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Exchange Trading Rules, Surveillance and Insider Trading

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EXCHANGE TRADING RULES, SURVEILLANCE AND INSIDER TRADING*

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EXCHANGE TRADING RULES, SURVEILLANCE AND INSIDER TRADING

Abstract

We examine the impact of stock exchange trading rules and surveillance on the frequency and severity of suspected insider trading cases in 22 stock exchanges around the world over the period January 2003 through June 2011. Using new indices for market manipulation, insider trading, and broker-agency conflict based on the specific provisions of the trading rules of each stock exchange, along with surveillance to detect non-compliance with such rules, we show that more detailed exchange trading rules and surveillance over time and across markets significantly reduce the number of cases, but increase the profits per case.

Keywords: Insider trading, Surveillance, Exchange Trading Rules, Law and Finance

JEL Codes: G12, G14, G18, K22

1. Introduction

This paper addresses a central question at the intersection of law and finance: are rules and their enforcement effective at mitigating insider trading? Our approach differs from prior work in three important ways. First, for the first time, we examine exchange trading rules that govern market conduct and relate these rules to insider trading. Second, we use recent changes in such rules that resulted from European directives to explore time series variation in the structure of exchange trading rules pertinent to insider trading and market manipulation. These changes were mandated by the European Commission and were not enacted in response to market manipulation problems in any one country per se, thereby giving rise to a natural experiment with which to study the effectiveness of exchange trading rules. Third, we employ unique surveillance data in relation to insider trading and market manipulation. The surveillance data are based on alerts, or computer algorithms, used by surveillance authorities to detect instances or patterns of market manipulation. Our surveillance data cover a wide range of market manipulation and are used by sophisticated surveillance authorities to detect cross-product and cross-market manipulation. Unlike other studies on the impact of securities regulation, published and otherwise, we study the extent and timing of enforcement by considering surveillance.

We do not consider actual successful prosecutions of insider trading, but rather, suspected cases of insider trading. We distinguish between insider trading ahead of announcements from clear cases of market anticipation and thereby use data on suspected cases of insider trading applied by expert surveillance authorities in their ex post data analyses and assessment of market quality. Our analysis involves monthly data from 22 exchanges in 17 countries, including

Australia, Canada, China, Germany, Hong Kong, India, Japan, Malaysia, New Zealand, Norway, Singapore, South Korea, Sweden, Switzerland, Taiwan, the United Kingdom (UK), and the United States (US) for the period January 2003 through June 2011. Insider trading data are compiled by the joint organizations Capital Market Cooperative Research Centre (CMCRC),[1] SIRCA,[2] and SMARTS Group Inc.[3] These organizations have both research and commercial interests in surveillance activities on many stock exchanges around the world.

An important aspect of this study involves the broad nature of insider trading and its detection. Insider trading can be facilitated by forms of market manipulation that are not, strictly speaking, by themselves insider trading. For example, spoofing, which involves giving up priority, switches, and layering of bids/asks, can be used to further illegal insider trades by creating other market distortions that would make insider trading more difficult to detect. Similarly, volume manipulation through churning and wash trades can likewise make the detection of insider trading more difficult. Therefore, the ability of an exchange to mitigate insider trading activity and profits from insider trading depend significantly on the overall rule structure of the exchange and the ability of the exchange to detect manipulation through domestic and cross-market surveillance.

An equally important aspect of this study is the difference between exchange trading rules and surveillance. Exchange trading rules are unambiguous and purposely made obvious to

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1 http://www.cmcrc.com/

2 http://www.sirca.org.au/display/SBX/Home

3 http://www.smartsgroup.com/

market participants, and they are very visible on each exchange's webpage. Surveillance activities, by contrast, are not made obvious, but can be estimated by market participants. If market participants knew exactly which computer algorithms were, or were not used, by surveillance authorities to alert them of breaches of trading rules, they could tailor their trades to avoid detection. Rules and surveillance together, therefore, have the potential to mitigate the perpetration of market manipulation or to exacerbate the profits from such manipulation according to the Becker (1968) economic model of crime (commit a crime if the expected benefits exceed the costs; see also Garfinkel and Nimalndran, 2003; Karpoff et al., 2008a,b, 2012; Brockman et al., 2009; Baker et al., 2010; Karpoff and Lou, 2010; Yu and Yu, 2011).

Based on the unique, and in some dimensions proprietary, data set in this study, we uncover a non-trivial role for exchange trading rules and surveillance in mitigating the number of insider trading cases, but exacerbating the profits per case. In our most conservative estimates, a 1-standard-deviation improvement in trading rule specificity gives rise to a 23.43% reduction in the number of insider trading cases and a 53.17% increase in profits per case. These findings are robust to numerous specifications, including but not limited to difference-in-differences regressions and two-stage instrumental variables regressions. Similarly, we conservatively estimate that a 1-standard-deviation improvement in surveillance gives rise to a 67.0% reduction in the number of cases and 26.3% increase in profits per case. Overall, the findings highlight complementarities across different trading rules and surveillance, and these complementarities are at least twice as important as stand-alone insider trading rules for predicting the frequency of insider trading cases; however, the complementarities are less economically important for

predicting the trading value for surrounding the insider trading cases relative to stand-alone insider trading rules.

This paper is related to a substantial body of work in securities regulation that explores the question of whether securities laws and their enforcement facilitate more efficient markets with greater integrity. For instance, recent studies have shown a positive empirical link between securities regulation and capital raising (La Porta et al., 2006; Roe, 2006; Jackson, 2007; Jackson and Roe, 2009), and liquidity (Cumming et al., 2011).[4] More specifically in the area of insider trading however, the evidence is more varied and generally shows that insider trading laws are relatively less effective (the Appendix provides an overview of related papers). Bris (2005) studies the adoption of insider trading laws across 54 countries from the 1960s through the 1990s and finds some evidence that such laws fail to mitigate the number of cases while increasing profits per case. Similarly, Beny (2005, 2007) and Bhattacharya and Daouk (2002, 2009) find evidence that insider trading laws do more harm than good when they are not properly enforced. The present paper complements this literature by examining, for the first time, whether surveillance (computer-based alerts based on algorithms) and exchange trading rules across countries and time mitigate insider trading activity. Our findings strongly support this prior work

[4] See also, e.g., Aggarwal (2001), Aggarwal and Wu (2006), Allen and Gale (1992), Allen and Gorton (1992), Comerton-Forde and Rydge (2006), Daouk et al. (2006), DeMarzo et al. (2005), Gerard and Nanda (1993), Hillion and Suominen (2004), Jarrow (1992, 1994), La Porta et al. (1997, 1998, 1999, 2002, 2006), Mahoney (1999), Merrick et al. (2005), Ni et al. (2005), Peng and Röell (2009), O'Hara and Mendiola (2003), Pirrong (1993, 1995a,b, 1999, 2004), Pistor et al. (2003), Pistor and Xu (2003, 2005), Prichard (2003), Reiffen and Robe (2007), Romano (2001, 2002).

and extend the literature by highlighting the effect of different yet complementary market manipulation rules and specific direct policy mechanisms directly relevant to insider trading.

This paper proceeds as follows. Section 2 describes stock exchange trading rules and exchange surveillance. The data are introduced in Section 3. Section 4 presents multivariate analyses of the relation between the frequency and profitability of insider trading and exchange trading rules and surveillance. Concluding remarks are set forth in Section 5.

2. Expected impact of exchange trading rule complementarities on insider trading

Traditional studies of the impact of rules on insider trading have considered specific exchange trading rules pertaining to insider trading and governance (e.g., Bhattacharya and Daouk, 2002, 2009; Beny, 2005, 2007; Bris, 2005; see the Appendix). Our perspective is similar, but with three important differences. First, we conjecture that there are myriad exchange trading rules specific to insider trading that impact the frequency and severity of such trading. Second, we consider that non-insider trading exchange trading rules influence insider trading through rule complementarities. Finally, we believe that surveillance efforts directed towards these first two issues affect insider trading. We explain in this section each of these three points in turn prior to introducing the data and tests in the subsequent sections.

2.1. Insider trading rules

Insider trading, which generally refers to trading on material non-public information, is far from generic. Insider trading can be propagated through many different channels and brought about by different market participants. As a result, exchange trading rules regarding client precedence, front-running, trading ahead of research reports, separation of research and trading, broker ownership limits, restrictions on affiliation, restrictions on communications, investment company securities, influencing or rewarding the employees of others, and anti-intimidation/coordination could all potentially have an impact on the frequency and severity of insider trading.

Two types of rule affect the ability of brokers to impact trading on material non-public information: client precedence and front-running. Client precedence refers to brokers violating the time priority of client orders. A client precedence rule is violated during insider trading when a broker initiates a trade on his own account shortly ahead of the execution of a client's order, with the client's trade being executed at a worse price. Front-running likewise refers to brokers trading ahead of client orders. In the case of front-running, upon receipt of a large client order, a broker trades shortly prior to the client's order, with the expectation that the client's order will move the price. Front-running can also involve brokers who, after receiving a client's order, take the opposite position to the client's order in the market without the client's knowledge and then, immediately thereafter, the same broker crosses with the same client off-market at a profit.

Other forms of insider trading can involve the use of material non-public information about the company being traded. Trading rules can mitigate the incidence of this form of insider trading by prohibiting trading ahead of the public release of research reports created by brokerages, and the separation of research and trading departments at brokerages (commonly referred to as "Chinese Walls"). As well, rules that limit affiliation between exchange members and member companies, or between members and their investment company securities, mitigate the flow of information that might be material and non-public. Rules can also provide guidance with respect to the nature of communication between brokerages and the public by regulating how the flow of material non-public information is released. Further, trading rules sometimes limit brokerage ownership, the extent to which brokerages can influence or reward employees of others, or ban intimidation and/or coordination activities (e.g., to stop people from reporting illegal activities). These restrictions can have the effect of limiting the flow of material non-public information.

2.2. Other exchange trading rules and insider trading

Insider trading can be facilitated by other forms of market manipulation, such as through price manipulation, volume manipulation, spoofing, disclosure manipulation, and broker–agency conduct.

Price manipulation can enable insider trading by distorting the market and prices prior to an announcement, thereby facilitating execution of insider trades while hindering detection of insider trading by surveillance authorities. Price manipulation can be carried out in many

different ways, can take many forms, and may be executed by multiple market participants. One common way is where one broker (or colluding brokers) enters purchase orders at successively higher prices to create the appearance of active interest in a security, which is also termed ramping/gouging. This can also take the form of pump and dump schemes, whereby exchange participants generate a significant increase in price and volume for a security, carry out a quick flip, and the securities are then sold (often to retail customers) at the higher prices. Another similar type of price manipulation takes the form of pre-arranged trading. Pre-arranged trades involve colluding parties simultaneously entering orders at an identical price and volume. Because pre-arranged trades avoid the order queue, they can influence the price of a security. Similarly, market setting is a form of manipulation wherein brokers cross-order at the short-term high or low to affect the volume weighted average price, or to set the price in one market for the purpose of a cross in another market. Additional forms of price manipulation include corners (securing control of the bid- or demand-side of both the derivative and the underlying asset, and this dominant position can then be exploited to manipulate the price of either) and squeezes (taking advantage of a shortage in an asset by controlling the demand-side and exploiting market congestion during such shortages in a way that creates artificial prices). Further, price manipulation includes mini-manipulations wherein trading in the underlying security of an option is carried out to manipulate its price so that the options will become in-the-money (Merrick et al., 2005). Price manipulation may be more pronounced at the market open or close, or on a particular date (end of month/quarter/year). Financial record keeping schedules among companies provide incentives, particularly for insider traders, to manipulate share prices around the end of the month/quarter/year.

