and Zeckhauser, 1999) to capture incentives for managers to avoid reporting small losses relative to their heuristic target of zero. Such incentives lead to a well-known "kink" in the distribution of reported earnings near zero, i.e., a statistically small number of firms with small losses and a statistically large number of firms with small profits (e.g., Burgstahler and Dichev, 1997). The existence of such a kink, from our perspective, reflects a type of distortion of earnings information.

To ensure that our results are robust, we use two alternative proxies for each type of earnings manipulation (for a total of four proxies). The first alternative measure is Jones's (1991) residual accruals (*Jones*), which is based on Jones's (1991) model and is defined as the residual accruals obtained by regressing accruals on revenue growth and fixed assets for each country and year. All numbers are scaled by lagged total assets. Because a firm's accruals correlate with its fundamentals, by regressing accruals on revenue growth and fixed assets, the residual component in Jones's (1991) model can reflect the discretionary nature of earnings management. Total accruals include discretionary and nondiscretionary components. Because nondiscretionary components depend on the economic performance of a firm – such as changes in revenues and depreciation on fixed assets – the

residual component in Jones's (1991) model can measure managerial discretion in reported earnings more precisely.

The second alternative measure is FLOS's (2005) residual accruals (*FLOS*), which is based on the model of Francis, LaFond, Olsson, and Schipper (2005). Residual accruals are obtained by regressing accruals on past, current, and future cash flows and on revenue growth and fixed assets for each country and year. All numbers are scaled by lagged total assets. These authors extend Jones's model by incorporating past, current, and future cash flows to further control for the impact of variations in fundamentals on accruals. Past, current, and future cash flows reflect the realization of operating cash flows, and including cash flow variables addresses any unintentional estimation errors that arise from management lapses and environmental uncertainty.

The third proxy is target beating on small positive forecasting profits (*SPAF*), based on Degeorge, Patel, and Zeckhauser (1999). It is a dummy variable that equals one if the reported earnings per share-forecasted earnings per share/price is between 0 and 1%. The variable captures the target-beating nature of earnings management: managers try to meet or beat analyst forecasts. Investors rely on analysts' information disclosures to make decisions; therefore, managers have a great incentive to manipulate reported earnings to beat or meet analyst forecasts.

Our last proxy is target beating on small positive past-earnings profits (*SPDE*) based on Burgstahler and Dichev (1997). It is a dummy that equals one if the change in net income scaled by lagged total assets is between 0 and 1%. In a similar spirit, managers often manage earnings using the previous year's income as the benchmark, as investors may compare current-year income with that of the previous year. This variable is based on investors' psychological distinction between positive and negative values in changes, and managers do not want to upset investors.

Table 11 examines how short-selling potential disciplines the four alternative manipulation proxies. Models (1) to (4) present the main specifications, whereas Models (5) to (8) pursue *SSP* on ETF ownership (*ETF*) further. The effects of *SSP* are consistent with our previous observations; in all twelve models reported in this table, the disciplining effect of short-selling potential on alternative manipulation measures is confirmed. Out of the four alternative measures, only *SPAF* has an insignificant correlation with instrumented *SSP*. However, even in this case, the un-instrumented SSP continues to significantly reduce manipulation. For the three other proxies, the disciplining effect of short selling is highly significant. These results, together with the test on earnings persistence, demonstrate that short selling disciplines managerial incentives to manipulate accruals and other forms of earnings manipulation.

C. Earnings Manipulation and Price Synchronicity

Finally, we examine how earnings manipulation reduces stock-price informativeness. More specifically, we follow Morck, Yeung, and Yu (2000) and Jin and Myers (2006) and construct a proxy of firm-specific information based on the idiosyncratic risk of stock. This measure defines the degree of stock price non-synchronicity (*Nonsyn*) as the logarithm of $(1-R^2)$ divided by R^2, where R^2 is estimated by regressing weekly individual stock returns on local and US market index returns. A high R^2 implies a high degree of price synchronicity and a lower capitalization of firm-specific information. Thus, *Nonsyn* captures the amount of company specific information capitalized in the market and, therefore, the informativeness of the company.

In Table 12, this price synchronicity measure is regressed on the firm's accrual-based measure of earnings manipulation and on firm-level control variables and on the unreported industry-, country-, and year-fixed effects on the full samples and different subsamples. The results show a strong negative correlation between the accrual-based measure of earnings manipulation and non-synchronicity. One standard deviation higher manipulation is related to a lower price non-synchronicity of 0.8%. This evidence confirms the fact that manipulation is indeed related to less information and implies that disciplining manipulation might be regarded as an improvement in the market's informational efficiency. This intuition completes our analyses regarding the disciplining role of short selling in reducing earnings manipulation related incentives.

These results are important. Indeed, until now we have shown that short-selling potential reduces manipulation. These results show that manipulation lowers the informational content of the stock price. Taken together, these results suggest that short selling makes the price more informative by reducing manipulation, which is consistent with existing evidence (e.g., Saffi and Sigurdsson 2011) that shows that short selling improves price efficiency. However, the channel is different, and the efficiency does not arise from better market conditions but rather from lower earnings manipulation by the firm.

Conclusion

We study whether the potential of short selling has a disciplining role on managers. We argue that short selling affects the behavior and incentives of managers by acting as a possible "vote of no-confidence" on firms. Applying this intuition to earnings manipulation, we expect to see that "short-selling potential" – the potential downward pressure that the presence of short sellers may exercise on the market value of a firm – should significantly reduce the incentives for a firm to engage in earnings manipulation.

We test these hypotheses using data on worldwide short selling detailed at the stock level for the period from 2002 to 2009. Our results show a strong negative correlation between short-selling potential and earnings manipulation that is statistically significant and economically relevant. Our

results are also robust to spurious correlations with unobservable firm-specific characteristics and to the use of alternative proxies of earnings manipulation. We also control for firm-level endogeneity by providing evidence of a causal link between short-selling potential and earnings manipulation based on instrumental variables (ETF ownership), market-wide evidence, cross-country regulatory restrictions and two experiments (the introduction of short selling into the Hong Kong stock market and the SHO experiment in the US). Alternative disciplining channels do not absorb the power of short selling. Finally, we show that the potential of short selling reduces earnings persistence and other types of earnings manipulation.

In general, these results confirm our main hypotheses and offer evidence of the beneficial effects of the short-selling market on the corporate market because short selling generates a disciplining effect similar to the effect produced by the contestability of the firm in the context of M&As. In this regard, short selling contributes to the efficiency of the information environment of the market and to the contracting institutions of the real economy.

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Appendix A: The Model

Our model considers three-periods. In period 0, the manager of the firm decides whether to take a "bad action" (e.g., manipulation) that could benefit him but damage shareholders' value. We use the variable $\tilde{a}$ to describe the decision, which takes values of 0 if the manager decides not to take the bad action and 1 if the manager decides to take it. If the bad action is not taken, the value of the firm in period 2 is v, and the manager receives a payoff of $f_0 = \omega_1 P_1 + \omega_2 P_2$, where ω_1 and ω_2 are two constants and P_1 and P_2 denote the price of the firm in periods 1 and 2, respectively. If the bad action is taken, then the manager obtains a private benefit of $\beta > 0$ in addition to his normal payoff, and the value of the firm is reduced by $\tilde{\delta} > 0$. In period 0, the manager directly observes $\tilde{\delta}$, but investors only know the distribution of $\tilde{\delta}$ and whether the bad action is taken. The effective managerial payoff is $f_0 = \omega_1 P_1 + \omega_2 v$ when $\tilde{a} = 0$. It becomes $f_1 = \beta + \omega_1 P_1 + \omega_2 (v - \tilde{\delta})$ when $\tilde{a} = 1$. The following table summarizes the changes in managerial payoffs and firm value that are conditional on the managerial action.

Table A1: Managerial actions and corresponding payoffs.

Scenarios of Actions	Managerial Payoffs	Firm Value
$\tilde{a} = 0$; no bad action	$f_0 = \omega_1 P_1 + \omega_2 v$	v
$\tilde{a} = 1$; bad action taken	$f_1 = \beta + \omega_1 P_1 + \omega_2 (v - \tilde{\delta})$	$v - \tilde{\delta}$

Following Admati and Pfleiderer (2009), the manager takes the bad action when $f_1 \geq f_0$. This condition is equivalent to $\tilde{\delta} \leq x_B$, where $x_B \equiv \beta / \omega_2$ is a constant. In other words, $(0, x_B]$ is the range of $\tilde{\delta}$ in which the bad action will be taken. From this perspective, x_B might be regarded as a proxy for the agency cost of the economy. We refer to $(0, x_B]$ as the "bad action" region, upon which we can define a disciplining mechanism as follows:

Definition: *A mechanism is* ***disciplining*** *if it reduces the bad-action region of $\tilde{\delta}$ in which managers choose to take the bad action.*

This definition is consistent with Admati and Pfleiderer (2009) if we restrict the mechanism to the Wall Street Walk. Because of our goal, however, we take a broader definition, i.e., any mechanism that can reduce the bad action region of $(0, x_B]$ exhibits disciplining power following the intuition of Admati and Pfleiderer's (2009). The reduction can be achieved by making the price of P_1 more effective, as demonstrated in the following lemma.

