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Monitoring from Afar: Do Foreign Institutional Investors Deter Insider Trading?*

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Abstract

This paper examines the disciplinary effect of foreign institutional investors on opportunistic insider trading. Using a novel global insider trading data set containing 35,557 firms from 26 countries over the period 2000-2015, we find that greater foreign institutional ownership significantly reduces the profitability of insider trading, above and beyond the effect of domestic institutional ownership. Using the exogenous variation in foreign institutional ownership induced by MSCI index inclusion, we show that the effect is causal. The impact of foreign investors is stronger in countries with weak insider trading regulations and poor institutional environments, and operates mainly through the monitoring channel, rather than the channel of improved information environments.

JEL classification: G14, G34, K22

Keywords: Foreign Institutional Ownership, Insider Trading, Monitoring

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1   Introduction

Corporate officers and directors have privileged access to private information about their firms' prospects. Hence, their trades of their own companies' stocks are among the most scrutinized activities in the market. A large body of empirical literature has documented that insiders' trades are informative about future stock performances, indicating that insiders profit from having access to nonpublic information.[1] Insider trading, left unregulated, could hurt market liquidity (Glosten and Milgrom (1985)), reduce the informational efficiency of stock prices (Fishman and Hagerty (1992)), jeopardize investors' confidence and discourage stock market participation (Leland (1992)), and distort corporate investment (Manove (1989)). This has motivated almost all countries to enact and enforce insider trading laws that protect outside investors from insider trades (Bhattacharya and Daouk (2002)).[2]

However, laws and regulations may not be the only effective mechanism to deter opportunistic insider trading. Outside shareholders may be able to discipline insider trading by either threatening the sale of shares ("exit") or meeting with management ("voice"). They can also actively wield their voting rights. This market-based mechanism of deterring insider trading may be more important in countries with weak legal institutions and captured regulators, since laws and regulations are only as effective as the enforcement of the laws.[3] In addition, while legal regimes are highly persistent over time, the monitoring role assumed by institutional investors can change relatively swiftly.

Among all shareholders and interested parties of a firm, *foreign* institutional investors may play a particularly important role in monitoring insider trading, for

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[1]See, for example, Jaffe (1974); Seyhun (1986), Lakonishok and Lee (2001); Jeng, Metrick, and Zeckhauser (2003); Cohen, Malloy, and Pomorski (2012); and Ali and Hirshleifer (2017) etc.

[2]Governmental regulation of insider trading is not without controversy. Some scholars (Manne (1966) and Carlton and Fischel (1983)) argue that insider trading should not be regulated at all because it impounds private information into prices and improves market efficiency.

[3]See, for example, Bhattacharya and Daouk (2002); Bushman, Piotroski, and Smith (2005); Fernandes and Ferreira (2008); and Edmans, Jayaraman, and Schneemeier (2017).

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several reasons. First, institutional holdings have become increasingly globalized. According to International Monetary Fund (2015), the total asset under management of institutional investors exceeded 70 trillion US dollars in 2014, representing more than 100 percent of world GDP. In most countries, foreign institutional investors hold as much assets as domestic ones (Ferreira and Matos (2008)). Second, many domestic institutions with business ties to local corporations may feel compelled to be loyal to management (Davis and Kim (2007)), while foreign investors are more likely to be independent and take an active stance against the illicit behavior of corporate insiders.[4] Finally, there are often gaps between the legal and institutional environments of an institutional investor's home country and those of its destination countries. Some prior studies suggest that institutional investors tend to promote the higher governance standards and social norms of their home countries (Aggarwal, Erel, Ferreira, and Matos (2011); Dyck, Lins, Roth, and Wagner (2017)).

Foreign investors from a country of strong legal institutions could be particularly vocal about punishing insider trading in emerging countries, given their home-country experience. For example, in the 2015 insider trading scandal involving Thai convenience store operator CP All, foreign investors demanded tough action against top executives, requesting governance reforms.[5] The head of the local foreign institutions, Prinn Panitchpakdi, claimed that *"If we don't see any move or statement from the board today, we will submit a letter asking for appropriate action from the board"*[6].

At the same time, significant obstacles make it challenging for foreign investors to deter insider trading: they may be less familiar with local laws and regulations and lack informal relationships with other market participants, which can reduce the efficacy of their monitoring. In extreme cases, it may be optimal for them to collude

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[4]For example, Fidelity is reported to be more aggressive on governance issues in Europe, but it is relatively acquiescent in the U.S. where it manages several corporate pension accounts.

[5]CP All PLC, established in 1988, is the sole operator of 7-Eleven convenience stores in Thailand,

[6]See "Insider trading at CP All: Foreign investors demand action", and "Foreign investors enter fray over CP All inaction", *Bangkok Post*, 2015

with insiders of their portfolio companies and expropriate private information for their own benefit, given the monitoring costs and collusion benefits (Becker (1968)). Thus, whether foreign institutional investors deter opportunistic insider trading is ultimately an empirical question.

Investigating the relation between foreign institutional ownership and insider trading requires cross-country data on insider trading, which became available only recently. We employ a novel and comprehensive database of global insider trading, which contains 8.1 million transactions from over 200,000 insiders across a universe of over 60,000 stocks in more than 40 countries. This is one of the first academic studies that take advantage of this transaction-level insider trading database. We then merge this insider trading data with global institutional ownership data from FactSet, and stock returns and accounting information from CRSP and Compustat. Our final sample includes 274,919 unique insiders working in 35,557 firms from 26 countries over the period 2000 to 2015.

To validate our global insider trading data, we first examine the informativeness of insider trading around the world. This, to the best of our knowledge, has not been documented before. Our results show that insider trading activities are generally informative about future stock returns for most countries in our sample. Long-short portfolios based on insiders' net purchase ratio (Lakonishok and Lee (2001)) generate significant Fama and French (2015) five-factor alphas[7] for 17 out of 26 countries, with a magnitude ranging from 0.24% to 0.73% per month. Insider trades are more profitable in countries with weak insider trading regulation, and poor institutional and information environments.