Volume manipulation through churning and wash trades can likewise make the detection of insider trading more difficult for surveillance authorities. Volume manipulation can take two primary forms: churning and wash trading. Churning refers to excessive trading of a stock to inflate its volume, thereby giving rise to a false impression that there is positive investor sentiment for the stock. Wash trading, another form of volume manipulation, means having the same client reference on both sides of a trade. While there is no beneficial change in ownership, wash trades have the effect of creating a misleading appearance of active interest in a stock.

Spoofing can be used to facilitate illegal insider trades by creating other market distortions that would make insider trading more difficult to detect. Spoofing, also known as "painting the tape", is a form of market manipulation that involves actions taken by market participants to give an improper or false impression of unusual activity or price movement in a security. Spoofing includes fictitious orders, giving up priority, layering of bids-asks, and switches. Spoofing may give rise to volume and price manipulations that make insider trading more profitable and easier to carry out, and more difficult to detect.

A market participant may also more effectively execute an insider trade by engaging in false disclosure, parking, and warehousing. Many exchanges stipulate rules prohibiting false disclosure of information. Market participants might otherwise actively distribute false or misleading information that has the effect of distorting the marketplace. Alternatively, there can be a failure to disclose information such as mandatory disclosure of ownership interests when they reach threshold level. This latter form of manipulation is commonly known as parking or warehousing.

Broker–agency conflicts can similarly facilitate insider trading transactions by misleading market participants who are not insiders. Brokers act on behalf of clients, but can do so in ways that are against client interests. This type of principal agent problem may arise from failure of the broker to obtain the best price for a client (commonly known as a breach of a trade through obligation[5]), the broker charging excessive fees, or the broker acting in ways that are generally detrimental to client interests, such as by investing in securities that do not match the risk/return profile of the client (referred to as breach of the "know-your-client rule"). As well, brokers might use the exchange's name improperly in marketing their services, or carry out other forms of improper or unethical sales and marketing efforts.

2.3. Surveillance and insider trading

As with most exchange trading platforms, surveillance systems within exchanges around the world are automated (Harris, 2002). Real time computer surveillance systems alert surveillance staff of unusual trading activity based on orders and executed trades. Such alerts are not usually based on single trades but are generated based on patterns of trading to detect potential manipulative practices. The different types of market manipulation identified in Table 1 can be subject to both single- and cross-market surveillance. Single-market manipulations can also be a cross-market manipulation (such as for a security that is listed on more than one

[5] In the US, this obligation was released under Regulation NMS and published in the Federal Register in June 2005. Regulation NMS was phased in over many months in 2007; see http://www.nasdaqtrader.com/content/marketregulation/regnms/regnms_factsheet.pdf. Assigning the value 1 or 0 to trade through in the US during this period does not materially influence our results.

exchange) or cross-product manipulation (such as a derivative and its associated stock). For example, wash trades may take place across markets (in fact, multiple transactions across markets could be used as a way to disguise wash trades). Front-running may also take place across markets, where brokers place orders ahead of client orders for the same security traded on a different exchange.

In our empirical tests below, we sum up the scope of domestic and cross-market surveillance to create an overall scope-of-surveillance index. As with the underlying logic pertaining to the scope of trading rules, we expect the scope of surveillance, and not merely surveillance of one type of manipulative activity, to be important with respect to insider trading. Other surveillance index specifications within the subset of domestic or the subset of cross-market surveillance alerts are expected to give rise to materially similar results; we also assess these specifications in our empirical tests. A greater scope of surveillance is expected to lower the profits to insider trading by making the market more efficient (Cumming and Johan, 2008). The scope of surveillance is not precisely known by market participants, but it may be estimated, and as such, surveillance by any one exchange is expected to mitigate the frequency of insider trading. Based on the economic model of crime (Becker, 1968; see also Karpoff et al., 2008a,b), when there is a greater chance of detection, risk taking insiders will be willing to engage only in the more profitable insider trades.

In sum, we conjecture that rules prohibiting insider trading alone may not necessarily influence insider trading, but rather, that the rules we have outlined above, along with the surveillance associated with these rules, operate together to jointly have greater influence on

insider trading. More detailed rules mitigate the frequency of suspected insider trading. However, more detailed rules increase the expected costs of detection; based on the economic model of crime (Becker, 1968), insider traders will engage in insider trading only if the accompanying profits are larger. We test these propositions via a new, detailed panel data set, described in Section 3 below.

3. Sample and summary statistics

3.1 Sample

Our sample comprises 22 stock exchanges whose trading data are included in commonly used data sources such as Thomson Reuters Datastream. The sample comprises Australia, Canada, China (Shanghai and Shenzhen), Germany, Hong Kong, India (Bombay and the National Stock Exchange of India), Japan, Malaysia, New Zealand, Norway, Singapore, South Korea, Sweden, Switzerland, Taiwan, the UK, and the US (NASDAQ and NYSE).

Table 1 describes the main variables in our data set. Our main dependent variables are the number of suspected information leakage cases and pre-announcement abnormal profits per suspected information leakage case. The dependent variable is based on identified suspected cases from surveillance authorities via SMARTS Group, Inc., and CMCRC. SMARTS surveillance staff constructed the dependent variable by first examining news releases from the

exchanges themselves. SMARTS measures the return to the security in the six days prior to the announcement, up through two days following the announcement. SMARTS cross checked their findings with the Thompson Reuters News Network to ensure that no important news announcements were missed. SMARTS considers only news events that have no companion news announcements that could alternatively explain as market anticipation price movements in the six days before and the two days after the relevant announcement.

For each news announcement, a price movement is abnormal if it is three standard deviations away from the mean abnormal return during the 250-day benchmarking period ending 10 days prior to the news release. SMARTS surveillance staff independently examined the data to distinguish between market anticipation and suspected insider trading;[6] since SMARTS includes as insider trading only large movements that are three-standard-deviation changes, the possibility that insider trades could be viewed as market anticipation is mitigated and not plausibly observed in the data. To be included in our sample, the stock must have at least 150 days of trading activity. A one-factor market model based on the market index from each particular exchange is used to calculate daily abnormal returns. To ensure that no temporary stock fluctuations are captured, nine-day cumulative abnormal returns (CARs[t-6, t-2]) are calculated as well . To be included in the final data set for suspected information leakage cases, the CAR around each event [t-6, t+2] must be three standard deviations away from the normal nine-day CAR during the benchmarking period for each individual stock. The abnormal profit per case is calculated as the total trading volume multiple abnormal returns from 6 days before to the day before the news announcement We standardize the number of suspected information

[6] See, e.g., King (2009), for methods to distinguish between market anticipation and insider trading.

leakage cases by the number of trades per month on the exchange (scaled by a million for the purpose of reporting the regression results). We standardize the pre-announcement abnormal profits per suspected information leakage case by the average monthly trade size on each exchange. Our results with these standardized dependent variables are consistent when we do not standardize and available in an earlier draft of this paper.

[Insert Table 1 about here]

Trading rules for these stock exchanges are found on each exchange's webpage, with the sole exception of China, where the pertinent trading rules for the Shanghai and Shenzhen exchange are found on the China Securities and Regulatory Commission webpage. We use the trading rule indices from Cumming et al. (2011). The trading rules for a stock exchange are drafted with varying degrees of specificity, as they outline exchange membership requirements, listing requirements, trading rules and regulations, and especially prohibited trading practices.

Surveillance data are taken from Cumming and Johan (2008) and updated to 2011. Cumming and Johan surveyed 25 exchanges around the world to ascertain the extent of single- and cross-market surveillance. The data were obtained confidentially, because if precise information about surveillance activity were made available to a would-be manipulator, such entity might trade in ways that would obviously not be detected. The data are based on an equally weighted index that adds 1 each time a different type of single- and cross-market manipulation is monitored.

We also acquire a series of law and finance indices from La Porta et al. (1998, 2006) and Spamann (2010), which includes measures of rule of law and efficiency of the judiciary. Other legal indices were considered, but they did not impact the empirical tests reported below and are therefore excluded for conciseness. Although we do have information on the surveillance mentioned immediately above, we do not have data on enforcement of the trading rules that we analyze in this article; nevertheless, our understanding from our data sources for surveillance in Cumming and Johan (2008) is that enforcement is highly correlated with surveillance. Otherwise, exchanges would not bother to carry out surveillance. We nevertheless proxy enforcement by using established indices of enforcement, such as efficiency of the judiciary. In other works, note that La Porta et al. (2006) find evidence that private enforcement facilitates the development of stock markets, while Jackson and Roe (2009) find stronger evidence of the value of liability standards and public enforcement (see also Roe, 2006; Jackson, 2007). The difference in Jackson and Roe (2009) is that these authors employ more detailed resource-based measures, such as budgets/GDP and staffing/population to study enforcement. These enforcement measures differ significantly across countries, but not over time. We considered all the indices in La Porta et al. (2006) and Jackson and Roe (2009); inclusion/exclusion of these indices does not materially affect our conclusions regarding the trading rule indices introduced herein. Similarly, in some countries, the probability of detection of insider trading is low, and even upon detection and prosecution, the ensuing fines are light (see, e.g., Bhattacharya and Daouk, 2002, 2009). We considered separate variables for insider trading laws around the world (e.g., Beny, 2005, 2007) among others, but these variables did not materially impact the results presented herein.

We use several exchange-level variables as controls from January 2003 through June 2011, the period considered in this study, using data from Capital Markets CRC and Reuters. To control for the influence of market-specific changes, we draw from an MSCI Global Standard Index series from Morgan Stanley Capital International's webpage. Also, we consider both exchange and year dummy variables in our multivariate analyses.

3.2 Summary statistics

Table 2 provides summary statistics of the trading rule variables used in this paper. There are three primary legal indices introduced: the Insider Trading Rules Index, the Market Manipulation Rules Index, and the Broker-Agency Conflict Rules Index. The Market Manipulation Rules Index consists of four subcomponents: the Price Manipulation Rules Index, the Volume Manipulation Rules Index, the Spoofing Manipulation Rules Index, and the False Disclosure Rules Index. As discussed above, the indices are created by summing up the number of specific provisions in the exchange trading rules for each exchange. The Insider Trading Rules Index varies from a low value of 0 (for a number of exchanges listed in Table 2) to 10 (for NASDAQ). The Market Manipulation Rules Index varies from a low value of 2 (for Malaysia, Taiwan, and Tokyo) to 13 (for London and NYSE). The Broker-Agency Conflict Rules Index varies from a low value of 0 (for Australia, Hong Kong, Germany, Shanghai, Shenzhen, Taiwan, Tokyo, and OSLO) to 5 (for NASDAQ).