Lemma 1: *If the market mechanism allows the price of P_1 to be updated to $P_1(\tilde{a} = 1)$ when the bad action is taken and $P_1(\tilde{a} = 0)$ when no bad action is taken, then*

1) it disciplines the manager of the firm if and only if $P_1(\tilde{a} = 0) - P_1(\tilde{a} = 1) > 0$ and

2) *its discipline effect can be quantified by the shrinkage of the bad-action region from* $(0, x_B]$ *to* $(0, x_B - \Delta x_B]$, *where* $\Delta x_B = \frac{\omega_1}{\omega_2} \times \left(P_1(\tilde{a} = 0) - P_1(\tilde{a} = 1)\right)$ *is a constant.*

Proof: We can rewrite the condition of $f_1 \geq f_0$ as $\tilde{\delta} \leq \frac{\beta}{\omega_2} - \frac{\omega_1}{\omega_2} \times (P_1(\tilde{a} = 0) - P_1(\tilde{a} = 1)$. In this case, the range of $\tilde{\delta}$ in which bad actions will be taken becomes $(0, x_B - \Delta x_B]$. Compared to the original "bad action" region of $(0, x_B]$, managers are disciplined if and only if $\Delta x_B > 0$ or $P_1(\tilde{a} = 0) - P_1(\tilde{a} = 1) > 0$. ■

The intuition of the lemma is that if the market mechanism pushes down the stock price of P_1 when bad actions are taken by the manager, then the manager suffers additional loss when he actually takes the bad action because of his payoff sensitivity to P_1. This reduces the incentive for the manager to take the bad action.

Next, we model the effects of (informed) short selling. In period 0, a (representative) short seller observes the private information of $\tilde{\delta}$ that the manager observes. She also observes the managerial action of $\tilde{a}$. If $\tilde{a} = 1$, the short seller submits an order of $\xi < 0$ shares of the stock to the market to short sell the stock in period 1. For tractability, we assume that $\tilde{\delta}$ is normal (i.e., $\tilde{\delta} \sim N(\delta_0, \Sigma_\delta)$, where δ_0 and Σ_δ are two constants that denote its mean and variance, respectively).[19] The short seller has a negative exponential utility function of $U(\pi) = -exp(-\pi)$, where $\pi = \left(v - \tilde{\delta} - P_1\right)\xi$ represents her trading profits. The risk aversion of the utility function has been normalized to 1. Furthermore, assume that the short seller maximizes her expected utility function by her trading at P_1. Simultaneously, a fraction of existing shareholders must buy or sell u shares of the stock to cover their private liquidity shocks ($u \sim N(0, \sigma_u^2)$). Finally, the market observes the summation of the orders $\xi + u$.

Proposition 1: *The presence of the short seller disciplines managers. More specifically,* $P_1(\tilde{a} = 0) - P_1(\tilde{a} = 1) > 0$ *because of informed short selling, and the bad-action region is reduced by* $\Delta x_B = \frac{\omega_1}{\omega_2} \times (\tilde{\delta} - \delta_0)/2$.

Proof: Following Kyle (1985), the market (or the market maker) conjectures that the value of P_1, conditioned on the total order of $\xi + u$, should be

$$P_1 = v - E\left[\tilde{\delta} \middle| \xi + u\right] = v - \left(\delta_0 - \lambda'(\xi + u)\right) = v - \delta_0 + \lambda'(\xi + u), \quad (A1)$$

where λ' is a constant to be solved in the equilibrium. Here, δ_0 is the unconditional expectation of the agency cost (the value destroyed by the manager). Conditioned on $\xi + u$, the updated agency cost

[19] Of course, normal distribution could lead to negative value. This is a common issue of the rational expectation models. We avoid this problem by restricting $\tilde{\delta} \in (0, x_B]$ as the bad-action region. The unconditional value destroyed by the manager is $E\left[\tilde{a}\tilde{\delta}\right] = E\left[\tilde{\delta} \middle| \tilde{a}\right] \times Prob[\tilde{a}] = E\left[\tilde{\delta} \middle| \tilde{\delta} \in (0, x_B]\right] \times Prob\left[\tilde{\delta} \in (0, x_B]\right]$, which is based on the $N(\delta_0, \Sigma_\delta)$ distribution.

becomes $E\left[\tilde{\delta}\middle|\xi+u\right]=\delta_0-\lambda'(\xi+u)$, where the negative sign before $\lambda'(\xi+u)$ indicates that more short selling demand (i.e., an increased negative value of $\xi+u$) implies a higher agency cost.

Because the maximization over $E[-exp(-\pi)]$ is equivalent to maximizing $E[\pi]-1/2Var(\pi)$, the short seller's maximization problem becomes

$$Max_{\xi}\ E\left[\left(v-\tilde{\delta}-P_1\right)\xi\right]=\xi\left(\delta_0-\tilde{\delta}-\lambda'\xi\right), \qquad (A2)$$

which leads to the following first order condition (FOC):

$$\xi=\frac{\delta_0-\tilde{\delta}}{2\lambda'}\equiv\alpha'+\beta'\times\tilde{\delta}, \quad (A3)$$

where $\alpha'=\frac{\delta_0}{2\lambda'}$ and $\beta'=\frac{-1}{2\lambda'}$ are two constants. This equation indicates that short sellers short sell the stock if the value to be destroyed by the manager is large. To solve for the constant λ', note that the vector of $\left(\tilde{\delta},\ \xi+u=\alpha'+\beta'\tilde{\delta}+u\right)^T$ follows a joint normal distribution with mean $(\delta_0,\alpha'+\beta'\delta_0)^T$ and the covariance matrix of $(\Sigma_\delta\ \ \beta'\Sigma_\delta;\ \beta'\Sigma_\delta\ \ \beta'^2\Sigma_\delta+\sigma_u^2)$ using public information.[20] Thus, $E\left[\tilde{\delta}\middle|\xi+u\right]=\delta_0+\frac{\beta'\Sigma_\delta}{\beta'^2\Sigma_\delta+\sigma_u^2}(\xi+u)$. This means that $\lambda'=-\frac{\beta'\Sigma_\delta}{\beta'^2\Sigma_\delta+\sigma_u^2}$, which can be used to solve for the value of λ'. Thus, $\lambda'=\frac{1}{2}\sqrt{\Sigma_\delta/\sigma_u^2}$. The parameters α' and β' can be solved based on λ'. These parameters quantify the trading equilibrium in Period 1.

With informed short selling, the price becomes $P_1(\tilde{a}=0)=v-\delta_0+\lambda'u$ and $P_1(\tilde{a}=1)=v-\frac{\delta_0+\tilde{\delta}}{2}+\lambda'u$. Thus, in this case, the expected disciplining effect becomes $\Delta x_B=\frac{\omega_1}{\omega_2}\times\left(P_1(\tilde{a}=0)-P_1(\tilde{a}=1)\right)=\frac{\omega_1}{\omega_2}\times(\tilde{\delta}-\delta_0)/2$, where we have averaged out the impact of liquidity shocks. ■

Proposition 1 quantifies the disciplining effect of informed short selling based on Kyle's (1985) informed trading model. The short seller helps the market to incorporate negative news and makes the price more informative, which is consistent with the literature (e.g., Saffi and Sigurdsson 2011). Based on the improved price efficiency, the incentives for the manager to take the bad action will be reduced following Lemma 1.

Two issues that may affect the disciplining efficiency of short selling are notable. First, what will happen if short selling is constrained? To provide an intuitive answer to this question, we can effectively model a short selling constraint as a quadratic "short selling cost", as $c\times\xi^2$, where c is a constant. If so, a high cost should intuitively lead to lower price and disciplining efficiencies, which is confirmed in the following corollary:

[20] Note that the market must only update $\tilde{\delta}$ because the participation of the short seller reveals that $\tilde{a}=1$. This also explains why the conjectured price is $P_1=v-\delta_0+\lambda'(\xi+u)$ rather than $P_1=v-E\left[\tilde{a}\tilde{\delta}\right]+\lambda'(\xi+u)$.

Corollary 1: *The disciplining effect of short selling declines in short-selling costs.*

Proof: The optimal short demand becomes $\frac{\delta_0-\bar{\delta}}{2(\lambda'+c)}$, which declines in c. We can continue to use (A3) to denote the demand, but $\beta' = \frac{-1}{2(\lambda'+c)}$ in this case. Plugging this into $\lambda' = -\frac{\beta'\Sigma_\delta}{\beta'^2\Sigma_\delta+\sigma_u^2} =$ and re-arranging terms lead to $\frac{\Sigma_\delta}{4\sigma_u^2} = \frac{\lambda'(\lambda'+c)^2}{\lambda'+2c} = \lambda'^2 + \frac{\lambda' c^2}{\lambda'+2c}$. Compared to Proposition 1, in which we have $\frac{\Sigma_\delta}{4\sigma_u^2} = \lambda'^2$, this new equation implies a negative correlation between λ' and c (i.e., the cost of short-selling leads to slower information updating). To illustrate, denote $g(\lambda', c) = \lambda'^2 + \frac{\lambda' c^2}{\lambda'+2c}$ as a function of $\lambda'$and c. Now, consider small changes of the parameters around their values when there is no short-selling cost: $\{\lambda'_0 = \frac{1}{2}\sqrt{\Sigma_\delta/\sigma_u^2}, c = 0\}$. Denoting parameter changes as $\{\Delta\lambda', \Delta c\}$, we have $g(\lambda'_0 + \Delta\lambda', \Delta c) = g(\lambda'_0, 0) + \frac{\partial g}{\partial \lambda'}\Delta\lambda' + \frac{\partial g}{\partial c}\Delta c$, where high order terms are ignored. Because $g(\lambda'_0 + \Delta\lambda', \Delta c) = g(\lambda'_0, 0) = \frac{\Sigma_\delta}{4\sigma_u^2}$, we have $\frac{\partial g}{\partial \lambda'}\Delta\lambda' + \frac{\partial g}{\partial c}\Delta c = 0$, from which we can further derive that $\Delta\lambda' = -(\frac{\partial g}{\partial c} / \frac{\partial g}{\partial \lambda'}) \times \Delta c$, which is easy to check: $\frac{\partial g}{\partial c} > 0, \frac{\partial g}{\partial \lambda'} > 0$. Thus, an increase in short-selling cost leads to slower information updating. Because the optimal demand of short selling also declines, less information can be incorporated into the stock price of $P_1(\tilde{\alpha} = 1)$, which reduces the disciplining effect of short selling. ■

The second issue that may affect the disciplining effect of short selling is information asymmetry. It is notable that there are two possible types of information asymmetry presented in this economy. First, there is information asymmetry between the manager and the market. The economic role of this information asymmetry is to enhance the agency cost of the firm. If short selling is perfectly informed, then its disciplining effect will also be enhanced. Second, information asymmetry can also arise between the manager and the short seller, which indicates that the latter may have imperfect information. The economic role of this type of information asymmetry is to reduce the disciplining effect of short selling. However, while the short seller continues to know more than the market, the short-selling mechanism continues to reduce the agency cost of the economy. A detailed treatment of information asymmetry goes beyond the scope of this paper. Interested readers can obtain a copy of the proof of the above two properties from the authors.