Our main analyses use firm-level panel regressions and show that foreign institutional ownership strongly reduces the profitability of insider trading. While domestic institutional ownership displays a modest mitigating effect on insider trading

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[7]In our asset pricing tests, we control for both the global and regional factors to estimate alphas.

profitability, the impact of foreign investors is significantly greater. For example, a one-unit increase in the insider net purchase ratio (NPR) predicts a 0.5 percentage points increase in the next-month excess return. If domestic institutional ownership increases by 10%, the predictability of NPR drops by 0.01 percentage points. The same magnitude increase in foreign institutional ownership lowers insider profitability by an *additional* 0.08 percentage point. Moreover, foreign institutional ownership affects insider trading above and beyond its effect on general corporate governance (Aggarwal, Erel, Ferreira, and Matos (2011)), as the effect of foreign investors barely changes when we control for the corporate governance index. These findings are consistent with the notion that foreign institutions exert a disciplinary effect on corporate insiders worldwide.

A potential endogeneity concern for our baseline result is the selection bias. Ferreira and Matos (2008) and Leuz, Lins, and Warnock (2008) document that foreign institutional investors tend to hold firms with better governance and lower insider ownership. However, we show that our results are not driven by institutional investors' selection of firms. In the baseline regressions, we use firm fixed-effects to absorb time-invariant unobserved firm heterogeneity. We further utilize exogenous shocks to foreign institutional ownership following the membership changes to the MSCI All Country World Index (ACWI) to isolate the causal effect. The identification exploits the fact that foreign institutions are more likely to invest in MSCI ACWI constituents, because international portfolios are typically benchmarked against this index (Cremers, Ferreira, Matos, and Starks (2016)). As with previous studies, we find foreign institutions increase their holdings by around 2% of market capitalization when a firm's stock is added to the MSCI ACWI, while domestic institutional ownership decrease.[8] In a differences-in-differences setting, we find that, within a narrow bandwidth around the MSCI index cutoff, the profitability of insider trading

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[8]MSCI ACWI eligibility is largely market cap-based. See Bena, Ferreira, Matos, and Pires (2017) and Kacperczyk, Sundaresan, and Wang (2018) for similar identification strategy.

decreases significantly after the stock is added to the MSCI index, compared with otherwise similar stocks. This finding supports a causal interpretation that foreign institutional ownership reduces insider trading profits.

Next, we examine the heterogeneous effects of foreign institutional investors conditional on a country's legal, institutional and information environments. Our tests suggest that the disciplinary role of foreign investors serves mainly as a *substitute* for country-level insider-trading regulations: the mitigating effect of foreign institutions on insider trading profitability is more pronounced in countries with weak enforcement of insider trading laws, in non-common law countries, and in countries with poorer institutional infrastructure. We further examine the legal origins of foreign institutions' *home countries*: institutional investors from common-law countries more effectively curb opportunistic insider trading than those from civil-law countries.

Our finding that foreign institutional investors reduce insider trading profitability is potentially consistent with two non-mutually-exclusive channels. First, foreign institutions could directly monitor insiders' illicit behavior and take corrective actions, as they are less entangled with their portfolio companies through business relationships (the *"monitoring"* channel). Second, foreign institutional ownership may reduce insider trading profitability by improving the information efficiency of the stock.[9] To the extent that insiders profit from private information and better information environments impound private information into stock prices more quickly, foreign investors may mitigate insider trading profitability through the *"information"* channel.[10]

We conduct several tests to disentangle the two channels. First, we show that even after controlling for several proxies of firms' information environments, foreign insti-

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[9]Several studies have shown that institutional investors could improve firms' information environment and price efficiency, either in the U.S. (Boehmer and Kelley (2009)) or globally (Kacperczyk, Sundaresan, and Wang (2018)).

[10]Several studies document that insider trades are more profitable in firms characterized by higher information asymmetry, such as firms followed by fewer analysts (Frankel and Li (2004)) and with higher R&D intensity (Aboody and Lev (2000)).

tutional ownership still reduces insider profitability with a similar intensity. Second, by examining the timing of insider trades, we find that insiders in firms with higher foreign ownership shift more trades to the month right after earnings announcements, to avoid trading in information-intensive periods. This evidence suggests that firms, under the pressure of foreign institutions, start to impose blackout periods for insider trading, which has been shown to effectively reduce insider trading profitability (Bettis, Coles, and Lemmon (2000)). Third, the disciplinary effect of foreign investors is asymmetric, stronger for insider sales than insider purchases. This is consistent with the monitoring channel, as prior studies have shown that insider sales ahead of negative news are associated with greater litigation risks compared with insider purchases (Cheng and Lo (2006); Rogers (2008)). Lastly, we decompose insider trades into those conducted by top-tier insiders versus low-tier insiders, and find that foreign institutions reduce the profitability of trades made by top-tier insiders relative to trades made by lower-tier insiders. This is consistent with top-tier insiders being directly monitored by institutional investors.

The rest of this paper is organized as follows. Section 2 briefly surveys related literature and discusses the contribution of this study. Section 3 describes the data and presents the summary statistics. Section 4 presents our main results for the effect of foreign institutions on insider trading profitability and its heterogeneous effect. Section 5 examines the economic channels. Section 6 presents robustness tests and examines alternative explanations. Section 7 concludes.

2 Related Literature and Contribution

This paper contributes to several strands of the literature. First, it contributes to a growing literature that examines the effect of federal regulation and firm-level governance mechanisms on the mitigation of informed trading by corporate insiders. At

the country-level, an overwhelming amount of evidence has been drawn from the U.S., where the SEC is the main regulatory agency responsible for enforcing insider trading laws. Confirming the important role of the SEC, Del Guercio, Odders-White, and Ready (2017) document that aggressive SEC enforcement deters illegal insider trading (measured by price run-up before news events) and helps improve market liquidity. Cohen, Malloy, and Pomorski (2012) and Akbas, Jiang, and Koch (2018) show that SEC enforcement actions are more likely to target opportunistic insiders, and that insider trading activities abate following waves of SEC enforcement. Taking advantage of a regulatory change requiring more timely disclosure of insider trades, Brochet (2010) find that insiders are less likely to sell ahead of negative private information after the implementation of the Sarbanes-Oxley Act of 2002 (SOX). At the firm-level, Bettis, Coles, and Lemmon (2000) show that self-imposed insider trading policies (ITP) are effective in suppressing insider trading profits. Ravina and Sapienza (2009) show that independent directors' trades are more profitable in firms with weak governance, while Dai, Fu, Kang, and Lee (2016) find that better-governed firms have lower profitability of insider sales ahead of negative news. In addition to internal governance mechanisms, studies also explore various external governance mechanisms that can discipline insider trading, including news dissemination by media (Dai, Parwada, and Zhang (2015)) and institutional investors (Dai, Fu, Kang, and Lee (2016)).