[Insert Table 2 about here]

Aside from differences in levels of rule detail across countries, few studies analyze a material change to trading rules across countries stemming from the Directive on Markets in Financial Instruments. In November 2007, MiFID, a Europe-wide harmonization directive, became effective. Because the timing, motivation, and content of MiFID were not instigated by a specific European exchange or European country, but were promulgated instead at the European Union level, this legislative change can be regarded as exogenous, thereby providing a useful test of causality between rules and liquidity. MiFID became effective November 1, 2007. While an earlier directive, the Market Abuse Directive (MAD), was introduced in 2004, appropriate measures were not in place in 2004 across member states, for a number of reasons. First, surveillance data from Cumming and Johan (2008) indicate that exchanges in 2004 and 2005 had not adopted/implemented the provisions in MAD in a meaningful way. Second, MiFID covers many aspects of MAD, and states that provisions are needed to ensure that MAD principles are in place by November 1, 2007 (see, for example, Article 25 in MiFID). The draft provisions in MiFID in 2004 already made this point, so investors in 2004 would expect adoption of MAD at the time of MiFID. Third, principles in MAD were added to / clarified in MiFID for the implementation and definition of conduct to ensure that MAD was legally effective. Hence, given that the legal situation in Europe is not perfectly delineated over time, we test for market adoption of these principles using the November 1, 2007 date, but also test for an earlier impact dating back to 2004. We expect that the substantial details provided in MAD/MiFID enhanced investor protection and mitigated insider trading, as discussed below.

Table 3 shows that the average (median) number of suspected information leakage cases in a month, divided by the number of trades on the exchange in that month (scaled by

multiplying by 1 million) is 3.42 (0.17), with a range from a minimum of 0 to a maximum of 124.36.[7] Distribution across countries is shown graphically in Figure 1. One standard deviation in the monthly number of suspected information leakage cases is 9.40. The average (median) pre-announcement abnormal profit (in 2011 USD) per information leakage case per month divided by the ratio of the total dollar volume per month per number of trades per month is 3425.92 (248.83).[8] Table 3 also provides summary statistics for the Total Trading Rules Index, surveillance index, public enforcement, rule of law index, efficiency of the judiciary index, MSCI, and GDP per capita.

[Insert Table 3 about here]

Table 4 sets forth a comparison of means and medians tests of the number of suspected information leakage cases in relation to different cutoff values, which are the median value of the Total Trading Rule Index. Panel A reports differences in means and medians of the number of suspected information leakage cases for the full sample of all exchanges in the data. The data indicate that the number of suspected information leakage cases is significantly greater for higher values in the Total Trading Rules Index. The average (median) number of suspected information

[7] We scale by the number of trades to make the comparisons across markets and time more direct. Without scaling, we produce very similar results, which are available on request from an earlier draft of this paper. Note that without scaling, the average (median) number of cases per month is 10 (4) and the range is 0 to 287.

[8] As with the number of cases, the profits per case are scaled to make more direct comparisons across time and markets. Results without scaling produced nearly identical results and are available from an earlier draft of this paper. The raw data show the average (median) profit per case is $1.9 million ($0.8 million), with a range between $0 and $6.25 million profit per suspected case.

leakage cases for all exchanges is 1.29 (0.50) for exchanges with a value of more than 11 in the Total Trading Rules Index. The average (median) number of suspected information leakage cases is 5.21 (1.56) for exchanges with values of less than or equal to 18 in the Total Trading Rules Index. These differences in means and medians are statistically significant at the 1% level. Panel A also considers differences in the Total Trading Rules Index for the subset of European exchanges for which MiFID applies. The results are broadly consistent with those reported for the whole data set. We note, however, that in both MiFID and non-MiFID countries, there were fewer cases post-MiFID, which gives rise to the need to test for a difference-in-differences in our multivariate tests below. In Table 4, we also compare the difference in means and medians for the Surveillance Index in Panel A of Table 4, and the results are similarly significant for the whole sample and the subset of MiFID exchanges. For the MIFID countries, the change is 2.62 down to 1.46 for cases, and non-MIFID countries the change is 4.39 to 2.98. In other words, the percentage change is -44.3% for MIFID countries, and only -32.1% for non-MIFID countries. Clearly, the drop is bigger on a percentage basis for MIFID than non-MIFID countries.

[Insert Table 4 about here]

Table 4, Panel B presents a comparison of mean and median tests for pre-announcement abnormal profits. Both mean and median tests of the full sample show that pre-announcement abnormal profit is significantly higher for exchanges with higher Total Exchange Rules Index. The average (median) pre-announcement abnormal profit per suspected announcement (scaled by the average exchange-month trade size, as defined in Table 1) for all exchanges is 7854.22 (1333.73) for exchanges with a value of more than 11 in the Total Trading Rules Index. The

average (median) pre-announcement abnormal profit per suspected announcement is 1201.998 (64.51) for exchanges with a value of less or equal to 11 in the Total Trading Rules Index. The difference in both means and medians are statistically significant at the 1% level. For a subset European exchanges, the pre-announcement abnormal profit per suspected announcement is 1154.44(225.75) for Total Trading Rules Index greater than 11, and 598.45 and 31.42 for Total Trading Rules Index less than or equal to 11, and these differences are significant at the 1% level. Similar differences in means and medians are observed for surveillance in Panel B. Finally, Panel B also shows that average and median pre-announcement abnormal profit is higher after November 2007 for MiFID exchanges and that these differences are significant at the 1% level; we observe similar results for the non-MiFID exchanges. For the dollar value of trades surrounding insider trading, in MIFID countries the increase is 413.58 to 1676.22, or 305.3%, and in non-MIFID countries the increase is 4191.3 to 6288.2, or 50.0%.

Overall, the comparison of means and medians in the data highlight patterns that suggest that detailed exchange trading rules and a broader scope of surveillance are better in terms of being associated with fewer insider trading cases, but worse in terms of higher profits per insider trading case. But this type of univariate comparison is not fully informative for the following reasons. First, the data are highly skewed in terms of outlier observations on some exchanges and some months. Differences in case numbers are particularly right-skewed on some exchanges (see Figure 1). To address this skewness, we winsorize our dependent variables in the regression analyses in the next section, and consider robustness by removing some countries from the data set. Second, the comparison tests do not control for all other factors being equal, particularly economic conditions in terms of wealth and market depth, which differ across countries. In our

empirical tests in the next section, we account for economic conditions to isolate the unique marginal impact of exchange trading rules and surveillance. We highlight the results in the regression tables and present partial regression plots to show the effects graphically. Moreover, we consider robustness checks with alternative explanatory variables, as well as difference-in-differences regressions and instrumental variable regressions, among others.

Table 5 presents a correlation matrix for the main variables used in the multivariate tests provided in section 4. The correlations highlight trends similar to those in the comparison tests. Further, the correlations show areas in which collinearity is potentially problematic for regression analyses, and as such, we present alternative specifications with and without collinear variables in the regressions in section 4.

[Insert Table 5 about here]

4. Multivariate analyses

4.1. Empirical methods

In this section, we empirically test whether exchange trading rules and surveillance have an impact on the frequency and profitability of insider trading, while controlling for other economic and institutional determinants of trading activity. We consider each exchange-month from January 2003 through June 2011 as a separate observation across 22 exchanges in 17 countries and cluster standard errors (as in Petersen, 2009). We use fixed effects by exchange

and cluster by month (Model 1, difference-in-differences estimates), cluster by exchange and month (Models 2, and 3,), by country and month (model 4), cluster by exchange and year (Models 5, 6 and 7, robustness checks), and cluster by year alone (Models 8, further robustness checks). Also, we consider other approaches for treating standard errors for panel data sets (e.g., Bertrand et al., 2004), which we find to be quite robust.

Panels A and B of Table 6 examine the effect of exchange trading rules and surveillance on the frequency and profitability of insider trading, respectively. The dependent variable in Panel A is the number of suspected insider trading cases each month, excluding cases of clear market anticipation, divided by the number of trades in the month (scaled by 1 million, as defined in Table 1). The dependent variable in Panel B is the sum total of the profits from suspected insider trading in a market relative to the number of suspected cases, thereby giving a measure of profitability per case. Again, this variable is scaled by volume per trade, as defined in Table 1. In each of Panels A and B, we present eight identical regressions to show robustness to alternative specifications. Model 1 shows a difference-in-differences specification for the European regulatory change with trading rules with and without country fixed effect. Models 2 and 3 separately include the trading rules index and surveillance index, respectively. Model 4 shows the trading rule indices with a number of other legal and enforcement variables, including the public enforcement measures from Djankov et al. (2008) and the resource measure from Jackson and Roe (2009), in addition to creditors rights, investor protection, and disclosure index from La Porta et al. (1998, 2006). Model 5 shows the results without the US exchanges, and Model 6 excludes the US and Japan, since these countries are outliers (Figure 1). Model 7 presents the second step of the two-stage instrumental variable (IV) estimation, discussed further

below. Finally, Model 8 presents the results with different dates for the implementation of the European changes dating back to 2004 under MAD (discussed above). For each regression, we control for economic factors, including market capitalization, market conditions (MSCI index), GDP, and exchange institutional features (Röell, 1992), as well as exchange and year dummy variables.

[Insert Table 6 about here]

As discussed above, the European rule changes came via a central directive, and were not prompted by any one country, thereby mitigating the effect of endogeneity. Nevertheless, in Model 7 we report two-step instrumental variable regressions for the possibility of endogeneity with respect to insider trading and trading rules, with legal origin variables as instruments, consistent with the La Porta et al. (2006) instrumental variable specifications. Diagnostic tests indicate that these instruments are suitably correlated with the potentially endogenous variables (correlation between common law and rules index=0.32), but not the left-hand-side variables for the number of insider trading cases (correlation=0.12) and profits per case (correlation=-0.10).

4.2. Regression results

Panel A of Table 6 presents regression results for the number of suspected information leakages in each market. The data consistently indicate (Models 1–8 in Panel A) that exchange trading rules are significantly negatively related to the number of suspected information leakages. The effect is significant at the 5% level in Models 2 and 3, , and at the 1% level in

Models 5, 6, 7, and 8. The economic significance in the difference-in-differences regression shows that the rule change in Europe gives rise to a 25.73% (=-0.88/3.42) reduction in the number of cases per trade relative to the average number of cases per trade. In the other specifications, the economic significance is such that a 1-standard-deviation change in rules gives rise to a reduction in the number of cases per trade from 23.43% (=-0.137*5.85/3.42) in the most conservative estimate (Model 2), to a 28.91% (=-0.169*-5.85/3.42) reduction in the number of cases per trade in the least conservative estimate. Even after controlling for potential endogeneity (Model 7), the statistical significance of this effect remains and the economic significance of this effect is consistent with other estimates. This finding pertaining to endogeneity not mitigating the results is not surprising; if there were an endogenous relationship, we would expect a positive association, since more trading rules would be adopted in response to insider trading, but instead we see a negative relationship. The findings are quite similar using the MAD start date (Model 8). Overall, the data provide very strong support for the notion that more detailed trading rules significantly reduce insider trading. To highlight the significance of this effect graphically, we generate a partial regression plot (Figure 2).

[Insert Figures 2–6 about here]

As a robustness check, we consider subsets of the trading rule indices described in Table 1 and Section 2, as well as combinations of different rule indices in the same regressions (and considering collinearity across indices). The index subsets are generally consistent with the Total Trading Rule Index. We report the Total Trading Rule Index results since, as discussed in

Section 2, rules pertaining to market conduct, such as price and volume manipulation and the like, are all pertinent to the ability of an insider to effect insider trading.

Consistent with the Trading Rule Index, the data indicate that surveillance is negatively and significantly related to the number of suspected information leakages. The economic significance is comparable to the effect of rules (a 1-standard-deviation increase gives rise to a reduction of 67.0% in Model 4 (-0.169*13.56/3.42)), as shown graphically in Figure 4.