Appendix B: Variable definitions

Variable	Acronym	Definition	Data Source
A. Firm-level variable			
A1. Short selling variables			
Shares on loan	*On Loan*	Annual average fraction of shares of a firm lended out	Dataexplorers
Lendable shares	*Lendable*	Annual average fraction of shares of a firm available to lend	Dataexplorers
ETF ownership	*ETF*	Annual average holdings by ETF as a percentage of total number of outstanding shares	FactSet
Outward Short Selling Demand Shift	*DOUT*	A dummy variable that takes the value of 1 if both short interest and short selling fee increase	Dataexplorers
Inward Short Selling Demand Shift	*DIN*	A dummy variable that takes the value of 1 if both short interest and short selling fee decrease	Dataexplorers
Outward Short Selling Supply Shift	*SOUT*	A dummy variable that takes the value of 1 if short interest increases and fee decreases	Dataexplorers
Inward Short Selling Supply Shift	*SIN*	A dummy variable that takes the value of 1 if short interest decreases and fee increases	Dataexplorers
Net Supply Changes	*SSHIFT*	SSHIFT = SOUT-SIN	Dataexplorers
A2. Earnings management variables			
Accruals	*Accruals*	Scaled accruals calculated from balance sheet and income statement information Accruals=((ΔCA-ΔCash)-(ΔCL-ΔSD-ΔTP)-DP)/Lagged TA ΔCA=Change in current asset; ΔCash=Change in cash and equivalents; ΔCL=Change in current liability; ΔSD=Change in short-debt included in current liabilities; ΔTP=Change in income tax payable; DP=Depreciation and amortization expense TA=Total assets	Worldscope
Jones's (1991) residual accruals	*JONES*	Based on Jone's (1991) model, residual accruals are obtained by regressing accruals on revenue growth and fixed assets for each country and year. All numbers are scaled by lagged total assets.	Worldscope
FLOS's (2005) residual accruals	*FLOS*	Based on Francis, LaFond, Olsson, Schipper's (2005) model, residual accruals are obtained by regressing accruals on past, current, and future cash flows, revenue growth, and fixed assets for each country and year. All numbers are scaled by lagged total assets.	Worldscope
Small positive forecasting profits	*SPAF*	A dummy variable which equals to one if (reported earnings per share-forecasted earnings per share)/price is between 0 and 1%.	IBES
Small positive past-earnings profits	*SPDE*	A dummy variable which equals to one if change in net income scaled by lagged total assets is between 0 and 1%.	Worldscope

Appendix B: Variable definitions - Continued

Variable	Acronym	Definition	Data Source
A3. Control variables			
Firm size	*Size*	Log of market capitalization denominated in U.S. $.	Datastream
Book-to-market ratio	*BM*	Log of book-to-market equity ratio	Datastream
Financial leverage	*Leverage*	Ratio of total debt to total assets	Worldscope
Annual stock return	*Return*	Log of annual stock return	Datastream
Stock return volatility	*STD*	Annualized standard deviation of monthly stock returns	Datastream
American Depository Receipts	*ADR*	An ADR dummy equals one if the firm was cross-listed on a U.S. stock exchange	Multiple sources**
MSCI country index membership	*MSCI*	An MSCI index member dummy which equals one if the firm is included in an MSCI country index and zero otherwise	Datastream
Number of analysts following	*Analyst*	Number of financial analysts following a firm	IBES
Closely-held ownership	*CH*	Fraction of shares closely held by insiders and controlling shareholders	Worldscope
Institutional ownership	*IO*	Aggregate equity holdings by institutional investors as a percentage of total number of outstanding shares	FactSet
A4. Other variables			
Big N auditor	*BigN*	A dummy variable which equals one if the firm is audited by any of the Big 4 or Big 5 auditors	Compustat & Worldscope
International accounting standard	*IAS*	A dummy variable which equals one if the firm adopts the international accounting standards	Compustat & Worldscope
ISS corporate governance index	*ISS*	Firm-level corporate governance index	ISS
Amihud's (2002) illiquidity	*Illiquidity*	Log of the average of daily Amihud's (2002) measure calculated as the absolute value of stock return divided by dollar trading volume on a given day	Datastream
Analyst dispersion	*Disp*	Standard deviation of analyst forecasts scaled by stock price	IBES
News coverage	*NewsCoverage*	Log of one plus number of news realeases recorded in Dow Jones Newswire	RavenPack
Cash flows	*Cash Flows*	Value which equals to operating income minus accruals scaled by lagged total assets	Worldscope
Earnings	*Earnings*	Operating income scaled by lagged total assets	Worldscope
Stock price non-synchronicity	*Nonsyn*	Log of (1-R2) divided by R2, where R2 is estimated by regressing individual stock returns on local and US market returns.	Datastream
B.Country-level variable			
Legality of short selling	*Legality*	A dummy variable which equals one if short selling is legally allowed in a country	Charoenrook and Daouk (2005)
Feasibility of short selling	*Feasibility*	A dummy variable which equals one if short selling is feasible in a country	Charoenrook and Daouk (2005)
Put option trading	*Put Option*	A dummy variable which equals one if put option trading is feasible in a country	Charoenrook and Daouk (2005)
Feasibility or Put Option	*F or P*	A dummy variable which equals one if either short selling or put option is feasible in a country	Charoenrook and Daouk (2005)
Market segmentation	*SEG*	Segmentation measure developed by Bekaert, Harvey, Lundblad, and Siegel (2008)	Datastream
Anti-director index	*Anti-Director*	Anti-director index	Pagano and Volpin (2005)
Market capitalization-to-GDP ratio	*MVGDP*	Ratio of stock market capitalization to GDP	World Development Indicators
Standard deviation of GDP growth	*STDGDPG*	Standard deviation of GDP growth in the last five years.	World Development Indicators
Future stock market return	*MKTReturn*	Log of one-year ahead annual stock market index return	Datastream
Future S&P sovereign credit rating	*MKTCreditRating*	One-year head S&P rating of a country's government debt scaled by 22	Standard & Poor's

Appendix C: Number of Stocks by Country and Year

This table summarizes the number of our sample stocks for each country over the 2002 to 2009 sample period. The first column reports the name of the country. The second column indicates whether a country is a developed country (DEV) or an emerging market (EMG). The column "N" reports the total number of stocks across all sample periods for each country. The rest of the columns report the number of stocks in each year.

Country	DEV/EMG	N	2002	2003	2004	2005	2006	2007	2008	2009
Australia	DEV	1,148	170	268	334	389	557	856	819	475
Austria	DEV	66	19	27	31	39	45	50	54	51
Belgium	DEV	110	27	40	53	66	79	93	94	85
Brazil	EMG	109				2	11	53	91	72
Canada	DEV	1,158	179	238	351	585	722	836	826	720
Denmark	DEV	127	21	31	45	67	94	108	102	69
Finland	DEV	109	34	47	64	67	85	95	94	80
France	DEV	583	190	236	251	304	387	455	437	335
Germany	DEV	606	137	169	240	361	385	459	429	357
Greece	EMG	63	2	22	3	4	33	35	44	43
Hong Kong	DEV	544	86	119	166	195	260	400	430	388
Indonesia	EMG	38	8	7	12	18	24	20	23	11
Ireland	DEV	54	22	23	28	28	32	44	40	36
Israel	EMG	57	1	10	15	19	18	36	44	47
Italy	DEV	314	101	131	161	199	220	240	256	235
Japan	DEV	2,776	1,489	1,600	1,793	2,003	2,195	2,333	2,340	2,152
Mexico	EMG	71	19	32	33	38	43	52	58	59
Netherlands	DEV	134	59	73	79	93	101	107	97	85
New Zealand	DEV	62	12	19	25	29	29	43	40	45
Norway	DEV	186	28	44	59	83	99	121	129	107
Philippines	EMG	24	4	6	8	8	9	17	15	10
Poland	EMG	31				7	11	2	17	28
Portugal	EMG	39	12	14	16	24	29	30	30	33
Singapore	DEV	303	51	63	90	105	142	219	240	176
South Africa	EMG	199	48	64	70	89	128	143	139	136
South Korea	EMG	509	30	67	105	144	332	420	422	410
Spain	DEV	146	60	69	86	91	105	111	118	114
Sweden	DEV	290	64	105	128	148	198	232	224	207
Switzerland	DEV	259	84	127	159	180	192	207	211	208
Taiwan	EMG	234	17	25	52	58	51	76	145	215
Turkey	EMG	97	6	6	11	23	39	69	81	83
United Kingdom	DEV	1,536	657	690	680	815	911	949	875	706
United States	DEV	5,573	1,193	3,552	3,774	4,039	4,073	4,101	4,118	4,031
All	Total	17,555	4,830	7,924	8,922	10,320	11,639	13,012	13,082	11,809

Table 1: Illustration of the Relationships between Earnings Misstatement and Short Selling

This table illustrates the relationship between earnings misstatement and short selling. Model (1) reports how do short sellers potentially attack firm with reported earnings misstatement in the following annual panel regression:

$$Short\ Seller\ Attack_{i,t} = \alpha + \beta_1 Earnings\ Misstatement_{i,t} + \beta_2 X_{i,t} + \varepsilon_{i,t},$$

where $Short\ Seller\ Attack_{i,t}$ refers to the positive changes in short-selling demand (*DOUT*) for stock i in year t, $Earnings\ Misstatement_{i,t}$ is the dummy variable indicating whether a firm has been reported to have earnings misstatement in the concurrent year *t* obtained from RavenPack database, and $X_{i,t}$ stacks the list of control variables including changes in firm size (*Size*), book-to-market ratio (*BM*), financial leverage (*Leverage*), annual stock return (*Return*), stock return volatility (*STD*), American Depository Receipts (*ADR*), MSCI country index membership (*MSCI*), number of analysts following (*Analyst*), closely-held ownership (*CH*), and institutional ownership (*IO*). Model (2) examines the extent to which the threats of short selling could possibly reduce the probability for firms to get into earnings misstatement in the following annual probit regression:

$$Prob(Earnings\ Misstatement)_{i,t+1} = \alpha + \beta_1 SSP_{i,t} + \beta_2 X_{i,t} + \varepsilon_{i,t},$$

where $Prob(Earnings\ Misstatement)_{i,t+1}$ is the dummy variable indicating whether a firm has engaged in earnings misstatement or not in year $t+1$, and $SSP_{i,t}$ is the availability of lendable shares to short sellers (i.e., *Lendable*) in the market in the previous year. *t*-statistics shown in parentheses are based on standard errors adjusted for heteroskedasticity and firm-level clustering. Obs denotes the number of firm-year observations, and AdjRsq is adjusted R^2. The sample period is from 2002 to 2009. Appendix B provides the definition for all variables.