Evidence from outside the U.S. is more limited.[11] The majority of cross-country studies on insider trading examine how the initial enactment and enforcement of insider trading laws affects various economic outcomes including the informational efficiency of financial markets (Bushman, Piotroski, and Smith (2005); Fernandes and Ferreira (2008)), cost of equity (Bhattacharya and Daouk (2002)), and real economic efficiency (Edmans, Jayaraman, and Schneemeier (2017)), without showing the direct

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[11]See Fidrmuc, Goergen, and Renneboog (2006) for insider trading in UK and Dardas and Güttler (2011) for evidence from European countries.

effect of these laws/regulations on intensity of opportunistic insider trading.[12] We complement these studies by documenting the direct evidence that insider trades are more informative in countries with insufficient insider trading regulations and poor institutional infrastructures. More importantly, we show that when governmental regulations fail to effectively curb insider trading, foreign institutional investors could step in and act as a partial substitute for inferior institutional environments.

Our paper also contributes to the literature that explores the impact of foreign institutional investors' on a wide range of corporate outcomes. Gillan and Starks (2003), Ferreira and Matos (2008) and Aggarwal, Erel, Ferreira, and Matos (2011) show that foreign institutional investors are more active in improving firms' governance. Dyck, Lins, Roth, and Wagner (2017) shows that foreign institutional investors transplant their social norms regarding E&S issues around the world. Bena, Ferreira, Matos, and Pires (2017) find that foreign institutional ownership fosters long-term tangible and intangible investments. Our findings that foreign investors mitigate insider trading are broadly consistent with the idea that foreign institutions exert a disciplinary effect on entrenched corporate insiders worldwide. The advantage of our setting is that, unlike other firm-level governance attributes that are highly persistent and slow moving, insider trading activities occur at a higher frequency.

3 Data and Summary Statistics

3.1 Global insider transaction data

Our global insider transaction data is obtained from 2iQ Research, a global data company that specializes in monitoring and analyzing share transactions made by directors and officers of public firms around the world. In aggregate, the 2iQ database

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[12]Notable exceptions include Fidrmuc, Korczak, and Korczak (2013) on how country-level shareholder protection affects the informativeness of insider trading and Brochet (2017) on the predictability of insider trades for aggregate market return.

contains 8.1 million transactions from over 200,000 insiders across a universe of over 60,000 stocks in 50 countries with an average history across all regions of 12 years. The data are sourced from stock exchanges, news portals, or company announcements made public under disclosure regulations and enhanced with qualitative research. Panel A of Table A1 lists the sources of insider trades data used by 2iQ for each country/region in our sample. One caveat about this data is that since 2iQ covers only legal insider trading that is reported to regulators, the reporting requirement and enforcement may vary across regions. In the Internet Appendix, we provide a detailed overview of the insider trading regulations of the major countries in our sample.

For a given transaction, the main information available includes the name and unique ID of the insider, his or her position in the firm, the transaction type (e.g., purchase, sale, transfer, option exercise, award), the transaction date, the security involved, the average price and number of shares transacted, the total transaction value (in local currency and Euro), the insider's post-trade holdings, and the date on which the transaction was reported. 2iQ also includes firm identifiers such as ISIN and SEDOL, firm name, and the country in which the transaction occurred and was announced.

2iQ classifies all insiders into eight levels, and the definition of each level is shown in Panel B of Table A1. We include all the insiders in levels A, B, C, and D. This includes top five management, executive board and committee, non-executives board members, and lower level executives. We exclude insiders of levels E, F, G, and H, which include legal entities, funds and trusts, family and other relatives, partners, large shareholders, founders, investors, and family holdings.

2iQ also classifies all insider trades into three significance levels: 1, 2, and 3. We focus on insiders' open market buy and sell transactions, by including only the trades with significance within the top two categories (i.e., 1 and 2), and excluding private placements and OTC trades (with a Transaction Label of PP or PR). This excludes

non-intentional or mechanical transactions, awards shares, tax-related transactions, remuneration, share plan purchases, or cases where there is no change in beneficial holdings such as a share transfer to a spouse. This filter focuses our study on transactions initiated by insiders, in which they have discretion regarding the timing and volume of trading.

Our sample focuses on insider transactions in the home country where the firm's headquarter is located and where the transaction occurred and announced. We exclude countries with fewer than 1,000 reported insider buys and sells for the entire sample period, countries that started reporting to 2iQ after 2012, and one major developed market, Japan, where insider trades are not required to be reported by the law. As a result, our final sample consists of 26 countries with varying starting years when information on insider transactions becomes available. The US, Singapore, and South Korea have the longest sample period starting from 2000, whereas most emerging markets (such as China and India) have data only after 2005. Finally, we exclude firm-months before the firm had the first insider trading record and after the firm had the last insider trading record. Restricting the sample to periods with insider trading helps address the concern that our results are driven by selective insider reporting.[13]

Table 1 presents the summary statistics of insider trades for each country in our sample. Multiple trades by the same insider of the same firm in one single day are counted as one trade. Panel A reports the total number of reported insider trades, average number of shares and value of transactions (in EUR) per trade, separately for insider buys and sells. The total number of insider purchases ranges from 2,000 in Belgium to 190,800 in the U.S., and the total number of insider sells range from 1,500 in Denmark to 543,900 in the U.S.. Although it is well known that insider sells are much more frequent than insider purchases in the U.S., this is not the case for many other countries. In fact, the total number of insider purchases exceeds the number

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[13]Alternatively, we relax the criteria by including all the observations of a firm if at least one insider trade is reported during the sample period. The results are similar.

of insider sells in 17 of the 26 countries in our sample. However, insider sells tend to be much larger than insider buys. The median transaction value for insider buys ranges from 5,400 EUR in Canada to 54,800 EUR in Hong Kong, while the median transaction value for insider sells varies from 13,900 EUR in Finland to 243,300 EUR in the United Kingdom. In the last two columns, we report the average monthly country-level dollar insider trading volume as a fraction of each country's total dollar trading volume and market capitalization, respectively. Insider trading seems to be more prevalent in countries such as Hong Kong and Malaysia, where insider trading activities account for more than 2% of the total volume in the market.[14]