Panel B of Table 6 reports regressions for the profitability of insider trading per suspected case. The same nine model specifications are reported as in Panel A. In Model 1, the difference-in-differences regression shows that average profits per case (scaled by volume per trade) are between 49.28% (1688.4/3425.92) higher after the legal change in Europe relative to average profit per case, and this effect is significant at the 10% level at a minimum. The economic significance of the results is much stronger in the other models, and the effect is significant at the 1% level in each of Models 2, 4, 7 and 8. The most conservative estimate is from Model 6 with outlier countries removed, which shows a 1-standard-deviation change increases profits per case by 53.17% (=311.398*5.85/3425.92), and in the least conservative case (Model 2) by 135.87% (=795.713*5.85/3425.92). To highlight the significance of this effect graphically, we generated a partial regression plot (Figure 3). This evidence is consistent with the Becker (1968) economic model of crime, such that the profits need to be worthwhile in view of the increased probability of expected detection in the presence of more rules.

Panel B of Table 6 further shows that a 1-standard-deviation improvement in surveillance gives rise to an increase in profits per case by 120.21% (Model 4) (303.70*13.56/3425.92), and this effect is significant at the 5% level in Model 4. The economic significance of this effect is lower at 26.3% when we exclude the US data from the sample (the equivalent of Model 7 with the surveillance variable added, not reported but available on request). In all specifications reported and otherwise, the data thus strongly support the view that like rules, surveillance increases profits per case, consistent with the Becker (1968) model of crime. See also Figure 5.

The control variable in Panel A for the regressions for the number of suspected insider trading cases shows that insider trading is less common in larger exchanges. This result is perhaps not surprising, as insider trading is reputed to occur more in weaker markets. Some of the other legal indices included as control variables are significant, but the degree of significance depends in part on the exclusion or inclusion of other indices, due to collinearity across different indices; regardless, the inclusion or exclusion of these other indices does not alter the results pertaining to trading rules and/or surveillance. Finally, the control variables for the regressions with profits per case in Panel B show evidence in all models that market capitalization is positively related to profits per case, which is perhaps expected since smaller markets may have less profitable opportunities.

4.3. Additional robustness checks

In the course of our empirical analyses, we carry out a number of robustness checks. First, instead of using total trading rules, we use subsets of the trading rules indices. For these

regressions, the results are as follows. A 1-standard-deviation increase in the price manipulation index, volume manipulation index, spoofing index, false disclosure index, market manipulation index, or insider trading index (each defined in Table 1 and summarized in Table 2) reduces the number of insider trading cases by 33.37%, 33.60%, 39.28%, 3.0%, 33.56% and 10.85%, respectively (regressions equivalent to Model 3 in Table 6, Panel A), and increases the profits per case by 47.24%, 84.47%, 128.5%, 71.72%, 150.0% and 169.5%, respectively (regressions equivalent to Model 3 in Table 6, Panel B). Relative to the economic magnitudes reported in Table 6 and discussed above, therefore, the findings highlight complementarities across different trading rules and surveillance, and these complementarities are at least twice as important as stand-alone insider trading rules for predicting the frequency of insider trading cases; however, the complementarities are less economically important for predicting the trading value for surrounding the insider trading cases relative to stand-alone insider trading rules. These and other specifications are available on request.

Second, we consider different specifications for the dependent variables, such as without the use of ratios and with different ratios (such as suspected cases/announcements), different time periods, etc. Third, we consider alternative dates for the timing of rule changes for European exchanges, as discussed in Section 2 above. Fourth, we consider other measures of law quality, such as anti-director rights (La Porta et al., 1998; Spamann, 2010), disclosure (La Porta et al., 2006), and other proxies for resources devoted to securities regulation (Jackson and Roe, 2009). Fifth, we consider other instrumental variable and difference-in-differences specifications, such as lagged dependent variables and other specifications. Sixth, we consider possible outlier time periods and outlier exchanges. These alternative models and checks, among others, do not

suggest material differences in the array of results reported in the tables. Alternative specifications are available on request.

5. Conclusions

In this paper, we empirically examine the relationship between the frequency and profitability of insider trading and exchange trading rules and surveillance across 22 exchanges over the period January 2003 through June 2011. The ability of an exchange to mitigate insider trading activity and profits from insider trading depend significantly on the overall rule structure of the exchange and its domestic and cross-market surveillance. The scope of exchange trading rules is precisely known by market participants, since they are prominent on each exchange's webpage. The scope of surveillance, by contrast, is not precisely known,[9] but can only be estimated by market participants. Rules and surveillance, therefore, have the potential to exacerbate crime according to the Becker economic model of crime (commit a crime if the expected benefits exceed the costs).

The data examined herein are strongly consistent with the view that more detailed exchange trading rules and surveillance reduce the number of cases of market manipulation, as would-be manipulators are less likely to engage in insider trading where there are fewer ways to hide such trades. The data indicate that rules and surveillance, ceteris paribus, exacerbate the profits to insider trading, since would-be manipulators are likely to engage in insider trading only

[9] If market participants knew exactly what surveillance authorities did and did not have alerts (computer algorithms) for, then they could trade in precise ways to avoid detection.

if the expected profits outweigh the expected costs, and the greater the number of rules and the broader the scope of surveillance the greater the expected costs. These findings are robust to many alternative specifications and highlight the importance of trading rules and surveillance in comparing international differences in stock exchanges.

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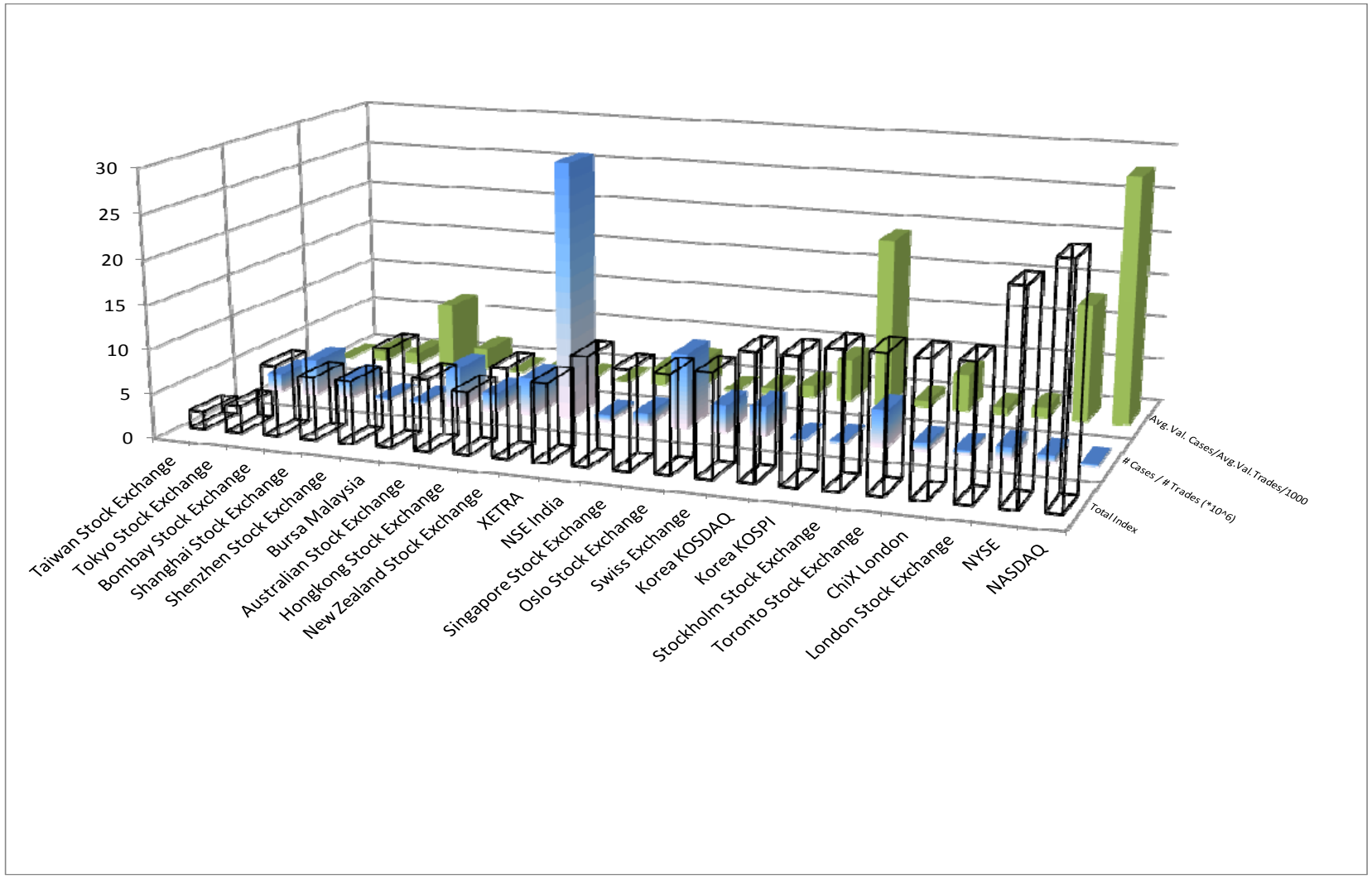

Figure 1. Three-dimensional graph comparison of Average Number of Suspected Information Leakage Cases, Average Pre-Announcement Abnormal Profit, and Total Trading Rules Index by exchange. Data involve monthly data from 22 exchanges in 17 countries, including Australia, Canada, China, Germany, Hong Kong, India, Japan, Malaysia, New Zealand, Norway, Singapore, South Korea, Sweden, Switzerland, Taiwan, the UK, and the US in the period January 2003–June 2011.

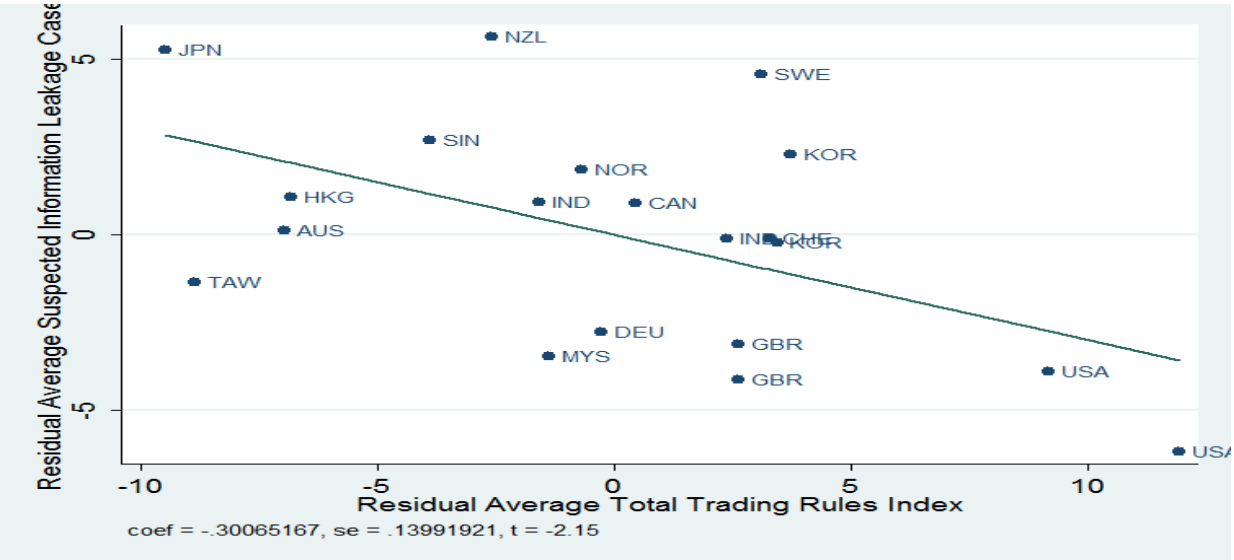

Figure 2. Partial regression plot of Average Suspected Information Leakage Case and Average Total Trading Rules Index. The dependent variable is winsorized at 95% before taking the average by exchange. Independent variables include rule of law index, efficiency of judiciary, log of lag GDP per capita, log of MSCI, and log of Market Capitalization. Variables are defined in Table 1.