Detailed Relationships between Earnings Misstatement and Short Selling			
	Model (1)		Model (2)
Dependent Variable	*Short Seller Attack*	**Dependent Variable**	*Prob(Earnings Misstatement)*
Independent Variable		**Independent Variable**	
Earnings Misstatement	0.023	*SSP*	-0.657
	(3.53)		(-2.01)
Control Variable		**Control Variable**	
ΔSize	-0.013	*Size*	0.064
	(-6.95)		(2.95)
ΔBM	0.000	*BM*	0.133
	(-0.14)		(3.97)
ΔLeverage	0.055	*Leverage*	0.392
	(6.56)		(3.53)
ΔReturn	-0.005	*Return*	-0.254
	(-4.97)		(-5.48)
ΔSTD	0.017	*STD*	0.255
	(7.60)		(3.73)
ΔADR	-0.028	*ADR*	0.111
	(-2.52)		(1.31)
		MSCI	-0.023
			(-0.30)
ΔAnalyst	0.001	*Analyst*	0.006
	(4.53)		(1.27)
ΔCH	0.006	*CH*	-0.044
	(1.25)		(-0.42)
ΔIO	0.115	*IO*	-0.070
	(13.12)		(-0.73)
Fixed Effects	ICY	Fixed Effects	ICY
Obs	31,806	Obs	31,806
AdjRsq	8.40%	Pseudo R-squared	6.20%

Table 2: Summary Statistics

This table presents the summary statistics and Spearman (Pearson) correlation coefficients of main variables used in this study. The variables are accruals (*Accrual*), shares on loan (*On loan*), lendable shares (*Lendable*), log of firm size (*Size*), log of book-to-market ratio (*BM*), financial leverage (*Leverage*), log of annual stock return (*Return*), stock return volatility (*STD*), American Depository Receipts (*ADR*), MSCI country index membership (*MSCI*), number of analysts following (*Analyst*), closely-held ownership (*CH*), institutional ownership (*IO*). Panel A reports the number of observations (N), mean, median, standard deviation (STD), and the deciles (90% and 10%) and quartiles (75% and 25%) distribution of the variables. Panel B reports the correlation coefficients among the variables above, where the highlighted upper-right part (bottom-left part) of the table refers to the Spearman (Pearson) correlation matrix. The sample is between 2002 and 2009. All the variables are defined in Appendix A.

Panel A: Summary Statistics

Variable	N	Mean	STD	90%	75%	Median	25%	10%
Accrual	67,019	-0.036	0.094	0.048	0.000	-0.035	-0.073	-0.125
Lendable	67,019	0.067	0.094	0.214	0.090	0.024	0.005	0.000
On Loan	67,018	0.018	0.035	0.049	0.017	0.004	0.001	0.000
Size	67,019	12.969	1.841	15.422	14.150	12.831	11.689	10.728
BM	67,019	-0.617	0.883	0.427	-0.062	-0.590	-1.128	-1.673
Leverage	67,019	0.201	0.181	0.452	0.323	0.174	0.027	0.000
Return	67,019	0.019	0.665	0.691	0.380	0.096	-0.252	-0.784
STD	67,019	0.455	0.327	0.786	0.554	0.378	0.261	0.191
ADR	67,019	0.039	0.194	0.000	0.000	0.000	0.000	0.000
MSCI	67,019	0.663	0.473	1.000	1.000	1.000	0.000	0.000
Analyst	67,019	5.175	6.118	13.667	7.667	2.917	1.000	0.000
CH	67,019	0.311	0.242	0.656	0.494	0.283	0.106	0.002
IO	67,019	0.243	0.293	0.769	0.361	0.112	0.020	0.000

Panel B: Correlation Coefficients (Spearman for the upper-right part, highlighted; Pearson for the bottom-left part)

Variable	*Accrual*	*Lendable*	*On Loan*	*Size*	*BM*	*Leverage*	*Return*	*STD*	*ADR*	*MSCI*	*Analyst*	*CH*	*IO*
Accrual	-	-0.061	-0.042	-0.022	0.034	-0.041	0.012	-0.034	-0.057	-0.009	-0.063	0.015	-0.021
Lendable	-0.037	-	0.596	0.498	-0.161	0.020	-0.027	-0.140	0.086	0.343	0.576	-0.224	0.547
On Loan	-0.036	0.418	-	0.425	-0.185	0.094	-0.034	0.004	0.083	0.349	0.508	-0.178	0.400
Size	0.001	0.317	0.210	-	-0.312	0.163	0.142	-0.349	0.176	0.592	0.734	-0.065	0.379
BM	0.033	-0.106	-0.117	-0.287	-	0.084	-0.209	-0.072	-0.050	-0.101	-0.270	0.094	-0.204
Leverage	-0.002	0.011	0.075	0.126	0.019	-	-0.002	-0.102	0.024	0.116	0.107	0.008	-0.011
Return	0.033	-0.029	-0.062	0.144	-0.203	-0.023	-	-0.002	0.010	0.078	-0.008	0.035	0.012
STD	-0.038	-0.110	0.030	-0.309	-0.092	-0.059	0.075	-	-0.026	-0.168	-0.190	-0.039	-0.078
ADR	-0.046	0.068	0.056	0.212	-0.043	0.017	0.006	-0.022	-	0.070	0.152	-0.077	0.013
MSCI	0.002	0.245	0.206	0.554	-0.088	0.100	0.082	-0.164	0.070	-	0.432	-0.026	0.298
Analyst	-0.044	0.344	0.283	0.730	-0.210	0.070	-0.013	-0.179	0.213	0.342	-	-0.113	0.437
CH	0.011	-0.258	-0.139	-0.083	0.071	0.009	0.039	-0.039	-0.069	-0.048	-0.138	-	-0.195
IO	-0.017	0.483	0.374	0.340	-0.196	-0.004	-0.008	-0.071	-0.040	0.278	0.337	-0.274	-

Table 3: Short Selling and Earnings Management

This table presents panel regression of a firm's earnings management measure (*Accruals*) on lendable shares (*Lendable*) in Panel A or its shares on loan (*On Loan*) in Panel B, and firm-level control variables (*X*) as well as unreported industry-, country-, and year-fixed effects (ICY) on the full samples and different subsamples. The regression model is $Accruals_{i,t+1} = \alpha + \beta_1 SSP_{i,t} + \beta_2 X_{i,t} + \varepsilon_{i,t}$, where $SSP_{i,t}$ refers to short-selling potential, $X_{i,t}$ includes firm size (*Size*), book-to-market ratio (*BM*), financial leverage (*Leverage*), annual stock return (*Return*), stock return volatility (*STD*), American Depository Receipts (*ADR*), MSCI country index membership (*MSCI*), number of analysts following (*Analyst*), closely-held ownership (*CH*), and institutional ownership (*IO*). The construction of these variables is detailed in Appendix B. Ex.Zeros only includes firms with non-zero short-selling values. NUS refers to firms from non-US countries. DEV refers to firms from developed countries, whereas EMG refers to firms from emerging countries. GFC refers to the global financial crisis period from 2007 to 2008, whereas Ex.GFC excludes the global financial crisis period. *t*-statistics shown in parentheses are based on standard errors adjusted for heteroskedasticity and firm-level clustering. Obs denotes the number of firm-year observations, and AdjRsq is adjusted R^2. The sample period is from 2002 to 2009.