Panel B of Table 1 shows the insider trades statistics at the insider and firm level. Columns (1) and (2) of Panel B report the number of unique insiders and firms with reported insider transactions for each country. The number of unique firms with reported insider transactions varies from 141 in Belgium to 11,131 in the U.S., and the total number of unique firms employed in this study is 35,557. The number of unique insiders varies from 650 in Switzerland to 98,501 in the U.S., and the total number of unique insiders is 274,919. Column (3) reports the number of firms that appear in the 2iQ insider database as a fraction of the total number of public firms in each country. This fraction varies from 24% in India to 85% in South Korea. Column (4) reports the market capitalization of firms with reported insider trades as a fraction of total market capitalization in each country. This number varies from 78% in India to over 95% for most countries in the sample, suggesting that firms with insider transaction are typically big firms. Columns (5) and (6) report the average number of trades per insider for each country. On average, insider trades are not very frequent, with the median being only two to three trades per insider in our sample. Columns (7) and (8) show the average number of insiders per firm. This number varies widely across

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[14]One country with unexpectedly low insider trading activity is China, where insider trading accounts for only 0.08% of the total trading volume on average. However, this is mainly due to the high total trading activity and turnover in the Chinese stock market. If we focus instead on insider trading volume over market capitalization, China is on par with other countries.

countries, from an average of 2 insiders per firm in India to 12 insiders in Finland, perhaps due to different legal definitions of insiders across countries.

Following Lakonishok and Lee (2001), we measure insider trading activity at firm-month level as the net purchase ratio (NPR), defined as follows:

$$NPR = \frac{\#INSIDER\_BUY_{t-1,t-6} - \#INSIDER\_SELL_{t-1,t-6}}{\#TOTAL\_TRANSACTIONS_{t-1,t-6}}.$$

NPR is calculated as the number of purchases minus the number of sells in the past six months, scaled by the total number of transactions. NPR is bounded between -1 and 1. A higher NPR indicates stronger intensity of insider purchases relative to insider sells.

3.2 Global institutional ownership data

The global institutional ownership data is from FactSet, available from 1999 onward. FactSet reports holdings for a wide range of institution types, such as mutual funds, hedge funds, pension funds, bank trusts, and insurance companies (Ferreira and Matos (2008)). For non-U.S. firms, FactSet collects ownership data directly from national regulatory agencies, stock exchange announcements (e.g., the Regulatory News Service in the U.K.), local and offshore mutual funds, mutual fund industry directories (e.g., the European Fund Industry Directory), and company proxies and financial reports.

Total institutional ownership (IO_Total) is defined as the sum of the holdings of all institutions in a stock divided by the stock's total shares outstanding. Foreign institutional ownership ($IO\_Foreign$) is defined as the sum of the holdings of institutions domiciled in countries different from the one in which the stock's issuing company is headquartered, scaled by the stock's shares outstanding. We further partition foreign institutional ownership into institutional ownership from common-law

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countries ($IO\_Foreign(Common)$) and institutional ownership from civil-law countries ($IO\_Foreign(Civil)$), based on the legal origins of the foreign institutions' home countries (Porta, Lopez-de Silanes, Shleifer, and Vishny (1998)).

In Panel C of Table 1, the average total institutional ownership is 19.18%, of which 3.23% is held by foreign institutions. It may seem that foreign institutional ownership is dwarfed by domestic institutional ownership. However, the average statistics is skewed by a small number of countries, in which domestic institutions are dominant. In fact, if we exclude the U.S. and Canada stocks, the average total institutional ownership is 6.74%, of which 3.08% is held by foreign institutions. When we compare the foreign institutions from common-law countries and those from civil-law countries, the average ownership by common-law country institutions (2.21%) is on average twice as high as the average ownership by civil-law country institutions (0.98%).

3.3   Stock market and accounting variables

For firms in the U.S., we obtain stock returns and prices from the Center for Research in Security Prices (CRSP) and accounting data from Compustat/North America. For firms in Canada, we obtain stock and accounting information from Compustat/North America. For firms in other countries, data from Compustat/Global are used. We include all domestic common stocks listed on the major stock exchange(s) in each country. Analyst forecasts and quarterly earnings announcement dates are obtained from I/B/E/S. We construct standard control variables in our empirical analysis. Log(Size) is defined as the natural logarithm of market capitalization at the end of June in each year. Book-to-market ratio (B/M) is the most recent fiscal year-end report of book value divided by the market capitalization at the end of calendar year t-1. Book value equals the value of common stockholders' equity, plus deferred taxes and investment tax credits, and minus the book value of preferred stock. Past 12-

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months return is defined as the cumulative holding-period return from month t-12 and t-2. The prior month's return captures the short term reversal effect. The summary statistics for firm characteristics are reported in Panel C of Table 1.

We also construct several variables to proxy for firms' information environment and price informativeness. Analyst coverage is the number of analysts covering a given stock. Forecast dispersion is the standard deviation of annual earnings-per-share forecasts scaled by the absolute value of the average outstanding forecast (Diether, Malloy, and Scherbina (2002)). Forecast error is defined as the absolute value of the difference between the consensus EPS forecast and the actual EPS scaled by the absolute value of the actual EPS. We use price non-synchronicity to measure price informativeness. For each firm i in month t belonging to country j, we regress the monthly return of the stock $RET_{i,j,t}$ on the value-weighted local market return $MKTRET_{j,t}$ and the value-weighted US market return $MKTRET_{US,t}$ using data from past 36 months, with a minimum of 15 observations.

$$RET_{i,j,t} = \alpha + \beta_1 MKTRET_{j,t} + \beta_2 MKTRET_{US,t} + \epsilon_{i,j,t}$$

Following Chen, Goldstein, and Jiang (2006), we define price non-synchronicity (NONSYNCH) as $1 - R^2$, where R^2 is the coefficient of determination from the estimation of the above equation. Negative adjusted R^2 numbers are trimmed at 0.0001. We use the Amihud illiquidity (Amihud (2002))[15] and the frequency of zero return trading days (Lesmond (2005)) to measure stock liquidity.

3.4 Country-level variables

Our analysis includes several country-level variables related to the legal and institutional environments of sample countries. Table A2 reports the descriptive statistics

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[15] $Amihud = Average(\frac{|r_t|}{Volume_t})$, where r_t is the stock return on day t and $Volume_t$ is the dollar trading volume on day t.

for these country characteristics.