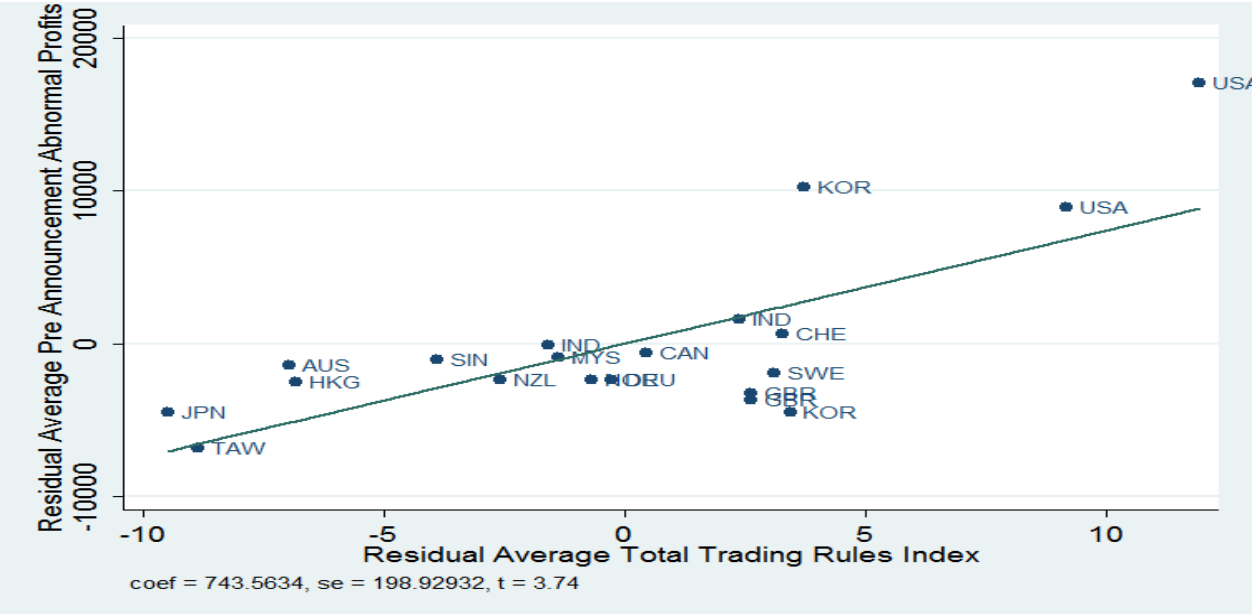

Figure 3. Partial regression plot of Average Pre-Announcement Abnormal Profits and Average Total Trading Rules Index. The dependent variable is winsorized at 95% before taking the average by exchange. Independent variables include rule of law index, efficiency of the judiciary, log of lag GDP per capita, log of MSCI, and log of Market Capitalization. Variables are defined in Table 1.

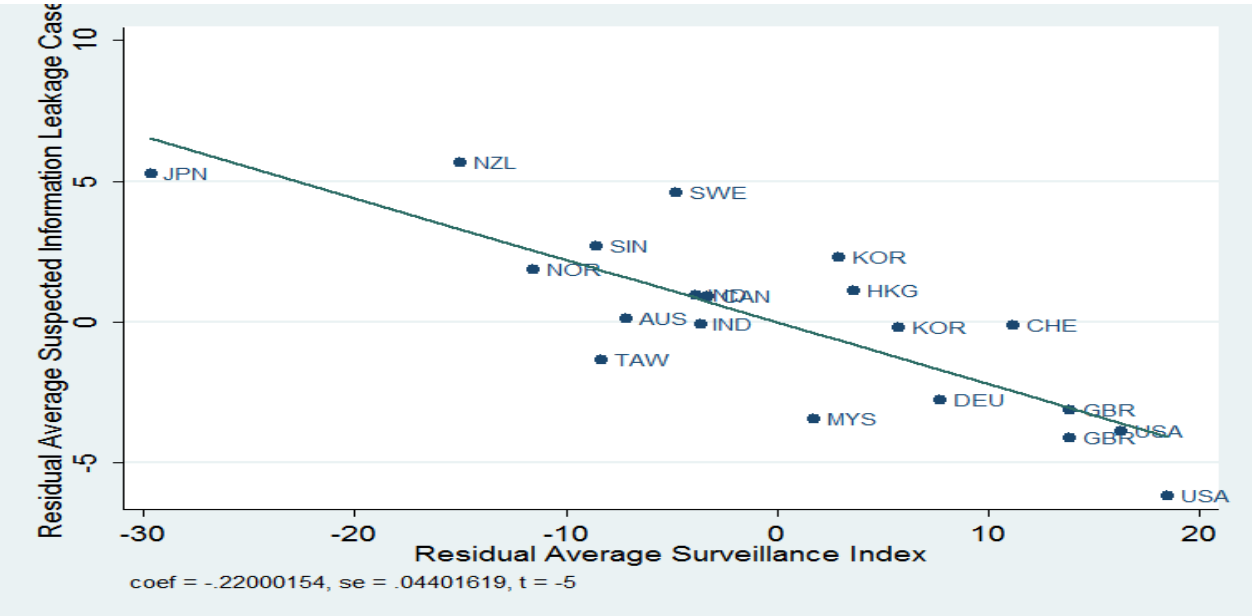

Figure 4. Partial regression plot of Average Suspected Information Leakage Case and Average Surveillance Index. The dependent variable is winsorized at 95% before taking the average by exchange. Independent variables include rule of law index, efficiency of judiciary, log of lag GDP per capita, log of MSCI and log of Market Capitalization. Variables are defined in Table 1.

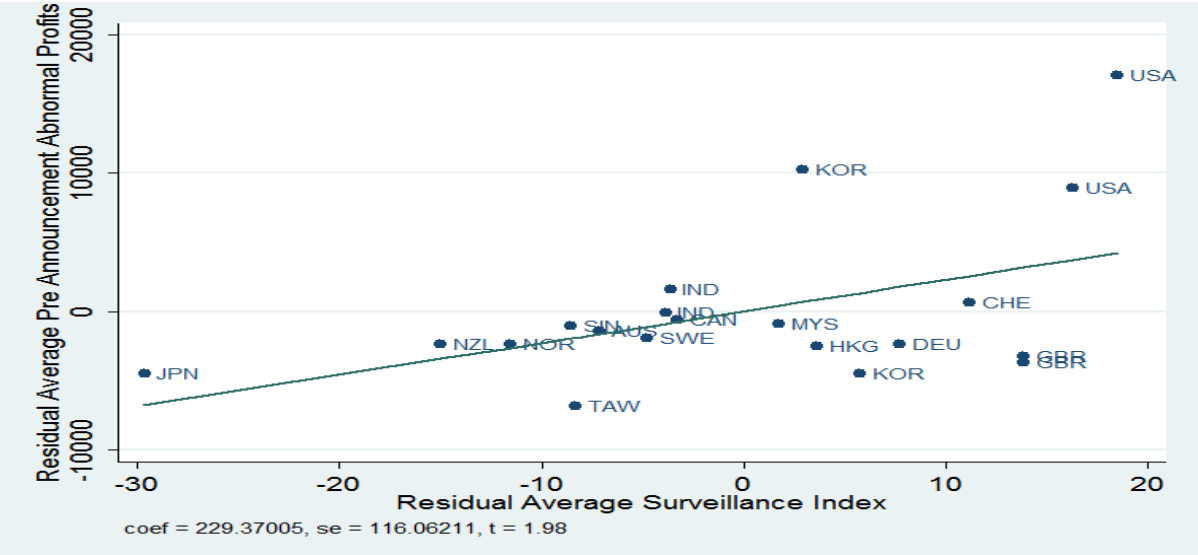

Figure 5. Partial regression plot of Average Pre-Announcement Abnormal Profits and Average Surveillance Index. The dependent variable is winsorized at 95% before taking the average by exchange. Independent variables include rule of law index, efficiency of judiciary, log of lag GDP per capita, log of MSCI, and log of market capitalization. Variables are defined in Table 1.

Table 1.
Definition of Variables.
This table defines our independent, dependent, and control variables.

Variable Name	Definition
Market Quality	
Average Number of Suspected Information Leakage Cases	Total number of announcements with suspected pre-announcement insider trading cases per month divided by the number of trades per month on the exchange (scaled by multiplying by 1 million). Source: Capital Markets Cooperative Research Centre (CMCRC) and SMARTS, Inc.*
Average Pre-Announcement Abnormal Profits	Pre-Announcement Abnormal Profit per Information Leakage Case divided by average monthly trade size on the exchange. Source: CMCRC and SMARTS Group Pty, Ltd.*
	* CMCRC and SMARTS surveillance staff constructed these two dependent variables. CMCRC and SMARTS first examined all news releases from the exchanges themselves. CMCRC and SMARTS measured the return to the security in the six days prior to the announcement up to the two days after the announcement. They double checked the Thompson Reuters News Network to ensure that they did not miss any important news announcements. They consider only news events that have no companion news announcements that could explain price movements in the six days before and the two days after the relevant announcement that could explain the price movement. For each news announcement, a price movement is abnormal if it is three standard deviations away from the mean abnormal return during the 250-day benchmarking period ending at 10 days before the news release. To be included in our sample, the stock must have at least 150 days' trading activities. A one-factor market model based on the market index for each exchange is used to calculate daily abnormal returns. To be included in the final data set as a suspected information leakage case, the CAR around each event over the period [t-6, t+2] must be three standard deviations away from the normal nine-day CAR for each individual stock. Once the suspected information leakage case is defined, abnormal profit per case is calculated as the trading-volume-multiple abnormal returns from six days before to the day before the news announcement. SMARTS surveillance staff independently examined the data to distinguish between market anticipation and suspected insider trading; since SMARTS includes as insider trading only large movements that are three-standard-deviation changes, the possibility that insider trades could be viewed as market anticipation is mitigated.
Trading Rule Index	
Insider Trading Rules Index	Sum of dummy variables for Front-running, Client precedence, Trading ahead of research reports, Separation of research and trading, Broker ownership limit, Restrictions on affiliation, Restrictions on communications, Investment company securities, Influencing or rewarding the Employees of Others, and Anti-intimidation / Coordination. Source: Cumming et al. (2011).
Price Manipulation Rules Index	Sum of dummy variables for marking the open, marking the close, misleading end of the month/quarter/year trades, intraday ramping/gouging, market setting, pre-arranged trades, and domination and control. Source: Cumming et al. (2011).
Volume Manipulation Rules Index	Sum of dummy variables for Churning and Wash trade. Source: Cumming et al. (2011).
Spoofing Rules Index	Sum of dummy variables for Giving up priority, Switch and Layering of bids/asks. Source: Cumming et al. (2011).
False Disclosure Rules Index	Sum of dummy variables for Dissemination of false and misleading information and Parking or warehousing. Source: Cumming et al. (2011).