	A: *Accruals(t+1)* Regressed on *Lendable Shares* as *SSP*							**B: *Accruals(t+1)* Regressed on *On Loan* as *SSP***						
	All	Ex. Zeros	US	NUS	DEV	EMG	Ex. GFC	All	Ex. Zeros	US	NUS	DEV	EMG	Ex. GFC
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)	Model (9)	Model (10)	Model (11)	Model (12)	Model (13)	Model (14)
SSP	-0.050	-0.047	-0.057	-0.040	-0.049	-0.061	-0.039	-0.062	-0.061	-0.038	-0.093	-0.055	-0.368	-0.044
	(-8.33)	(-7.82)	(-6.20)	(-3.39)	(-8.15)	(-1.26)	(-5.11)	(-4.68)	(-4.64)	(-2.40)	(-3.22)	(-4.16)	(-2.35)	(-2.14)
Size	0.004	0.004	0.005	0.004	0.005	-0.001	0.004	0.004	0.004	0.004	0.004	0.004	-0.001	0.004
	(9.50)	(9.41)	(6.54)	(6.58)	(10.09)	(-0.81)	(7.78)	(8.85)	(9.00)	(5.96)	(6.37)	(9.50)	(-0.95)	(7.46)
BM	0.003	0.003	0.004	0.003	0.003	0.006	0.003	0.002	0.003	0.003	0.003	0.002	0.006	0.003
	(4.07)	(4.08)	(3.17)	(3.10)	(3.75)	(2.37)	(3.67)	(3.45)	(3.50)	(2.63)	(2.92)	(3.15)	(2.44)	(3.39)
Leverage	0.000	0.000	-0.005	0.004	-0.001	0.029	-0.004	0.001	0.001	-0.004	0.004	-0.001	0.030	-0.004
	(0.07)	(0.19)	(-1.27)	(1.10)	(-0.53)	(2.64)	(-1.43)	(0.23)	(0.21)	(-0.98)	(1.19)	(-0.41)	(2.72)	(-1.33)
Return	0.004	0.004	0.007	0.003	0.004	0.001	0.005	0.004	0.004	0.007	0.003	0.004	0.002	0.005
	(4.54)	(4.53)	(4.28)	(2.70)	(4.45)	(0.28)	(4.06)	(4.31)	(4.34)	(4.19)	(2.62)	(4.22)	(0.35)	(3.94)
STD	-0.004	-0.005	-0.003	-0.005	-0.005	0.010	-0.008	-0.004	-0.004	-0.002	-0.005	-0.004	0.011	-0.007
	(-2.36)	(-2.30)	(-0.74)	(-2.60)	(-2.57)	(0.98)	(-3.55)	(-2.02)	(-2.00)	(-0.56)	(-2.40)	(-2.24)	(1.01)	(-3.34)
ADR	-0.012	-0.012		-0.012	-0.008	-0.029	-0.010	-0.012	-0.012		-0.011	-0.008	-0.029	-0.010
	(-5.10)	(-5.22)		(-4.94)	(-3.31)	(-5.28)	(-3.85)	(-5.05)	(-5.09)		(-4.75)	(-3.26)	(-5.29)	(-3.85)
MSCI	-0.006	-0.005	0.001	-0.009	-0.007	0.008	-0.005	-0.006	-0.006	-0.001	-0.009	-0.007	0.008	-0.006
	(-4.96)	(-4.49)	(0.43)	(-6.02)	(-5.46)	(1.56)	(-3.99)	(-5.28)	(-5.44)	(-0.30)	(-6.01)	(-5.87)	(1.57)	(-4.24)
Analyst	-0.001	-0.001	-0.001	-0.001	-0.001	0.000	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	0.000	-0.001
	(-8.43)	(-8.30)	(-6.13)	(-6.36)	(-9.12)	(-0.27)	(-6.36)	(-8.73)	(-8.81)	(-6.06)	(-6.30)	(-9.46)	(-0.23)	(-6.61)
CH	-0.007	-0.006	-0.007	-0.004	-0.006	-0.002	-0.005	-0.005	-0.006	-0.004	-0.004	-0.005	-0.003	-0.005
	(-3.42)	(-3.09)	(-2.15)	(-1.81)	(-3.12)	(-0.32)	(-2.43)	(-2.81)	(-2.87)	(-1.20)	(-1.59)	(-2.50)	(-0.46)	(-2.11)
IO	0.007	0.008	0.000	0.033	0.007	0.075	0.008	0.002	0.002	-0.005	0.029	0.002	0.071	0.005
	(2.98)	(3.37)	(0.03)	(5.65)	(2.78)	(3.38)	(2.89)	(1.04)	(1.06)	(-1.92)	(5.26)	(0.77)	(3.41)	(1.89)
Fixed Effects	ICY	ICY	ICY	ICY	ICY	ICY	ICY	ICY	ICY	ICY	ICY	ICY	ICY	ICY
Obs	67,019	62,720	22,471	44,548	62,811	4,208	45,644	67,018	66,962	22,471	44,547	62,810	4,208	45,643
AdjRsq	4.0%	4.3%	3.7%	4.3%	3.9%	8.9%	4.2%	4.0%	4.0%	3.6%	4.3%	3.8%	9.0%	4.2%

Table 4: Alternative Specifications on Short Selling and Earnings Management

This table address the endogeneity problem and presents Granger causality tests in Panel A and tests with fixed firm effects and diff-in-diff specifications in Panels B and C, respectively. Panel A uses both *Lendable* (Models 1 to 2) and *On Loan* (Models 3 to 4) as the proxy for short-selling potential (SSP). Models (1) and (3) regress accruals on (lagged) SSP with lagged accruals as control. Models (2) and (4) regress SSP on (lagged) accruals with lagged SSP as control. Models (5) and (6) in Panel B show results of the baseline regression with firm-fixed effect. Model (7) regress the change in accruals on the proxy for positive supply changes in the short-selling market (*SOUT*). *t*-statistics shown in parentheses are based on standard errors adjusted for heteroskedasticity and firm-level clustering. Obs denotes the number of firm-year observations, and AdjRsq is adjusted R^2. The sample period is from 2002 to 2009.

	A. Granger Causality Tests				**B. Firm Fixed-Effect Tests**		**C. Diff-in-Diff Tests**	
Dependent Variable	*Accruals (t+1)*	*SSP (t+1)*	*Accruals (t+1)*	*SSP (t+1)*	*Accruals (t+1)*		*ΔAccruals (t+1)*	
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	
SSP = Lendable	-0.046	0.829			-0.03			
	(-8.16)	(198.77)			(-3.75)			
SSP = On Loan			-0.061	0.725		-0.143	*ΔSSP*	-0.013
			(-4.89)	(99.35)		(-7.01)		(-3.50)
Accruals	0.079	0.003	0.080	0.003				
	(8.57)	(1.77)	(8.62)	(2.13)				
Size	0.004	0.002	0.004	-0.001	0.029	0.029	*ΔSize*	0.051
	(9.43)	(9.14)	(8.77)	(-8.41)	(16.41)	(16.37)		(19.35)
BM	0.003	0.003	0.002	-0.001	0.018	0.018	*ΔBM*	0.042
	(3.78)	(12.48)	(3.18)	(-5.05)	(9.69)	(9.74)		(15.61)
Leverage	0.000	-0.002	0.000	0.007	0.092	0.096	*ΔLeverage*	0.223
	(-0.02)	(-2.26)	(0.16)	(10.97)	(10.71)	(11.18)		(18.43)
Return	0.005	-0.004	0.004	-0.003	0.001	0.001	*ΔReturn*	0.001
	(4.91)	(-9.25)	(4.69)	(-11.89)	(1.29)	(1.09)		(0.63)
STD	-0.005	-0.006	-0.004	0.002	-0.010	-0.009	*ΔSTD*	-0.004
	(-2.76)	(-7.71)	(-2.42)	(5.16)	(-3.37)	(-3.25)		(-1.29)
ADR	-0.011	0.002	-0.011	0.002	-0.005	-0.006	*ΔADR*	0.004
	(-5.13)	(2.05)	(-5.06)	(4.15)	(-0.98)	(-1.03)		(0.51)
MSCI	-0.006	0.010	-0.006	0.006				
	(-5.05)	(22.28)	(-5.31)	(23.24)				
Analyst	-0.001	0.000	-0.001	0.000	0.000	-0.000	*ΔAnalyst*	0.000
	(-8.43)	(6.23)	(-8.68)	(11.80)	(-2.22)	(-1.61)		(0.80)
CH	-0.007	-0.011	-0.006	0.001	-0.002	-0.001	*ΔCH*	-0.002
	(-3.70)	(-16.00)	(-3.10)	(3.06)	(-0.44)	(-0.17)		(-0.49)
IO	0.007	0.056	0.003	0.021	0.005	0.011	*ΔIO*	-0.006
	(3.22)	(37.04)	(1.45)	(21.51)	(0.66)	(1.54)		(-0.64)
Fixed Effects	ICY	ICY	ICY	ICY	FY	FY		ICY
Obs	66,223	54,127	66,222	54,129	67,019	67,018		51,557
AdjRsq	4.8%	88.6%	4.7%	66.2%	19.1%	19.2%		4.4%

Table 5: ETF, Short Selling, and Earnings Manipulation

Panel A addresses the endogeneity problem using ETF ownership (*ETF*) as an instrument variable and presents panel regression of a firm's earnings management measure (*Accruals*) on ETF ownership (ETF), predicted shares on loan (*On Loan*), or lendable shares (*Lendable*), and firm-level control variables (*X*) as well as unreported industry-, country-, and year-fixed effects (ICY) on the variation of the following models

$$\textbf{\textit{The 1st stage}}: SSP_{i,t} = \alpha + \beta_1 ETF_{i,t} + \beta_2 X_{i,t} + \varepsilon_{i,t}; \textbf{\textit{The 2nd stage}}: Accruals_{i,t+1} = \alpha + \beta_1 Predicted\ SSP\ on\ ETF_{i,t} + \beta_2 X_{i,t} + \varepsilon_{i,t},$$

where $SSP_{i,t}$ refers to short-selling potential, $X_{i,t}$ includes the list of standard control variables. Models (1) and (3) regress short-selling variables on ETF ownership. Models (2) and (4) regress accruals on predicted short-selling variables. Panel B provides the diagnostic analyses on the impact of ETF ownership (*ETF*) on *Accruals* on the subsample of the stocks for which short selling is either prohibited due to regulation (Models 5 and 6) or low – when very little shares could be or actually be lent out (Models 7 to 8). Models (9) to (10) of Panel C explore the reverse constraint by regressing *Accruals* on *SSP* (*Lendable* and *On Loan*, respectively) on the sample of stocks whose ETF ownership is low. *t*-statistics shown in parentheses are based on standard errors adjusted for heteroskedasticity and firm-level clustering. Obs denotes the number of firm-year observations, and AdjRsq is adjusted R^2. The sample period is from 2002 to 2009.