We use two country-level variables to capture the extent of insider trading in a country.[16] "Blackout" is the difference between the percentage of insider trades that occur within one month after an earnings announcement and one month before it, as described by Brochet (2017). "Insider trading regulation" measures the effectiveness of insider trading regulation elicited from global surveys on corporate officers, which we get from Du and Wei (2004). Our measure of country-level information environments includes the accounting quality index from Porta, Lopez-de Silanes, Shleifer, and Vishny (1998), which is based on the reporting or omission of 90 items in corporate financial reporting. Auditing quality is measured as the proportion of firms audited by one of the Big 4 firms in a country (based on 2012 WorldScope data). We measure the legal system using Legal Origin, a binary indicator that takes the value of 1 if the origin of the country's legal system is common law and 0 otherwise (Porta, Lopez-de Silanes, Shleifer, and Vishny (1998)). We use three indicators, namely the rule of law, government effectiveness, and regulatory quality from Worldwide Governance Indicators to measure general institutional quality at country-level (Kaufmann, Kraay, and Mastruzzi (2011)). These indicators combine views and survey results and are intended to measure governance quality at the country level.

4 Empirical Results

4.1 Informativeness of insider trading around the world

Before investigating the relation between foreign institutional ownership and insider profitability at firm level, we provide evidence of the informativeness of insider trading around the world. To our knowledge, this has not been documented before because

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[16]We do not use the year insider trading law was enacted and first enforced (Bhattacharya and Daouk (2002)) in each country to proxy for insider trading regulation, because all (22) countries have enacted (enforced) insider trading laws prior to the beginning of our sample period.

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of data limitations. We use portfolio sorting methodology, but our results hold using Fama-MacBeth regression controlling for the usual cross-sectional return predictors.

Every month, we sort stocks within each country into quintiles based on insiders' net purchase ratio (NPR) formed using data from the previous six months. We form equal-weighted long-short portfolios by longing the top quintile stocks and shorting the bottom quintile stocks, and hold the portfolio for three months. The average portfolio return for month t is the equal-weighted average month t returns of the portfolios implemented in the previous three months (Jegadeesh and Titman (1993)). Table 2 reports the time series average monthly returns and alphas for each country. Portfolio alpha is estimated using a global version of five-factor model following Fama and French (2017).[17]

Table 2 suggests that insider trading activity is generally quite informative about future stock returns for most countries in our sample. The alphas of the long-short portfolio are significant for 17 of the 26 countries, ranging from 0.24% to 0.73% per month. We can benchmark the insider trading profitability in other countries against that in the U.S.: the monthly long-short portfolio alpha for the U.S., estimated using Fama and French (2015) five-factor model, is 0.37% (t-stat=1.93).[18] Many countries, however, generate stronger return predictability. For example, the monthly alphas formed on NPR are 0.52%, 0.53%, 0.62% and 0.60% in Australia, Canada, South Korea and India, respectively.[19]

Another fact evident from Table 2 is that the alpha of the long-short portfolio comes mainly from the long leg. This is consistent with the US evidence that insider

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[17]The global and regional return factors are available for download at Ken French's website: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

[18]The magnitude estimated using 2iQ data is in line with studies using Thomson Reuters Insider Filing data. See, for example, Cohen, Malloy, and Pomorski (2012) and Jeng, Metrick, and Zeckhauser (2003).

[19]The return predictability of insider trading is not subsumed by firm characteristics commonly associated with cross-sectional stock returns. In Table A3 of the Internet Appendix, we run Fama-MacBeth regressions controlling for the past one month and twelve months returns, the natural logarithm of market capitalization, and book-to-market ratio. Coefficients of NPR are significantly positive in 23 of the 26 countries.

purchases are much more informative than insider sales (Lakonishok and Lee (2001); Jeng, Metrick, and Zeckhauser (2003)). The common explanation is that insider sales could be driven potentially by many non-information reasons, such as liquidity or diversification motives, while insider purchases are motivated more likely by private information.

How does the informativeness of insider trading vary with proxies of country-level institutional environments? This question could serve as a validation test of our global insider trading data: one should expect the profitability of insider trades to be larger in countries with inferior legal institutions and more opaque financial reporting environment. To demonstrate this, we plot the cross-country relation between insider trading profitability and country characteristics in Figure 1. The y-axis is the insider trading profitability, measured by the average monthly long-short portfolio return (in percentage) based on the NPR quintile rank. The x-axis represents the country characteristics, including average foreign and domestic institutional ownership, accounting quality index, auditing quality, and three institutional quality measures from the Worldwide Governance Indicators: government effectiveness, rule of law, and regulatory quality.

The plots in Figure 1 are generally consistent with our prior that insider trades are less profitable in countries with better institutional environments. Panels C and D reveal that the average returns based on NPR are lower in countries with better financial reporting environments, as measured by accounting and auditing quality. Panels E and F show that insider trading are less profitable in countries with more effective insider-trading regulation, as measured by the fraction of firms with a blackout period and the insider trading restrictiveness measure from Du and Wei (2004). Panels G to I show the same negative relation between average insider trading profitability and three institutional quality measures: regulatory quality, government effectiveness, and rule of law, respectively. The negative relation is not entirely significant due to

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the small sample size. Nevertheless, the consistent results we obtain using different measures of institutional environments suggest, reassuringly, that our data indeed captures the insider trading activity in those countries.

Panel A of Figure 1 shows that there is a significant negative relation between average foreign institutional ownership and insider trading profitability at country level. A five percentage points increase in average foreign institutional ownership is associated with a reduction of 0.45% of monthly return based on NPR. Panel B shows an *insignificant* and flatter relation between insider trading profitability and average domestic institutional ownership. These results provide suggestive evidence that foreign investors are more effective in deterring opportunistic insider trading than domestic investors. Of course, the country-level analysis cannot clearly identify the effect of foreign investors, due to the confounding effects of other (unobserved) country characteristics. In the next section, we will shift the analysis to firm-level. By controlling for country-time and firm fixed effects in panel regressions, and utilizing the exogenous variation in foreign institutional ownership, we can better identify the causal effect of foreign investors on the profitability of insider trading.

4.2 Foreign institutional ownership and the profitability of insider trading

The main hypothesis of this paper is that foreign institutional ownership reduces the profitability of insider trading. Moreover, because the interests of foreign institutional investors may be less entangled with firm management than those of local institutional investors, foreign institutional ownership is expected to have *incremental* power to mitigate insider trading, more so than its domestic counterpart. In this section, we empirically test these hypotheses at the firm-level.