Market Manipulation Rules Index	Sum of Price Manipulation Rules Index, Volume Manipulation Rules Index, Spoofing Rules Index, and False Disclosure Rules Index. Source: Cumming et al. (2011).
Broker-Agency Index	Sum of dummy variables for Trade through, Improper execution, and Restrictions on member use of exchange name, Restrictions on sales materials and telemarketing, and Fair dealing with customers. Source: Cumming et al. (2011).
Total Trading Rules Index	Sum of Insider Trading Rules Index, Market Manipulation Rules Index, and Broker-Agency Rules Index. Source: Cumming et al. (2011).
Surveillance, Enforcement, Efficiency of the Judiciary, Rule of Law Indices and Other Law and Finance Indices	
Rule of Law Indices	Assessment of the law and order tradition in the country produced by the country risk rating agency International Country Risk (ICR). Average of the months of April and October of the monthly index between 1982 and 1995. Scale from 0 to 10, with lower scores for less tradition of law and order (we changed the scale from its original range from 0 to 6). Original data come from International Country Risk Guide. Source: La Porta et al. (1998).
Surveillance Index	The principal component of (1) single-market surveillance and (2) cross-market surveillance. Source: Cumming and Johan (2008). Available for a subset of countries, and provided contingent on maintaining confidentiality and anonymity, as exchanges do not want market participants to know all of the things they do and do not look for in their surveillance. Source: Cumming et al. (2011).
Efficiency of the Judiciary	Assessment of the "efficiency and integrity of the legal environment as it affects business, particularly foreign firms" produced by the country risk rating agency International Country Risk (ICR).t "may be taken to represent investors' assessments of conditions in the country in question." Average between 1980 and 1983. Scale from 0 to 10; with lower scores, lower efficiency levels assessment of the efficiency and integrity of the legal environment. Scale from 0 to 10; with lower scores, lower efficiency levels. Original data come from International Country Risk Guide. Source: La Porta et al. (2006).
Staff per Million Population (extrapolated sample)	The 2005 size of the securities regulator's staff, divided by the country's population in millionsOrignial data come from regulators' annual report and nations' official document. Population data are from World Bank Data and Statistics Web site.. Source: Jackson and Roe (2009).
DLLS Public Enforcement Index	Public enforcement is an index aggregating whether certain suspect corporate transactions can lead to a fine or jail sentences for the approving body, or fine or jail sentence for the principal wrongdoer. Source: Jackson and Roe (2009); Original source: Djankov et al. (2008).
Creditor Rights	An index aggregating creditor rights. The index is formed by adding 1 when (1) the country imposes restrictions, such as creditor consent or minimum dividends to file for reorganization; (2) secured creditors are able to gain possession of their security once the reorganization petition has been approved (no automatic stay); (3) secured creditors are ranked first in the distribution of the proceeds that result from the disposition of the assets of a bankrupt firm; and (4) the debtor does not retain the administration of its property pending resolution of the reorganization. The index ranges from zero to four. Source: La Porta et al. (1998).

Corruption Index	ICR's assessment of corruption in government. Lower scores indicate that "high government officials are likely to demand special payments" and "illegal payments are generally expected throughout lower levels of government" in the form of "bribes connected with import and export licenses, exchange controls, tax assessment, policy protection, or loans." Average of the months of April and October of the monthly index between 1982 and 1995. Scale from 0 to 10, with lower scores for higher levels of corruption. The index ranges from zero to four. Original data come from International Country Risk Guide. Source: La Porta et al. (1998).
Risk of Expropriation	ICR's assessment of the risk of "outright confiscation" or "forced nationalization." Average of the months of April and October of the monthly index between 1982 and 1995. Scale from 0 to 10, with lower scores for higher risks. Original data come from International Country Risk Guide. Source: La Porta et al. (1998).
Accounting Standard	Index created by examining and rating companies' 1990 annual reports on their inclusion or omission of 90 items. These items fall into seven categories (general information, income statements, balance sheets, funds flow statement, accounting standards, stock data, and special items). A minimum of three companies in each country were studied. The companies represent a cross-section of various industry groups; industrial companies represented 70%, and financial companies represented the remaining 30%. Original data come from international accounting and auditing trends, Center for International Financial Analysis and Research. Source: La Porta et al. (1998).
Investor Protection	Principal components of the indices of disclosure requirements, liability standards, and anti-director right. Source: La Porta et al. (2006).
Disclosure	The Index of disclosure equals the arithmetic mean of (1) prospectus; (2) compensation; (3) shareholders; (4) inside ownership; (5) contracts irregular; and (6) transactions. Source: La Porta et al., Lopez-De-Silanes and Shleifer (2006).
Anti-director Rights	The updated Anti-director Rights index. Source: Spamann (2010).
Market Statistics	
Log (Market Capitalization)	Log of domestic market capitalization in USD millions. Source: Capital Markets Cooperative Research Centre (CMCRC).
Log (1+MSCI)	Log of 1one plus the MSCI index in the 1-month lagged period. Source: MSCI.COM (2003/01-2011/06).
Log (GDP)	Log of gross domestic product (GDP) per capita. Source: Global Insight. (2003/01-2011/06).

Table 2.

Trading Rule Indices

This table summarizes the index values for the trading rules for each exchange, as defined in Table 1. Panel A presents the Trading Rule Index values for post-MiFID (Nov. 2007–Jun. 2011; and in brackets are values for Jan. 2003–Oct. 2007). Panel B compares the mean of Trading Rule Index among different legal origins. Cochran and Cox (1950) t-statistics are shown in Panel B and *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A Indicies by Exchange:

Exchange	Price Manipulation Index	Volume Manipulation Index	Spoofing Index	False Disclosure Index	Market Manipulation Index	Insider Trading Index	Broker-Agency Index
English Legal Origin							
Australia	3 (3)	1 (1)	2 (2)	0 (0)	6 (6)	2 (2)	0 (0)
Bombay	0 (0)	1 (1)	1 (1)	1 (1)	3 (3)	2 (2)	3 (3)
Canada	7 (7)	2 (2)	3 (3)	0 (0)	12 (12)	2 (2)	1 (1)
Hong Kong	3 (3)	2 (2)	1 (1)	1 (1)	7 (7)	0 (0)	0 (0)
India NSE	3 (3)	1 (1)	1 (1)	1 (1)	6 (6)	3 (3)	3 (3)
London (LSE and ChiX London)	7 (6)	2 (2)	3 (3)	1 (1)	13 (12)	3 (2)	0 (0)
Malaysia	0 (0)	0 (0)	1 (1)	1 (1)	2 (2)	7 (7)	2 (2)
NASDAQ	5 (5)	1 (1)	3 (3)	2 (2)	11 (11)	10 (10)	5 (5)
New Zealand	2(2)	0 (0)	1(1)	1(1)	4(4)	3(3)	3(3)
NYSE	6 (6)	2 (2)	3 (3)	2 (2)	13 (13)	7 (7)	3 (3)
Singapore	3 (3)	1 (1)	2 (2)	1 (1)	7 (7)	2 (2)	2 (2)
Average English Legal Origin	3.83 (3.67)	1.25 (1.25)	2.00 (2.00)	1.00 (1.00)	8.08 (7.92)	3.67 (3.50)	1.83 (1.83)
Median English Legal Origin	3.00 (3.00)	1.00 (1.00)	2.00 (2.00)	1.00 (1.00)	7.00 (7.00)	3.00 (2.00)	2.00 (2.00)
German Legal Origin							
Germany	7 (0)	1 (0)	3 (1)	1 (0)	12 (1)	3 (2)	0 (1)
Korea (KOSPI and KOSDAQ)	4 (4)	2 (2)	2 (2)	1 (1)	9 (9)	3 (3)	2 (2)
Shanghai	2 (2)	1 (1)	1 (1)	1 (1)	5 (5)	2 (2)	0 (0)
Shenzhen	2 (2)	1 (1)	1 (1)	1 (1)	5 (5)	2 (2)	0 (0)
Switzerland	7 (2)	1 (1)	3 (1)	1 (1)	12 (5)	3 (2)	1 (1)
Taiwan	2 (2)	0 (0)	0 (0)	0 (0)	2 (2)	0 (0)	0 (0)
Tokyo	1 (1)	0 (0)	1 (1)	0 (0)	2 (2)	1 (1)	0 (0)
Average German Legal Origin	3.63 (2.13)	1.00 (0.88)	1.63 (1.13)	0.75 (0.63)	7.00 (4.75)	2.13 (1.88)	0.63 (0.75)
Median German Legal Origin	3.00 (2.00)	1.00 (1.00)	1.50 (1.00)	1.00 (1.00)	7.00 (5.00)	2.50 (2.00)	0.00 (0.50)
Scandinavian Legal Origin							
OMX (Sweden)	7 (2)	1 (1)	3 (2)	1 (1)	12 (6)	5 (4)	2 (2)
OSLO (Norway)	7 (2)	1 (1)	3 (1)	1 (0)	12 (4)	4 (3)	0 (0)
Average Scandinavian Legal Origin	7.00 (2.00)	1.00 (1.00)	3.00 (1.50)	1.00 (0.50)	12.00 (5.00)	4.50 (3.50)	1.00 (1.00)
Median Scandinavian Legal Origin	7.00 (2.00)	1.00 (1.00)	3.00 (1.50)	1.00 (0.50)	12.00 (5.00)	4.50 (3.50)	1.00 (1.00)

Table 2. (Continued)

Panel B Comparison Tests:

Tests of Means	Price Manipulation Index	Volume Manipulation Index	Spoofing Index	False Disclosure Index	Market Manipulation Index	Insider Trading Index	Broker-Agency Index
English versus Civil Law	-3.01*** (16.07***)	5.74*** (8.76***)	1.57 (18.75***)	6.33*** (13.38***)	0.33 (17.44***)	7.90*** (11.33***)	14.02*** (14.81***)
English versus German	1.32 (14.87***)	5.09*** (8.25***)	5.66*** (19.69***)	7.32*** (11.94***)	4.07*** (16.26***)	11.76*** (14.25***)	14.67** (15.26***)
English versus Scandinavian	-29.75*** (19.54***)	7.95*** (9.13***)	-25.15*** (8.61***)	0.00 (9.71***)	-22.78*** (17.14***)	-6.41*** (0.00)	6.55** (7.53***)
German versus Scandinavian	-29.06*** (2.12**)	0.00 (-3.45***)	-25.96*** (-6.90***)	-10.82*** (2.41**)	-24.60*** (-1.54)	-30.57*** (-25.60***)	-3.22*** (-2.48**)

Table 3.

Descriptive Statistics

This table presents statistics for the full sample of country-month observations in the data. The data span the months from January 2003–June 2011, and the exchanges listed in Table 2. The full number of exchange-months in the data is 2196, but some variables have missing values. Surveillance data are available for select countries from Cumming and Johan (2008) with updated information up to 2011, as indicated in Table 1. Index from La Porta (1998, 2006) is not available for China. Market Capitalization is from CMCRC with some missing data in the early portion of 2003.