	A. ETF Ownership as an Instrimental Variable				**B. *Accruals* regressed on *ETF* when *SSP* is Low**				**C. *Accruals* on *SSP* when *ETF* is Low**	
Dependent Variable	*SSP=Lendable* (1st Stage)	*Accruals* (2nd Stage)	*SSP=On Loan* (1st Stage)	*Accruals* (2nd Stage)	*Accruals Legality=0*	*Accruals SSban=1*	*Accruals 0<Lendable<0.5%*	*Accruals 0<On Loan<0.5%*	*Accruals 0<ETF< 0.5%*	*Accruals 0<ETF< 0.5%*
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)	Model (9)	Model (10)
ETF	0.820		0.293		-0.114	-0.032	0.034	-0.023		
	(5.27)		(5.08)		(-0.16)	(-0.15)	(0.63)	(-0.67)		
SSP		-0.115		-0.322					-0.050	-0.112
		(-3.14)		(-3.14)					(-4.98)	(-4.29)
Size	0.003	0.005	-0.002	0.003	0.004	0.002	0.007	0.005	0.005	0.005
	(9.53)	(9.59)	(-10.70)	(6.88)	(0.94)	(0.67)	(6.84)	(7.26)	(8.72)	(8.52)
BM	0.009	0.004	0.000	0.002	-0.009	0.007	0.004	0.002	0.003	0.003
	(20.73)	(4.46)	(-1.63)	(3.33)	(-1.51)	(2.12)	(2.88)	(2.02)	(3.39)	(3.15)
Leverage	0.010	0.001	0.014	0.004	0.082	0.021	-0.008	0.002	0.004	0.005
	(5.84)	(0.31)	(12.35)	(1.47)	(2.80)	(1.85)	(-1.66)	(0.59)	(1.29)	(1.47)
Return	0.001	0.004	-0.002	0.003	-0.002	-0.003	0.006	0.006	0.006	0.006
	(3.09)	(4.61)	(-8.75)	(3.60)	(-0.31)	(-0.60)	(2.96)	(4.29)	(5.33)	(5.16)
STD	-0.005	-0.005	0.006	-0.002	-0.029	-0.012	-0.005	-0.001	-0.003	-0.003
	(-5.44)	(-2.51)	(14.00)	(-0.99)	(-1.62)	(-1.09)	(-1.57)	(-0.40)	(-1.72)	(-1.42)
ADR	0.005	-0.011	0.006	-0.010	-0.022	-0.036	-0.014	-0.017	-0.010	-0.009
	(2.68)	(-4.96)	(6.56)	(-4.17)	(-1.34)	(-2.06)	(-2.54)	(-4.56)	(-3.48)	(-3.24)
MSCI	0.021	-0.004	0.012	-0.003	-0.031	-0.006	-0.007	-0.006	-0.008	-0.008
	(20.93)	(-2.94)	(24.96)	(-1.67)	(-3.17)	(-1.17)	(-3.26)	(-3.73)	(-5.59)	(-5.67)
Analyst	0.002	-0.001	0.001	-0.001	-0.002	-0.001	-0.001	-0.001	-0.001	-0.001
	(17.77)	(-6.46)	(15.85)	(-4.69)	(-2.30)	(-1.41)	(-4.25)	(-7.46)	(-6.29)	(-6.45)
CH	-0.020	-0.008	0.002	-0.005	-0.015	0.008	-0.009	-0.008	-0.007	-0.007
	(-14.12)	(-3.82)	(3.13)	(-2.58)	(-0.94)	(0.90)	(-2.38)	(-3.32)	(-3.17)	(-2.91)
IO	0.123	0.017	0.034	0.014	0.054	0.023	-0.004	0.002	0.014	0.011
	(20.99)	(2.83)	(13.96)	(2.73)	(1.35)	(0.69)	(-0.76)	(0.64)	(4.05)	(3.28)
Fixed Effects	ICY	ICY	ICY	ICY	ICY	ICY	ICY	ICY	ICY	ICY
Obs	67,019	67,019	67,018	67,018	1,121	3,490	17,603	35,578	44,082	44,081
AdjRsq	0.65	0.04	0.35	0.04	9.3%	3.4%	3.7%	4.1%	4.0%	3.9%

Table 6: Uptick Restriction, Circuit Breakers, and Earnings Management

This table examines whether and how market regulations that increase the cost of short selling, including Uptick Restriction and Circuit Breaker, affect the impact of short-selling potential on earnings management. Models (1) and (2) apply the previous regressions between a firm's earnings management measure (*Accruals*) and short-selling potential (*SSP*, in terms of lendable shares (Lendable),) to stocks in the markets without or with uptick restrictions, respectively. The next column (Diff) reports the difference between the two sensitivity parameters of Accruals with respect to SSP – i.e., Model (1) sensitivity-minus-Model (2) sensitivity – as well as the p-value of the difference. Models (3) and (4) apply similar regressions to stocks in the markets without or with circuit breakers, respectively. The next column (Diff) reports the difference between the two sensitivity parameters of Accruals with respect to SSP – i.e., Model (3) sensitivity-minuses-Model (4) sensitivity – as well as the p-value of the difference. *t*-statistics shown in parentheses are based on standard errors adjusted for heteroskedasticity and firm-level clustering. Obs denotes the number of firm-year observations, and AdjRsq is adjusted R^2. The sample period is from 2002 to 2009.

	Uptick Restriction			Circuit Breaker		
Variable	*No* Model (1)	*Yes* Model (2)	*Diff* [p-value]	*No* Model (3)	*Yes* Model (4)	*Diff* [p-value]
SSP	-0.062	-0.028	-0.034	-0.055	-0.035	-0.020
	(-5.38)	(-3.69)	[0.014]	(-7.20)	(-2.19)	[0.083]
Size	0.006	0.003		0.005	0.003	
	(7.86)	(5.58)		(7.54)	(5.02)	
BM	0.005	0.002		0.004	0.003	
	(4.09)	(1.75)		(3.80)	(2.44)	
Leverage	0.002	-0.002		0.001	0.002	
	(0.54)	(-0.51)		(0.24)	(0.43)	
Return	0.004	0.005		0.006	0.002	
	(2.41)	(3.82)		(4.34)	(1.59)	
STD	-0.008	-0.002		-0.001	-0.012	
	(-3.24)	(-0.60)		(-0.32)	(-4.20)	
ADR	-0.014	-0.012		-0.012	-0.012	
	(-4.88)	(-3.48)		(-3.34)	(-3.99)	
MSCI	-0.010	-0.003		-0.003	-0.008	
	(-5.27)	(-1.90)		(-1.66)	(-5.28)	
Analyst	-0.001	-0.001		-0.001	-0.001	
	(-4.36)	(-7.86)		(-6.68)	(-4.52)	
CH	-0.013	-0.001		-0.010	-0.003	
	(-4.41)	(-0.54)		(-3.47)	(-1.00)	
IO	0.006	0.008		0.003	0.030	
	(1.24)	(3.07)		(1.26)	(4.02)	
Fixed Effects	ICY	ICY		ICY	ICY	
Obs	28,415	38,604		34,342	32,677	
AdjRsq	3.9%	4.5%		4.1%	4.3%	

Table 7: The U.S. and Hong Kong's Experiments on Short Selling and Earnings Management

This table explores two country-level experiments with changes in short-selling regulation. Panel A examines Regulation SHO in the U.S., in which the SEC randomly selects a sample of pilot firms announced in 2004 and formally removes their uptick restrictions in 2005. Models (1) and (2) report the results of the following annual panel regressions with firm and year-fixed effects (FY):

$$Accruals_{i,t+1} = \alpha + \beta_1 US\ SHO_{i,t} + \beta_2 X_{i,t} + \varepsilon_{i,t}.$$

where $US\ SHO_{i,t}$ refers to the dummy variable which takes the value of 1 if the stock is selected as a SHO pilot firm and $X_{i,t}$ stacks a list of control variables. The standard errors of the two models are further clustered at the firm and industry level, respectively. The testing period is from 2001 to 2007, in which the announcement year 2004 of Regulation SHO is removed from the sample. Models (3) and (4) conduct the following cross-sectional regression:

$$\Delta Accruals_{i,t+1} = \alpha + \beta_1 US\ SHO_{i,t} + \beta_2 \Delta X_{i,t} + \varepsilon_{i,t}.$$

where $\Delta Accruals_{i,t+1}$ refers to the difference between the three-year average value of firm *Accruals* after year 2004 and that before 2004, and $\Delta X_{i,t}$ refers to changes in the average value of the control variables over the same periods. Panel B explores the unique regulatory setting in the Hong Kong market in which the regulator changes the list of stocks eligible to short selling based on a quarterly frequency from 1994 to 2005. Models (1) and (2) report the results of the following panel regression with firm and year-fixed effects (FY) and clustered standard errors at the firm and industry levels:

$$Accruals_{i,t+1} = \alpha + \beta_1 HK\ SS_{i,t} + \beta_2 X_{i,t} + \varepsilon_{i,t}.$$

where $HK\ SS_{i,t}$ is the dummy variable that takes the value of 1 if a stock is eligible to short selling. Models (3) and (4) report the results of the following panel regressions

$$\Delta Accruals_{i,t+1} = \alpha + \beta_1 \Delta HK\ SS_{i,t} + \beta_2 \Delta X_{i,t} + \varepsilon_{i,t}.$$

where $\Delta HK\ SS_{i,t}$ refers to net inclusion that takes a value of 1 (-1) if a firm in included (excluded) in the eligible list in Model (3) and the dummy variable of exclusion in Model (4). Control variables are detailed in Appendix B. t-statistics shown in parentheses are based on standard errors adjusted for heteroskedasticity and firm-level clustering. Obs denotes the number of firm-year observations, and AdjRsq is adjusted R^2.