Our baseline specifications regress future one-, three-, or six-month market-adjusted excess return of stock i on its insider net purchase ratio (NPR), total institutional

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ownership (IO_Total), foreign institutional ownership ($IO\_Foreign$), and the interaction between NPR and institutional ownership. The observations are at monthly intervals.

$$ExRet_{i,t+1\to t+k} = \beta_1 NPR_{i,t} + \beta_2 NPR_{i,t} * IO\_Total_{i,t} + \beta_3 NPR_{i,t} * IO\_Foreign_{i,t} + \beta_4 IO\_Total_{i,t}$$
$$+ \beta_5 IO\_Foreign_{i,t} + \beta_6 Controls_{i,t} + \beta_7 Controls_{i,t} * NPR_{i,t} + \epsilon_{i,t}$$

$$(1)$$

Since the main variables of interest are interaction terms, some explanation is in order. Coefficient β_1 captures the profitability of insider trading: a positive β_1 suggests that the returns of stock i are higher when insider purchases are larger than insider sales. Coefficient β_2 captures the amplifying (or mitigating) effect of domestic institutional ownership on insider profitability. A negative β_2 indicates that insider trading profitability is lower when the total institutional ownership is higher.

Most importantly, the total amplifying (or mitigating) effect of foreign institutional ownership is captured by $\beta_2 + \beta_3$. If the sum is negative, it suggests that foreign institutions reduce insider profitability. The coefficient β_3 alone represents the incremental effect that foreign institutional ownership exerts on top of domestic institutional ownership, and the t-statistics of β_3 formally test the statistical difference between the effects of foreign and domestic institutional ownership.

As mentioned earlier, the regulations and reporting conventions of insider trading vary across countries. To ensure that such differences do not bias our estimates, we include country-time fixed effects in our specifications. In addition, we include firm fixed effects to absorb unobservable heterogeneity at firm-level, since insider trading is relatively persistent. To properly account for the time-series dependence in the dependent variable, we cluster all standard errors at firm-level.

Table 3 shows the regression results. Columns (1) and (2) examine the future excess returns measured over one-month's horizon. Column (2) controls for additional

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firm characteristics, including the past 1-month return, past 12-month return, logarithm of a firm's market capitalization, and book-to-market ratio. We also control for the interaction of these firm characteristics with NPR since some of these controls are correlated with institutional ownership and may affect insider trading profitability.[20] From Column (2), NPR is shown to predict higher future stock returns. When insider trading changes from $NPR = 0$ (equal number of purchases and sells) to $NPR = 1$ (all insider purchases), the associated monthly stock excess return increases by 0.50 percentage points. The interaction between NPR and total institutional ownership (IO_Total) is negative and significant, indicating that both domestic and foreign institutions have mitigating effect on insider profitability. When a firm has a higher institutional ownership in general, its insider trading becomes less predictive of future stock returns.

More importantly for our study, the interaction term between NPR and $IO\_Foreign$ is negative and significant (coefficient=-0.008, $t = 3.43$). This indicates that foreign institutions lower the profitability of insider trading *above and beyond* the impact of domestic institutions. In fact, the mitigating effect of foreign institutional ownership is evidently more pronounced than that of domestic institutional ownership. A 10% increase in *domestic* institutional ownership would reduce the profitability of insider trading by 0.01 percentage points $(0.1\% * 10\%)$, while the same magnitude of increase in *foreign* institutional ownership would lower insider profitability by 0.09 percentage points $((0.1\% + 0.8\%) * 10\%)$, almost an order of magnitude greater. The difference in the mitigating effect of foreign institutional ownership on insider trading profitability is unlikely to be driven by observable heterogeneity at firm level, as we control for the interactions between NPR and firm size, book-to-market ratio, and past returns.

In Columns (3) to (6), we replace the dependent variable with three- and six-month cumulative excess returns. In each specification, the interaction between NPR

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[20]For example, foreign investors may prefer to invest in larger firms and firm size also affects insider trading profitability.

and $IO\_Foreign$ is negative and significant. For the three-month horizon (Column (4)), the interaction effect of domestic institutional ownership is -0.004, while the total effect of foreign institutional ownership is -0.027 ($-0.004 - 0.023$). For the six-month horizon (Column (6)), the interaction effect of domestic institutional ownership is -0.006, while the total effect of foreign institutional ownership is -0.048 ($-0.006 - 0.042$). The differences between foreign and domestic institutional ownership for both horizons are statistically significant at the 1% level. These results suggest that foreign institutions curb insider trading profitability more effectively than domestic institutions. This finding highlights the benefit of our cross-country research design – namely that it enable us to separate the influences of domestic and foreign institutions.[21]

Aggarwal, Erel, Ferreira, and Matos (2011) show that foreign institutional ownership positively affects corporate governance, and prior studies also find that insider trading is less profitable among firms with better corporate governance (Ravina and Sapienza (2009); Dai, Fu, Kang, and Lee (2016)). However, does the foreign institutional ownership curb insider trading solely through corporate governance? To answer this, we control for the interaction between insider trading and the corporate governance index for a subset of firms. If foreign institutional ownership has no incremental effects, the mitigating effect of $IO\_Foreign$ should be expected to greatly decrease once corporate governance is controlled for.

The corporate governance index comes from the governance attributes of Bloomberg's Environmental, Social, and Governance (ESG), and has been used in other academic studies (e.g., Albuquerque, Brandão-Marques, Ferreira, and Matos (2018)).[22] In Columns (7) and (8) of Table 3, we compare the coefficient of $NPR*IO\_Foreign$ with

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[21]In Table A4, we show that our baseline findings are qualitatively unchanged in the non-U.S. sample. Foreign institutional ownership still has incremental power to mitigate insider trading profitability, more so domestic institutional ownership.

[22]We thank Pedro Matos for generously sharing the international firm-level corporate governance data with us.

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and without the interaction between NPR and corporate governance. The results show that the mitigating effect of foreign institutional ownership on insider trading barely changes. This indicates that foreign institutions do more than improve traditional corporate governance measures in curbing insider trading. As discussed later, they may engage in more direct monitoring activities in changing insider trading behavior.