		Mean	Median	Standard Deviation	Minimum	Maximum	Number of Observations
(1)	Average Number of Suspected Information Leakage Case	3.42	0.17	9.40	0.00	124.36	2196
(2)	Average Pre-Announcement Abnormal Profit	3425.92	248.83	8723.73	0.00	71504.02	2196
(3)	Total Trading Rules Index	11.48	11	5.85	2.00	26.00	2196
(4)	Surveillance Index	18.54	14.00	13.56	3.00	41.00	2196
(5)	Rule of Law (LLSV, 1998)	8.32	8.98	2.01	4.17	10.00	1992
(6)	Creditors' Rights (LLSV, 1998)	2.62	3.00	1.19	1.00	4.00	1992
(7)	Risk of Expropriation (LLSV, 1998)	9.17	9.40	0.79	7.75	9.98	1992
(6)	Accounting Standard (LLSV, 1998)	69.55	70.00	7.18	57.00	83.00	1992
(9)	Disclosure (LLS, 2006)	0.79	0.75	0.16	0.42	1.00	1992
(10)	Corruption Index (LLSV, 1998)	8.08	8.52	1.82	4.52	10.00	1992
(11)	Efficiency of the Judiciary (LLS, 2006)	9.08	10.00	1.37	6.00	10.00	1992
(12)	Investor Protection (LLS, 2006)	0.62	0.73	0.27	0.00	1.00	1992
(13)	Anti-director (Spamann, 2010)	4.18	4.00	1.03	2.00	6.00	1992
(14)	Public Enforcement (Jackson and Roe, 2009)	20.52	12.53	19.42	0.43	77.74	1992
(15)	Public Enforcement (DLLS, 2008)	0.47	0.50	0.42	0.00	1.00	1992
(16)	Log GDP	9.57	10.20	1.39	6.14	11.44	2196
(17)	Log MSCI	0.009	0.014	0.07	-0.41	0.31	2138
(18)	Log Market Capitalization	29.83	29.39	2.55	25.91	38.56	2178

Table 4

Comparison Tests

This table presents the comparison of mean and median tests for Average Number of Suspected Information Leakage Cases (Panel A) and Average Pre-Announcement Abnormal Profit (Panel B). Each Panel considers all exchanges in the data set, the subset of exchanges for which the Directive on Markets in Financial Instrument (MiFID) applies, and the last panel considers pre- versus post-MiFID for the subsample of MiFID and non-MiFID exchanges. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Average Number of Suspected Information Leakage Cases

	Total Trading Index		Total Trading Index	
	>11	≤11	>11	≤11
	All Countries		Subset of MiFID Exchange	
Group	**1**	**0**	**1**	**0**
Number of Observations	1002	1194	346	116
Mean	1.29	5.21	2.10	1.98
Standard Deviation	2.75	12.22	3.84	4.15
Median	0.50	1.56	1.13	0.58
Difference in Means (0-1)	10.75***		-0.27	
Difference in Medians (0-1)	*P*<0.01***		*P*=0.01***	

	Surveillance		Surveillance	
	>14	≤14	>14	≤14
	All Countries		Subset of MiFID Exchange	
Number of Observations	1074	1122	258	204
Mean	1.31	5.44	0.86	3.59
Standard Deviation	2.26	12.64	0.79	5.46
Median	0.50	1.63	0.62	2.00
Difference in Means (0-1)	10.76***		7.05***	
Difference in Medians (0-1)	*P*<0.01***		*P*<0.01***	

Panel B: Average Pre-Announcement Abnormal Profits

	Total Trading Index		Total Trading Index	
	>11	≤11	>11	≤11
	All Countries		Subset of MiFID Exchange	
Group	**1**	**0**	**1**	**0**
Number of Observations	1002	1194	346	116
Mean	7854..22	1201.998	1154.44	598.45
Standard Deviation	23446.59	5487.16	4197.02	2245.30
Median	1333.73	64.51	225.75	31.42
Difference in Means (0-1)	-8.78***		-1.81*	
Difference in Medians (0-1)	*P*<0.01***		*P*<0.01***	

	Surveillance		Surveillance	
	>14	≤14	>14	≤14
	All Countries		Subset of MiFID Exchange	
Number of Observations	1074	1122	258	204
Mean	7000.32	1592.49	1295.19	660.28
Standard Deviation	22731.93	5959.32	3935.16	3618.56
Median	553.51	169.34	363.15	54.93
Difference in Means (0-1)	-7.55***		-1.80*	
Difference in Medians (0-1)	*P*<0.01***		*P*<0.01***	

	Non-MiFID Countries		MiFID Countries	
Pre-MiFID versus Post-MiFID	Post-MiFID	Pre-MiFID	Post-MiFID	Pre-MiFID
Number of Observations	748	986	220	242
Mean	2.98	4.39	1.46	2.62
Standard Deviation	9.70	10.79	1.99	5.01
Median	0.52	1.17	0.83	1.27
Difference in Means (0-1)	2.86***		3.33***	
Difference in Medians (0-1)	*P*<0.01***		*P*=0.09*	

	Non-MiFID Countries		MiFID Countries	
Pre-MiFID versus Post-MiFID	Post-MiFID	Pre-MiFID	Post-MiFID	Pre-MiFID
Number of Observations	748	986	220	290
Mean	6288.18	4191.38	1676.22	413.58
Standard Deviation	13444.8	21625.83	5187.16	1587.66
Median	919.10	145.98	367.72	62.37
Difference in Means (0-1)	-2.49**		-3.47***	
Difference in Medians (0-1)	*P*<0.01***		*P*<0.01***	

Table 5

Correlation Matrix

This table presents Pearson correlation coefficients for the full sample of exchange-months in the data. * indicates correlations are statistically significant at least in the 5% levels.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(1)	Average Number of Suspected Information Leakage Cases	1																
(2)	Average Pre-Announcement Abnormal Profit	-0.0821*	1															
(3)	Total Trading Rules Index	-0.132*	0.301*	1														
(4)	Surveillance Index	-0.260*	0.254*	0.582*	1													
(5)	Rule of Law (LLSV, 1998)	0.106*	0.00152	0.164*	0.126*	1												
(6)	Efficiency of the Judiciary (LLS, 2006)	0.174*	-0.0675*	0.166*	-0.142*	0.725*	1											
(7)	Public Enforcement (Jackson and Roe, 2009)	0.118*	-0.027	0.0527*	-0.0689*	0.288*	0.362*	1										
(8)	Public Enforcement (DLLS, 2008)	0.01	-0.126*	-0.0533*	-0.415*	0.00987	0.0105	0.0917*	1									
(9)	Creditors' Rights (LLSV, 1998)	0.108*	-0.148*	-0.268*	-0.171*	-0.673*	-0.242*	0.0937*	0.0282	1								
(10)	Risk of Expropriation (LLSV, 1998)	0.0346	0.0582*	0.266*	0.280*	0.897*	0.602*	0.0810*	-0.0536*	-0.651*	1							
(11)	Corruption Index (LLSV, 1998)	0.147*	-0.0602*	0.145*	0.0658*	0.940*	0.795*	0.285*	0.141*	-0.490*	0.834*	1						
(12)	Investor Protection (LLS, 2006)	-0.0354	0.110*	0.387*	0.0687*	0.0274	0.291*	0.487*	-0.345*	-0.0301	-0.0991*	-0.0283	1					
(13)	Disclosure (LLS, 2006)	-0.0239	0.136*	0.340*	0.0700*	-0.244*	0.0603*	0.472*	-0.346*	0.159*	-0.300*	-0.291*	0.894*	1				
(14)	Anti-director (Spamann, 2010)	0.039	-0.135*	-0.481*	-0.105*	-0.460*	-0.613*	-0.180*	-0.0149	0.445*	-0.387*	-0.382*	-0.454*	-0.316*	1			
(15)	Log Market Capitalization	-0.195*	0.0890*	-0.127*	0.219*	-0.380*	-0.321*	-0.411*	-0.557*	0.136*	-0.183*	-0.384*	-0.108*	0.0546*	0.413*	1		
(16)	Log (1+MSCI)	-0.0570*	-0.0307	-0.0398	-0.0263	-0.0386	-0.0291	-0.000987	0.0425	0.0148	-0.0424	-0.0357	-0.00507	0.000507	0.00694	-0.0103	1	
(17)	Log GDP per Capita	0.0258	0.0808*	0.216*	0.306*	0.694*	0.357*	0.379*	-0.102*	-0.354*	0.644*	0.630*	-0.00804	-0.200*	0.0139	-0.110*	-0.0538*	1

Table 6.
Panel Regression

This table presents panel regression of determinants of market quality. Variables are as defined in Table 1. Panel A presents regression results for the Average Number of Suspected Information Leakage Cases and Panel B presents regression results for Average Pre-Announcement Abnormal Profits. Model 1 presents results of a difference-in-difference measure. Model 2 presents a regression results with Total Trading Rules Index. Model 3 presents the results with Surveillance Index. Model 4 presents the results with Total Trading Rules Index with various law and enforcement indexes. Models 5 and 6 present the regressions after removing the data from exchanges from the US and Japan, respectively. Model 7 presents the second-stage regression from a two-stage Least Square panel regression. In addition, we define the change of regulation in January 2004 after introduction of the Market Abuse Directive (MAD), and the results are shown in Model 8. *, **, and ***are statistically significant at the 10%, 5%, and 1% levels, respectively.

Panel A: Average Number of Suspected Information Leakage Cases

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Difference-in-Difference	Total Trading Rules Index	Surveillance	Total Trading Rules Index with Other Indices	Without Exchanges from US	Without Exchanges from US and Japan	Two-Stage IV Regression	Total Trading Rules Index (MAD)
Constant	7.976	6.292	25.134	19.917	-1.340	5.366	12.75***	12.75*
	[1.57]	[0.69]	[1.34]	1.04]	[-0.13]	[0.37]	[4.91]	[2.17]
Difference-in-Difference								
Treat	-6.284***							
	[-8.05]							
Treat*After	-0.880*							
	[-1.87]							
After	-0.235							
	[-0.63]							
Trading Rules and Surveillance								
Total Trading Rules Index		-0.137**		-0.153*	-0.147***	-0.117**	-0.177***	-0.247***
		[-2.10]		[-1.72]	[-3.29]	[-2.25]	[-5.72]	[-5.22]
Surveillance			-0.169**					
			[-2.42]					
Law and Enforcement Index								
Rule of Law (LLSV, 1998)		0.846	-0.224					-0.378
		[0.86]	[-0.40]					[-1.42]
Efficiency of the Judiciary (LLS, 2006)		0.266	0.32		1.196**	1.049	0.754***	1.107***
		[0.39]	[0.63]		[2.17]	[1.49]	[6.14]	[3.96]
Creditors Rights (LLSV, 1998)		1.439		0.605				
		[1.36]		[0.98]				
Public Enforcement (Jackson and Roe, 2009)			-0.013	-0.07				
			[-0.26]	[-01.13]				
Public Enforcement (DLLS, 2008)			-4.419	-4.563				
			[-1.26]	[-1.49]				
Corruption Index (LLSV, 1998)				2.072**	-0.031	-0.07		
				[2.34]	[-0.05]	[0.11]		
Investor Protection (LLS, 2006)				-15.38**	-12.009***	-11.075***		
				[-2.31]	[-4.63]	[-3.09]		
Disclosure (LLS, 2006)				32.57**	21.356***	19.951***		
				[2.34]	[6.08]	[4.78		
Risk of Expropriation (LLSV, 1998)				-1.391				
				[-0.81]				
Anti-director (Spamann, 2010)				1.260				
				[1.14]				
Exchange and Country Control Variables								
Log Market Capitalization		-0.367	0.751	-1.265*	-0.569**	-0.723**	-0.460***	-0.560***
		[-1.44	[-1.24]	[-1.81]	[-2.36]	[-2.15]	[-7.40]	[-3.49]
Log (1+MSCI)	-4.979*	-5.849	-5.149*	-4.886	-5.973*	-6.126	-2.292	-1.984
	[-1.82]	[-1.56	[-1.70]	[-1.67]	[-1.80]	[-1.85]	[-0.99]	[-0.78]
Log GDP per Capita	0.168	-0.359	0.534	-0.039	0.332	0.300	-0.0978	0.254
	[0.36]	[-0.86]	[0.63]	[-0.06]	[0.69	[0.64]	[-0.78]	[0.83]
Fixed Effect	Exchange	No	No	No	No	No	Exchange/Year	Year
Cluster	Month	Exchange/Month	Exchange/Month	Country/Month	Exchange/Year	Exchange/Year	Year	Year
Observations	2138	1916	1916	1916	1712	1610	1910	1916
R-squared	0.192	0.1107	0.142	0.181	0.108	0.114	0.100	0.125