Panel A: Accruals and SHO Pilot Firms in the U.S.				
	Accruals		*ΔAccruals(3Y average, after-minus-before)*	
Variable	Model (1)	Model (2)	Model (3)	Model (4)
US SHO	-0.008	-0.008	-0.007	-0.007
	(-2.50)	(-2.17)	(-2.50)	(-2.67)
Size	0.018	0.018	0.011	0.008
	(4.58)	(3.64)	(2.83)	(2.23)
BM	0.005	0.005	-0.001	-0.002
	(1.06)	(1.01)	(-0.20)	(-0.56)
Leverage	0.052	0.052	0.015	0.009
	(3.94)	(3.12)	(1.16)	(0.71)
Return	0.006	0.006	0.019	0.020
	(2.17)	(1.55)	(4.00)	(4.19)
STD	-0.024	-0.024	-0.027	-0.038
	(-4.40)	(-3.58)	(-3.21)	(-5.01)
Analyst	-0.002	-0.002	-0.001	-0.001
	(-3.84)	(-2.97)	(-1.67)	(-1.34)
CH	-0.008	-0.008	-0.004	-0.006
	(-1.05)	(-1.45)	(-0.36)	(-0.57)
IO	-0.007	-0.007	-0.005	-0.005
	(-0.69)	(-0.55)	(-0.46)	(-0.43)
Fixed Effects	FY	FY	I	N/A
Clustering	Firm	Industry	N/A	N/A
Obs	13,434	13,434	2,239	2,239
AdjRsq	15.4%	15.4%	9.5%	5.8%

Panel B: Accruals and Shortable Firms in Hong Kong				
	Accruals		*Δaccruals*	
			Net Inclusion	*Deletion*
Variable	Model (1)	Model (2)	Model (3)	Model (4)
HK SS	-0.022	-0.022		
	(-2.29)	(-2.45)		
ΔHK SS			-0.022	0.032
			(-1.93)	(2.12)
Size	0.041	0.041	0.085	0.085
	(6.86)	(5.88)	(8.76)	(8.79)
BM	0.013	0.013	0.048	0.048
	(1.94)	(3.09)	(4.17)	(4.16)
Leverage	0.134	0.134	0.332	0.331
	(3.64)	(5.83)	(5.72)	(5.71)
Return	-0.001	-0.001	-0.001	-0.000
	(-0.16)	(-0.21)	(-0.09)	(-0.03)
STD	0.003	0.003	0.011	0.011
	(0.36)	(0.36)	(0.93)	(0.94)
ADR	-0.150	-0.150	-0.127	-0.125
	(-5.18)	(-6.10)	(-1.28)	(-1.25)
Analyst	-0.000	-0.000	-0.001	-0.001
	(-0.24)	(-0.24)	(-0.99)	(-1.18)
CH	0.020	0.020	0.019	0.019
	(0.87)	(0.97)	(0.64)	(0.64)
Fixed Effects	FY	FY	IY	IY
Clustering	Firm	Industry	Firm	Firm
Obs	4,454	4,454	3,571	3,571
AdjRsq	10.6%	0.1064	6.2%	6.2%

Table 8: Market-wide Short Selling and Earnings Management

Panel A presents panel regression of a firm's earnings management measure (*Accruals*) on market-wide short-selling variables, firm-level control variables (*X*), and country-level control variables (*C*) as well as unreported industry-, country-, and year-fixed effects (ICY) on the variation of the following model

$$Accruals_{i,t+1} = \alpha + \beta_1 MKT\_SSP_{i,t} + \beta_2 C_{i,t} + \beta_3 X_{i,t} + \varepsilon_{i,t.}$$

$MKT\_SSP_{i,t}$ includes legality of short selling (*Legality*), feasibility of short selling (*Feasibility*), put option trading (*Put*), and feasibility or put option (*F or P*). $C_{i,t}$ stacks the list of market-level control variables, including segmentation (*SEG*), anti-director index (*AntiDirector*), market capitalization-to-GDP ratio (*MVGDP*), standard deviation of GDP growth (*STDGDPG*), future stock market return (*MKTReturn*), and future S&P sovereign credit rating (*MKTCreditRating*). $X_{i,t}$ includes the same list of firm control variables as before. The construction of these variables is detailed in Appendix B. Models 1-4 reports the regression results when only firm control variables are used. Models 5-8 tabulate the results when country-level control variables are also included. Panel B repeat the same regression on the sub-sample of firms which have American Depository Receipts (ADRs) traded in the U.S. *t*-statistics shown in parentheses are based on standard errors adjusted for heteroskedasticity and firm-level clustering. Obs denotes the number of firm-year observations, and AdjRsq is adjusted R^2. The sample period is from 1990 to 2009.

	A. Market-wide Short Selling and Earnings Management (All Stocks)								**B. Market-wide Short Selling and Earnings Management (ADRs)**							
	Legality	*Feasibility*	*Put*	*F or P*	*Legality*	*Feasibility*	*Put*	*F or P*	*Legality*	*Feasibility*	*Put*	*F or P*	*Legality*	*Feasibility*	*Put*	*F or P*
Variable	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)	Model (9)	Model (10)	Model (11)	Model (12)	Model (13)	Model (14)	Model (15)	Model (16)
MKT_SSP	-0.006	-0.004	-0.009	-0.009	-0.015	-0.012	-0.014	-0.017	-0.012	-0.025	-0.028	-0.034	-0.020	-0.015	-0.030	-0.047
	(-3.02)	(-1.85)	(-4.34)	(-3.91)	(-3.68)	(-2.98)	(-2.82)	(-3.65)	(-1.79)	(-3.08)	(-2.98)	(-2.80)	(-2.20)	(-1.82)	(-2.31)	(-5.21)
SEG					0.128	0.123	0.109	0.103					0.034	0.034	0.034	0.034
					(3.13)	(3.01)	(2.65)	(2.51)					(0.85)	(0.85)	(0.85)	(0.84)
AntiDirector					0.005	0.005	0.005	0.005					0.054	0.054	0.064	0.055
					(4.48)	(4.53)	(4.63)	(4.36)					(0.34)	(0.34)	(0.40)	(0.35)
MVGDP					0.002	0.002	0.002	0.002					0.003	0.003	0.004	0.003
					(1.59)	(1.58)	(1.30)	(1.31)					(0.68)	(0.71)	(0.90)	(0.79)
STDGDPG					0.056	0.051	0.018	0.021					0.005	0.005	0.004	0.004
					(1.54)	(1.40)	(0.48)	(0.57)					(0.92)	(0.92)	(0.77)	(0.75)
MKTReturn					-0.010	-0.010	-0.010	-0.010					0.388	0.361	0.346	0.339
					(-6.56)	(-6.34)	(-6.40)	(-6.32)					(3.14)	(2.90)	(2.76)	(2.77)
MKTCreditRating					0.049	0.047	0.051	0.051					-0.008	-0.008	-0.009	-0.008
					(6.99)	(6.68)	(7.25)	(7.28)					(-1.05)	(-1.02)	(-1.14)	(-1.09)
Lagged Accrual					0.019	0.019	0.019	0.019					-0.013	-0.007	-0.005	-0.006
					(3.39)	(3.40)	(3.39)	(3.40)					(-0.44)	(-0.25)	(-0.18)	(-0.20)
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	ICY	ICY	ICY	ICY	ICY	ICY	ICY	ICY	ICY	ICY	ICY	ICY	ICY	ICY	ICY	ICY
Obs	230,894	230,894	230,894	230,894	172,002	172,002	172,002	172,002	6,171	6,171	6,171	6,171	4,850	4,850	4,850	4,850
AdjRsq	3.7%	3.7%	3.7%	3.7%	3.8%	3.8%	3.8%	3.8%	9.3%	9.4%	9.3%	9.3%	10.3%	10.3%	10.3%	10.4%

Table 9: Short Selling, Earnings Management, and Alternative Discipline Channels

This table presents panel regression of a firm's earnings management measure (*Accruals*) on its shares under short-selling potential, its interaction with alternative discipline channels (*ADC*), and firm-level control variables (*X*) as well as unreported industry-, country-, and year-fixed effects (ICY) on the full samples and different subsamples. The regression model is $Accruals_{i,t+1} = \alpha + \beta_1 SSP_{i,t} + \beta_2 ADC_{i,t} + \beta_4 X_{i,t} + \varepsilon_{i,t}$, where $SSP_{i,t}$ refers to short-selling potential, $X_{i,t}$ includes the same list of firm control variables as before, $ADC_{i,t}$ includes Big N auditor (*BigN*), international accounting standard (*IAS*), ISS corporate governance index (*ISS*), Amihud's (2002) illiquidity (*Illiquidity*), analyst dispersion (*Disp*), and News coverage (*NewsCoverage*). Panel A reports the regression results. In Panel B, *SSP* is further instrumented on ETF ownership (*ETF*) following Table 5. The construction of these variables is detailed in Appendix B. *t*-statistics shown in parentheses are based on standard errors adjusted for heteroskedasticity and firm-level clustering. Obs denotes the number of firm-year observations, and AdjRsq is adjusted R^2. The sample period is from 2002 to 2009.

Panel A: *Accruals* Regressed on *SSP* and *ADC*

	BigN	*IAS*	*ISS*	*Illiquidity*	*Disp*	*NewsCoverage*
Variable	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
SSP	-0.053	-0.049	-0.037	-0.056	-0.040	-0.047
	(-8.81)	(-8.07)	(-3.86)	(-9.08)	(-6.17)	(-7.87)
ADC	-0.009	0.001	-0.024	-0.001	-0.211	-0.003
	(-7.97)	(0.85)	(-2.51)	(-2.89)	(-8.87)	(-8.02)
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	ICY	ICY	ICY	ICY	ICY	ICY
Obs	66,202	66,750	17,021	63,812	45,228	67,019
AdjRsq	4.1%	4.0%	4.4%	4.0%	5.4%	4.2%

Panel B: *Accruals* Regressed on (*ETF*) Instrumented *SSP and ADC*

	BigN	*IAS*	*ISS*	*Illiquidity*	*Disp*	*NewsCoverage*
Variable	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
SSP	-0.125	-0.113	-0.315	-0.125	-0.098	-0.113
	(-3.31)	(-3.11)	(-4.84)	(-3.35)	(-2.81)	(-3.11)
ADC	-0.008	0.003	-0.025	-0.001	-0.210	-0.003
	(-7.69)	(1.58)	(-2.61)	(-2.19)	(-8.84)	(-8.33)
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	ICY	ICY	ICY	ICY	ICY	ICY
Obs	66,202	66,750	17,021	63,812	45,228	67,019
AdjRsq	4.1%	4.0%	4.5%	3.9%	5.4%	4.1%

Table 10: Short Selling and Earnings Persistence

This table presents panel regression of a firm's future earnings, cash flows, or accruals (*ECA*) on its shares under short selling potential, short-selling variables' interaction with current earnings, cash flow, or accruals, and firm-level control variables (*X*) as well as unreported industry-, country-, and year-fixed effects (ICY) on the full samples and different subsamples. The regression model is

$$ECA_{i,t+1} = \alpha + \beta_1 SSP_{i,t} + \beta_2 SSP_{i,t} \times ECA_{i,t} + \beta_3 ECA_{i,t} + \beta_4 X_{i,t} + \beta_5 X_{i,t} ECA_{i,t} + \varepsilon_{i,t},$$

where $SSP_{i,t}$ refers to short-selling potential, $ECA_{i,t}$ refers to earnings, cash flows, or accruals. $X_{i,t}$ includes the list of firm controls as before. Panel A reports the regression results. In Panel B, *SSP* is further instrumented on ETF ownership (*ETF*) following Table 5. The construction of these variables is detailed in Appendix B. NUS refers to firms from non-US countries. t-statistics shown in parentheses are based on standard errors adjusted for heteroskedasticity and firm-level clustering. Obs denotes the number of firm-year observations, and AdjRsq is adjusted R^2. To save space the parameters for control variables and interaction terms between ECA and control variables are not tabulated. The sample period is from 2002 to 2009.