To further investigate where the mitigating effect of foreign institutional ownership lies, we separate out insider purchases from insider sells, and interact each of them with institutional ownership. Insider purchases are measured by $\max(NPR, 0)$, while insider sells are measured by $\min(NPR, 0)$. The regression specification is as follows:

$$
\begin{aligned}
ExRet_{i,t+1 \to t+k} = {} & \beta_1 \max(NPR_{i,t}, 0) + \beta_2 \min(NPR_{i,t}, 0) + \beta_3 \max(NPR_{i,t}, 0) * IO\_Total_{i,t} \\
& + \beta_4 \min(NPR_{i,t}, 0) * IO\_Total_{i,t} + \beta_5 \max(NPR_{i,t}, 0) * IO\_Foreign_{i,t} \\
& + \beta_6 \min(NPR_{i,t}, 0) * IO\_Foreign_{i,t} + \beta_7 IO\_Total_{i,t} + \beta_8 IO\_Foreign_{i,t} \\
& + Controls_{i,t} + Controls_{i,t} * NPR_{i,t} + \epsilon_{i,t}
\end{aligned}
\tag{2}
$$

Table 4 presents the results for one-month excess returns (Column (1)), three-month excess returns (Column (2)), and six-month excess returns (Column (3)). Across specifications, we consistently find several patterns. First, insider sells seem to have stronger predictive power over future stock returns than insider purchases. The coefficient for $\min(NPR, 0)$ is higher than the coefficient for $\max(NPR, 0)$. This is somewhat at odds with previous studies of insider trading in the U.S., which show that insider purchases are more informative (Lakonishok and Lee (2001)).[23] Second, both domestic and foreign institutional ownership reduce the profitability of insider sells, but not insider purchases. This is consistent with the notion that insider sales carry

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[23]This difference is mainly attributed to the time-series vs. cross-sectional variation in insider trades. Our regression uses firm fixed-effects, and large insider sales relative to within-firm average have strong predictive power over future stock returns. In untabulated analyses, we remove firm fixed-effects and find that insider purchases have a stronger predictive power than insider sells.

more litigation risks for insiders and firms (Cheng and Lo (2006); Rogers (2008)). Finally, foreign institutions have a stronger mitigating effect on the profitability of insider sells. For example, in Column (1), a 10% increase in domestic institutional ownership reduces the profitability of $\min(NPR, 0)$ by 0.2 percentage points, while the same magnitude of increase in foreign institutional ownership reduces insider sale profitability by 1.4 percentage points. The difference is 1.2 percentage points and highly significant ($t = 3.39$).

4.3 Identification using MSCI index additions and deletions

A potential concern about the panel regression results is the selection bias: foreign institutions may prefer firms with certain characteristics, which correlate with insider trading profitability. For example, Ferreira and Matos (2008) and Leuz, Lins, and Warnock (2008) show that foreign investors prefer firms with less insider control and better governance. These firms may be associated with lower insider trading profitability to begin with.

To alleviate such concerns, we exploit variations in foreign institutional ownership due to membership changes in Morgan Stanley Capital International All Country World Index (MSCI ACWI). MSCI ACWI is a commonly used benchmark index for portfolio managers when investing in foreign countries. Past studies show that a firm's foreign institutional ownership increases significantly when added to the MSCI ACWI (Ferreira and Matos (2008); Cremers, Ferreira, Matos, and Starks (2016)). For a stock to be included in the MSCI ACWI, it has to domicile in a Developed Markets (DM) country or a Emerging Markets (EM) country.[24]

The variation of a firm's MSCI ACWI membership status comes from a firm's market capitalization rank within its country. Within each country, MSCI ranks

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[24]Countries not in the Developed Markets or the Emerging Markets are grouped in the Frontier Markets. The list of the Developed Markets and the Emerging Markets countries remain virtually constant during our sample period. The only addition to the Emerging Markets between 2000 to 2015, United Arab Emirates, is not in our insider trading data set.

firms based on their (unadjusted) market capitalization, and include the larger firms until it covers about 85% of cumulative (free-float) market capitalization in the given country.[25] Bena, Ferreira, Matos, and Pires (2017) show that the foreign institutional ownership of a firm is sharply lower when a firm's market capitalization falls below the 85% cutoff. To take advantage of the exogenous variation in foreign ownership induced by MSCI ACWI membership, we adopt a difference-in-difference (D-in-D) methodology around a 20% bandwidth (number of firms) on each side of the MSCI market cap cutoff in eligible countries. We interact insider trading measure NPR and a dummy of a firm's MSCI AWCI membership, while simultaneously controlling for the interaction between NPR and a firm's market capitalization. The idea is that, while unobserved firm characteristics may correlate with insider trading profitability, their effect on insider trading profitability should be continuous. On the other hand, MSCI membership should have a distinct impact on insider trading profitability if foreign institutional ownership has a causal effect.

We first confirm in Table 5, Panel A that foreign institutional ownership increases significantly when a firm is added to the MSCI index. A dummy variable, $MSCI_t$ takes the value of one if a firm is a member of the MSCI ACWI in year t. The first column shows the estimates when we regress firms' foreign institutional ownership on the $MSCI$ dummy, with firm and country-by-time fixed effects. Foreign institutional ownership increases by 1.2% to 2.0% when the firm is newly added to the MSCI index, which is substantial given that the mean and standard deviation of $IO\_Foreign$ are 4.09% and 6.93%, respectively. In contrast, domestic institutional ownership decreases slightly when a firm is in the MSCI.

Next, we examine the impact of MSCI membership on insider trading profitability.

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[25]See "MSCI Global Investable Market Indexes Methodology", Morgan Stanley Capital International, 2017

We estimate the following difference-in-differences regression:

$$ExRet_{i,t+1\rightarrow t+k} = \beta_1 NPR_{i,t} + \beta_2 NPR_{i,t} * MSCI_{i,t} + \beta_3 MSCI_{i,t}$$

$$+ Controls_{i,t} + Controls_{i,t} * NPR_{i,t} + \epsilon_{i,t} \qquad (3)$$

The coefficient of interest is β_2, which measures the change in the return pre-dictability of NPR for treated firms relative to control firms, after a firm is included in or excluded from the MSCI ACWI. A negative β_2 indicates that insider trading profitability is lower when the firm becomes a member of the MSCI ACWI. Table 5, Panel B suggests that firm's three-month cumulative excess returns increases by 2.1% ($t = 4.61$) when NPR increases by one unit. When the firms are included in the MSCI ACWI, the predictability of NPR decreases by -0.4% ($t = 2.12$), which is economically large and statistically significant. The results are consistent when the dependent variables are the one-month or six-month cumulative excess returns.