Panel B: Average Pre-Announcement Abnormal Profits

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Difference-in-Difference	Total Trading Rules Index	Surveillance	Total Trading Rules Index with All Indices	Without Exchanges from US	Without Exchanges from both US and Japan	Two-Stage IV Regression	Total Trading Rules Index (MAD)
Constant	-140501.3***	-10812.1	-4264.67	-5661.82	-10843.4	-23060.4	-25788.4***	-23025.2***
	[-12.22]	[0.95]	[-0.18]	[-0.35]	[-1.03]	[-1.02]	[-3.98]	[-5.72]
Difference-in-Difference								
Treat	-19246.9***							
	[-4.11]							
Treat*After	1688.4*							
	[1.88]							
After	-4400.4***							
	[-3.78]							
Trading Rules and Surveillance								
Total Trading Rules Index		795.713***		674.31***	379.80**	311.398**	1229.4***	890.6***
		[3.70]		[5.50]	[2.29]	[2.08]	[15.95]	[6.11]
Surveillance			303.70**					
			[2.29]					
Law and Enforcement Index								
Rule of Law (LLSV, 1998)		-1441.86*						393.7*
		[-1.94]						[2.19]
Efficiency of the Judiciary (LLS, 2006)		-548.92	-157.77		-1729.03*	-1377.26	-1505.5***	-1872.2***
		[-0.71]	[-0.09]		[-1.69	[-1.29]	[-4.92]	[-3.69]
Creditors Rights (LLSV, 1998)		-2498.66		-1947.07***				
		[-2.63]		[-6.28]				
Public Enforcement (Jackson and Roe, 2009)			-4.447	6.39				
			[-0.08]	[0.154]				
Public Enforcement (DLLS, 2008)			-429.37	-1800.87				
			[0.18]	[-0.80]				
Corruption Index (LLSV, 1998)				-2149.8***	80.0.821	78.447		
				[-4.463]	[0.14]	[0.12]		
Investor Protection (LLS, 2006)				-13132.8***	-3746.46	-6162.97		
				[-3.55]	[-0.80]	[-0.97]		
Disclosure (LLS, 2006)				16846.46*	5252.287	8592.34		
				[1.86]	[0.72	[0.96]		
Risk of Expropriation (LLSV, 1998)				-819.09				
				[-0.83]				
Anti-director (Spamann, 2010)				-2286.77***				
				[-3.18]				
Exchange and Country Control Variables								
Log Market Capitalization		541.964*	60.852	459.67	525.62*	772.291	704.5***	809.0***
		[1.92]	[0.08]	[0.74]	[1.95]	[1.50]	[4.55]	[8.71]
Log (1+MSCI)	-3653.9	-4607.27	-.5772.87	-4191.2***	-4137.1*	-4092.72	-2594.8	-3380.6
	[-1.12]	[-1.47]	[-1.42]	[-2.83]	[-1.69]	[-1.64]	[-0.45]	[-0.93]
Log GDP per Capita	15412.8***	1303.77**	602.26	2343.79***	675.262	808.799	607.7*	484.1
	[11.24]	[2.10]	[0.75]	[5.55]	[1.24	[1.31]	[1.95]	[1.64]
Fixed Effect	Exchange	No	No	No	No	No	Exchange/Year	Year
Cluster	Month	Exchange/Month	Exchange/Month	Country/Month	Exchange/Year	Exchange/Year	Year	Year
Observations	2138	1916	1916	1916	1712	1610	1916	1916
R-squared	0.164	0.128	0.07	0.146	0.167	0.170	0.09	0.112

Appendix: Overview of Related Studies on Insider Trading

Author(s)	Data Source(s)	Country Samples	Time Period	Dependent Variables	Insider Trading Law and Enforcement	Main Findings
Bhattacharya and Daouk (2009)	Morgan Stanley Capital Market International (MSCI), International Financial Corporation (IFC), International Monetary Fund (IMF), Datastream, etc.	55 countries	1969 to 1998	Cost of Equity	Insider Trading Law and Enforcement are from Bhattacharya and Daouk (2002).	This paper provides both theoretically and empirically arguments that sometimes no securities law may be better than a good securities law that is not enforced. The authors find that the cost of equity rises when some countries enact an insider trading law but do not enforce it.
Beny (2005, 2007)	La Porta et al. (1998, 2003), Morck et al. (2000), Interational Finance Corporation (IFC),Gaillard (1992), Stamp and Welsh (1996),	33 countries	cross section	Ownership Dispersion, Stock Market Turnover, Stock Price Synchronicity	**Insider Trading Law index** equals the sum of (1) Tipping, (2) Tippee, (3) Damages and (4) Criminal or , equivalently, the sum of Scope and Sanction. Insider Trading Law variables (Tipping, Tippee, Damages, Criminal, Scope and Sanction) are from Gaillard (1992) and Stamp and Welsh (1996). **Enforcement variables** are Enforced by 1994 (Bhattacharya and Daouk, 2002), Public Enforcement Power (La Porta et al., 2003), and Private Right (Gaillard, 1992; Stamp and Welsh, 1996).	Countries with more prohibitive formal insider trading laws are associated with more dispersed equity ownership, more informative stock prices and more liquidity stock markets. Both enforceability and formal insider trading laws have positive impact on stock market development.
Bris (2005)	SDC Mergers and Acquisitions Database	4,541 acquisitions across 52 countries	1990 to 1999	Insider Trading Profit	Insider Trading Law and their Enforcement: initial prosecution data are from Bhattacharya and Daouk (2002)	Insider trading enforcement increases both the incidence, and the profitability of insider trading. Harsher laws reduce the incidence of illegal insider trading.
Bhattacharya and Daouk (2002)	Morgan Stanley Capital Market International (MSCI), International Financial Corporation (IFC), International Monetary Fund (IMF), Datastream, etc.	103 countries	1969 to 1998	Cost of Equity	Survey Approach [Email, letter and Fax to 103 stock exchanges and their regulator on whether or not the stock market has insider trading laws and on whether or not there had been a prosecution under the insider trading laws]	Introduction of insider trading law has no impact on the cost of equity in a country, but the enforcement of insider trading laws is associated with a significant decrease in the cost of equity.
Seyhun (1992)	National Archives	19,571 firms (U.S.)	1975 to 1989	Insiders' abnormal profits and share traded	**Changes in Insider Trading Regulation**: (1) March 1980, when the Chiarella decision was announced; (2) August 1984, when ITSA was signed into Law, and (3) November 1988, when ITSFEA was signed into law.	The increased statutory sanctions in the 1980s on corporate insider-trading has no impact on corporate insider trading activities and profit. The enforcements by courts have negative impact on insider trading activities, especially around earning announcements and takeover information.

Appendix (Continued): Overview of Related Studies on Insider Trading

Author(s)	Data Source(s)	Country Samples	Time Period	Dependent Variables	Insider Trading Law and Enforcement	Main Findings
Our paper	SMARTS, Inc., Capital Markets CRC, Cumming and Johan (2008)'s survey data, Cumming, Johan and Li (2011) exchange trading rules indices, La Porta et al. (1998, 2006) law and finance indices, Jackson and Roe (2008) resource based enforcement indices; Thompson Reuters Datastream;	22 countries	01/2003 – 06/2011	Frequency of suspected insider trading and trading value surrounding insider trading from Capital Markets CRC and Smarts, Inc.	**Trading Rules:** Insider trading index: Sum of dummy variables for Front-running, Client precedence, Trading ahead of research reports, Separation of research and trading, Broker ownership limit, Restrictions on affiliation, Restrictions on communications, Investment company securities, Influencing or rewarding the Employees of Others, and Anti-intimidation / Coordination. Source: Cumming et al. (2011). Price Manipulation Rule Index: Sum of dummy variables for marking the open, marking the close, misleading end of the month/quarter/year trades, intraday ramping/gouging, market setting, pre-arranged trades, and domination and control. Source: Cumming et al. (2011). Volume Manipulation Rule Index: Sum of dummy variables for Churning and Wash trade. Source: Cumming et al. (2011). Spoofing Rules Index: Sum of dummy variables for Giving up priority, Switch and Layering of bids/asks. Source: Cumming et al. (2011). False Disclosure Rules Index: Sum of dummy variables for Dissemination of false and misleading information and Parking or warehousing. Source: Cumming et al. (2011). Market Manipulation Rules Index: Sum of Price Manipulation Rules Index, Volume Manipulation Rules Index, Spoofing Rules Index, and False Disclosure Rules Index. Source: Cumming et al. (2011). Broker Agency Rules Index: Sum of dummy variables for Trade through, Improper execution, and Restrictions on member use of exchange name, Restrictions on sales materials and telemarketing, and Fair dealing with customers. Source: Cumming et al. (2011). Total Trading Rules Index: Sum of Insider Trading Index, Market Manipulation Rules Index, and Broker-Agency Rules Index. Source: Cumming et al. (2011). **Enforcement:** Surveillance Index: The principal component of (1) single-market surveillance and (2) cross-market surveillance. Source: Cumming and Johan (2008). Available for a subset of countries, and provided contingent on maintaining confidentiality and anonymity, as exchanges do not want market participants to know all of the things they do and do not look for in their surveillance. Source: Cumming et al. (2011) Efficiency of the Judiciary: Assessment of the "efficiency and integrity of the legal environment as it affects business, particularly foreign firms" produced by the country risk rating agency International Country Risk (ICR).t "may be taken to represent investors' assessments of conditions in the country in question." Average between 1980 and 1983. Scale from 0 to 10; with lower scores, lower efficiency levels assessment of the efficiency and integrity of the legal environment. Scale from 0 to 10; with lower scores, lower efficiency levels. Original data come from International Country Risk Guide. Source: La Porta et al. (2006). Staff Per Million: The 2005 size of the securities regulator's staff, divided by the country's population in millions Original data come from regulators' annual report and nations' official document. Population data are from World Bank Data and Statistics Web site.. Source: Jackson and Roe (2009). DLLS Public Enforcement: Public enforcement is an index aggregating whether certain suspect corporate transactions can lead to a fine or jail sentences for the approving body, or fine or jail sentence for the princi*pal wrongdoer. Source: Jackson and Roe (2009); Original source: Djankov et al. (2008). Other LLSV Variables Used as summarized in Table 1 of our paper.	We show that more detailed exchange trading rules and surveillance over time and across markets significantly reduce the number of cases, but increase the profits per case. Overall, the findings highlight complementarities across different trading rules and surveillance, and these complementarities are at least twice as important as stand-alone insider trading rules for predicting the frequency of insider trading cases; however, the complementarities are less economically important for predicting the trading value for surrounding the insider trading cases relative to stand-alone insider trading rules.

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