Panel A: One-year Ahead *ECA* Regressed on *SSP*

	Accruals			*Cash Flows*			*Earnings*		
	All	US	NUS	All	US	NUS	All	US	NUS
Variable	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)	Model (9)
SSP	-0.046	-0.052	-0.005	0.096	0.105	0.091	0.028	0.033	0.046
	(-7.51)	(-6.23)	(-0.43)	(8.30)	(6.93)	(4.03)	(3.91)	(3.18)	(3.64)
ECA	0.169	0.003	0.177	0.611	0.527	0.590	0.789	0.711	0.806
	(2.03)	(0.02)	(1.81)	(10.15)	(4.90)	(7.97)	(15.24)	(7.57)	(12.86)
*ECA*SSP*	-0.511	-0.639	-0.301	-0.551	-0.564	-0.574	-0.318	-0.316	-0.403
	(-5.12)	(-5.88)	(-1.74)	(-7.10)	(-5.73)	(-4.05)	(-5.07)	(-3.99)	(-3.44)
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
*ECA*Control*	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	ICY	IY	ICY	ICY	IY	ICY	ICY	IY	ICY
Obs	61,353	20,149	41,204	61,353	20,149	41,204	61,353	20,149	41,204
AdjRsq	8.7%	10.0%	8.6%	41.9%	50.0%	37.2%	67.9%	68.4%	67.7%

Panel B: One-year Ahead *ECA* Regressed on (*ETF*) Instrumented *SSP*

	Accruals			*Cash Flows*			*Earnings*		
	All	US	NUS	All	US	NUS	All	US	NUS
Variable	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)	Model (9)
SSP	-0.041	-0.124	0.009	-0.029	0.054	-0.068	0.005	0.028	-0.002
	(-1.77)	(-3.21)	(0.34)	(-0.90)	(0.94)	(-1.61)	(0.30)	(0.70)	(-0.11)
ECA	0.180	0.016	0.184	0.627	0.560	0.611	0.796	0.723	0.819
	(2.16)	(0.09)	(1.89)	(10.34)	(5.12)	(8.27)	(15.37)	(7.66)	(13.06)
*ECA*SSP*	-0.574	-1.170	-0.417	-0.439	-0.712	-0.233	-0.320	-0.408	-0.255
	(-3.54)	(-4.10)	(-2.12)	(-3.66)	(-3.59)	(-1.48)	(-3.06)	(-2.33)	(-1.91)
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
*ECA*Control*	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	ICY	IY	ICY	ICY	IY	ICY	ICY	IY	ICY
Obs	61,353	20,149	41,204	61,353	20,149	41,204	61,353	20,149	41,204
AdjRsq	8.6%	9.8%	8.6%	41.8%	49.8%	37.2%	67.9%	68.3%	67.7%

Table 11: Short Selling and Alternative Earnings Management Measures

This table presents panel regression of a firm's alternative earnings management measures (A*EM*) on its shares under short-selling potential (*SSP*), and firm-level control variables (*X*) as well as unreported industry-, country-, and year-fixed effects (ICY). The regression model is: $AEM_{i,t} = \alpha + \beta_1 SSP_{i,t} + \beta_2 X_{i,t} + \varepsilon_{i,t}$, where $SSP_{i,t}$ refers to short-selling potential, $AEM_{i,t}$ includes Jones's (1991) residual accruals (*JONES*), FLOS's (2005) residual accruals (*FLOS*), small positive forecasting profits (*SPAF*), and small positive past-earnings profits (*SPDE*). $X_{i,t}$ includes the same list of firm control variables as before. Models (1) to (4) report the regression results. In Models (5) to (8), *SSP* is further instrumented on ETF ownership (*ETF*) following Table 5. The construction of these variables is detailed in Appendix B. *t*-statistics shown in parentheses are based on standard errors adjusted for heteroskedasticity and firm-level clustering. Obs denotes the number of firm-year observations, and AdjRsq is adjusted R^2. The sample period is from 2002 to 2009.

Alternative Earnings Management Measures Regressed on *SSP* and Instrumented *SSP*								
	Earn Mgmt on *SSP*				Earn Mgmt on (*ETF*) Instrumented *SSP*			
	JONES	*FLOS*	*SPAF*	*SPDE*	*JONES*	*FLOS*	*SPAF*	*SPDE*
Variable	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)
SSP	-0.046	-0.031	-0.686	-1.320	-0.268	-0.128	-1.546	-4.401
	(-3.84)	(-3.14)	(-3.39)	(-4.94)	(-2.68)	(-1.78)	(-1.20)	(-2.92)
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	ICY	ICY	ICY	ICY	ICY	ICY	ICY	ICY
Obs	64,856	60,502	48,940	37,873	64,856	60,502	48,940	37,873
AdjRsq	2.9%	0.8%	3.3%	4.7%	2.9%	0.8%	3.2%	4.6%

Table 12: Stock Price Non-synchronicity and Earnings Management

This table presents panel regression of a firm's stock price non-synchronicity (*Nonsyn*) on its accruals (*Accruals*), and firm-level control variables (*X*) as well as unreported industry-, country-, and year-fixed effects (ICY) on the full samples and different subsamples. The regression model is

$$Nonsyn_{i,t} = \alpha + \beta_1 Accrual_{i,t} + \beta_2 X_{i,t} + \varepsilon_{i,t}.$$

$X_{i,t}$ includes the same list of firm control variables as before. The construction of these variables is detailed in Appendix B. NUS refers to firms from non-US countries. *t*-statistics shown in parentheses are based on standard errors adjusted for heteroskedasticity and firm-level clustering. Obs denotes the number of firm-year observations, and AdjRsq is adjusted R^2. The sample period is from 2002 to 2009.

			US	NUS
Variable	Model (1)	Model (2)	Model (3)	Model (4)
Accrual	-0.138	-0.174	-0.305	-0.101
	(-2.48)	(-3.09)	(-2.30)	(-1.91)
Lagged Nonsyn		0.196		
		(37.49)		
Size	-0.286	-0.233	-0.417	-0.215
	(-42.18)	(-38.50)	(-27.66)	(-31.02)
BM	-0.113	-0.077	-0.080	-0.123
	(-13.34)	(-10.21)	(-4.36)	(-14.55)
Leverage	-0.158	-0.124	-0.027	-0.182
	(-4.44)	(-4.03)	(-0.36)	(-5.20)
Return	0.129	0.096	0.305	0.072
	(11.99)	(8.83)	(11.20)	(6.86)
STD	0.316	0.288	0.111	0.419
	(13.19)	(12.20)	(2.54)	(13.81)
ADR	0.105	0.082		0.043
	(3.46)	(3.24)		(1.45)
MSCI	-0.251	-0.200	-0.610	-0.109
	(-13.98)	(-13.06)	(-14.54)	(-6.47)
Analyst	0.005	0.006	0.032	-0.013
	(2.84)	(4.57)	(10.13)	(-7.23)
CH	0.325	0.266	0.456	0.193
	(11.89)	(11.11)	(7.13)	(7.27)
IO	-0.845	-0.689	-0.527	-0.256
	(-22.57)	(-21.37)	(-10.91)	(-4.27)
Fixed Effects	ICY	ICY	ICY	ICY
Obs	62,093	60,707	21,742	40,351
AdjRsq	35.7%	38.4%	35.7%	32.5%

Figure 1: An Illustration of Earnings Misstatement and Short Selling

This figure plots the two-way relationship between earnings misstatement and short selling on the sample of firms covered by the newsdatabase, RavenPack. In each year, we sort all the firms into two groups according to one of the four criteria as follows: news coverage (Low or High Coverage), firm market capitalization (Small or Large Size), book-to-market ratios (Low or High BM), and past-year stock return (Low or High Return). Each sort effectively split the whole sample into two subsamples with equal size. For each subsample, Panel A demonstrates how short sellers attack manipulation by plotting the density of short-selling attack on the group of firms without or with earnings misstatement in a same year. The density of short-selling attack is proxied by the average value of the dummy indicator of positive changes in short-selling demand (i.e., *DOUT*, following Cohen, Diether, and Malloy 2007) of the firms in a year. Panel B illustrates the extent to which short-selling potential (SSP) could reduce manipulation incentives by plotting the probability of having future (next year) earnings misstatement for firms with high or low SSP (i.e., above or below median *Lendable*). Table 1 and the Internet Appendix B report the corresponding regression. The sample period is from 2002 to 2009.

Panel A: The Density of Short-Selling Attack on Firms with or without Earnings Misstatement.

Panel B: The Probability of Future Misstatement on Firms with Low or High Short-Selling Potential.