Another way of teasing out the causality is to examine the dynamic effect of MSCI inclusion events on insider trading profitability. If MSCI firms and non-MSCI firms are inherently different in terms of insider trading, we might expect the reduction in insider trading profitability to occur *before* the actual inclusion year. To investigate, we examine firms' insider trading profitability for the two years before and the two years after being included in the MSCI ACWI.

Table 5, Panel C shows the estimation results when estimating separately for $MSCI(t = -1)$, $MSCI(t = -2)$, $MSCI(t = 0)$, $MSCI(t = 1)$, $MSCI(t >= 2)$, and their interactions with NPR. $MSCI(t = -1)$ is a dummy variable that equals one for the first year before the inclusion into MSCI index. $MSCI(t = -2)$, $MSCI(t = 0)$, and $MSCI(t = 1)$ are similarly defined, where $t = 0$ refers to the initial inclusion year. $MSCI(t >= 2)$ is a dummy variable that equals one starting from the second year after inclusion in the MSCI index, and zero for exclusion years and year 0 and

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1. Panel C of Table 5 shows that the decrease in insider profitability, captured by the interaction of NPR with MSCI inclusion dummy, occurs *only after* the stock is included in MSCI (t=1). The coefficient on $t = 0$ is insignificant, which is consistent with the fact that it takes some time for foreign investors to monitor insiders' activity and for the monitoring effect to be reflected in the return predictability of NPR.

We plot the coefficient estimates of the interaction terms in Figure 2. The coefficients for the interactions of NPR and the MSCI inclusion dummies reflect the difference in the return predictability of NPR for the treated stocks, and for the control stocks, surrounding the inclusion in the MSCI ACWI. There is no "pre-trend" in year $t-1$ or $t-2$, reflected in the small and insignificant coefficients for the interaction terms of NPR with $MSCI(t-1)$ and $MSCI(t-2)$. Shortly after the inclusion, the predictability of treated stocks started to decline and the reduction in predictability of NPR persists for periods afterwards. Hence, the D-in-D tests suggest that foreign institutional ownership cause a reduction in insider trading profitability.

4.4 Heterogeneous effects of foreign institutions on insider trading

While foreign institutional investors can be effective at deterring opportunistic insider trading, is it substitutable for or complementary to a country's legal and institutional environments? On the one hand, foreign institutional investors may require adequate country-level legal protection to avoid being ripped off by corporate insiders. On the other hand, the monitoring from foreign institutions may be particularly valuable in countries where laws and regulations are not well-developed. In this section, we examine the cross-country variation in the mitigating effect of foreign institutional ownership.

The legal and institutional environments of a country are multi-dimensional, and one should not expect their relationship with foreign institutional ownership is uni-

form across different aspects. Therefore, we split our countries into subsamples based on a variety of country characteristics: insider trading restrictiveness, legal origin, government effectiveness, rule of law, regulatory quality, accounting quality, and auditing quality.

Table 6 shows the subsample results based on countries' insider trading restrictiveness, legal origins, and government effectiveness. In the first two columns, we sort all countries into two groups based on the median cut-off of the blackout, which is calculated as the difference between the percentage of insider trades that occur within one month after an earnings announcement and one month before (Brochet (2017)). The greater the blackout, the more likely corporate insider trades are subject to timing restrictions and stricter insider trading regulation. The coefficient of $NPR*IO\_Foreign$ is -0.039 ($t = 2.75$) for countries with low blackout values, and -0.017 ($t = 1.96$) for high blackout countries. This suggests that the deterring effect of foreign investors is stronger when the domestic insider trading restrictions are weaker. Similarly, when we divide the sample by the insider trading restrictiveness measure, per Du and Wei (2004), in Columns (3) and (4), the results show that a 10% increase in foreign institutional ownership is associated with a 0.55% ($t = 3.24$) decrease in the predictability of NPR for countries with weak insider trading restrictions, but has no noticeable effect on the predictability of NPR countries with strong insider trading restrictions.

In Columns (5) and (6), we split sample countries into common law and non-common law countries. The coefficient of $NPR*IO\_Foreign$ is -0.035 ($t = 2.65$) for non-common law countries and -0.023 ($t = 2.53$) for common-law countries. Foreign institutions seems to play a more important role in curbing insider trading in non-common law countries, which are usually associated with weaker investor protection (Porta, Lopez-de Silanes, Shleifer, and Vishny (1998)).

In Columns (7) to (12) of Table 6, we group the sample by countries' governance

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proxies, including government effectiveness, rule of law, and regulatory quality. Consistently, the disciplinary effect of foreign investors is also stronger in countries that are poorly governed, as identified by the three indicators from the Worldwide Governance Indicators (WGI) (Kaufmann, Kraay, and Mastruzzi (2011)). The measure of government effectiveness captures the perceptions of the quality of public services, civil service, and policy formulation and implementation. In countries with low government effectiveness, a 10% increase in $IO\_Foreign$ reduces the predictability of NPR by -0.044% ($t = 4.24$). In contrast, foreign institutional ownership has a small positive effect on insider trading profitability in countries with high governance effectiveness. Consistently, foreign investors have a stronger impact of curbing opportunistic insider trading in countries with weaker rule of law (Columns (9) and (10)). Finally, the curbing effect of foreign investors is stronger in countries with poorer regulatory qualities, which captures the ability of the government to formulate and implement sound polices on private sector development.

While most of the proxies we examined suggest that foreign institutional ownership is a substitute for country-level legal and institutional environment, the relationship between accounting quality and the effect of foreign institutional ownership is ambiguous. Columns (13) to (14) of Table 6 indicate that an increase in foreign institutional ownership reduces the profitability of NPR more in countries with low accounting quality than in countries with high accounting quality. Columns (15) and (16) show that foreign institutional ownership has similar effect in countries with poor or good auditing qualities. A potential explanation for the ambiguous relationship is that foreign investors rely on accounting information to understand their portfolio companies. In countries in which companies cook the accounting numbers, foreign institutional investors face higher information acquisition cost, which reduces the effectiveness of their monitoring on insider trading.

4.5 Legal origins of foreign institutional investors and insider trading profitability

We now analyze the legal origins of foreign institutional investors' home country, and how that might influence the mitigation effect of foreign institutions on insider trading. Porta, Lopez-de Silanes, Shleifer, and Vishny (1998) argue that common-law countries in general have stronger legal protections for shareholders than civil-law countries. Accordingly, it is plausible that institutional investors from common-law countries would tolerate insider trading less and monitor corporate insiders more forcefully. Therefore, we should expect heterogeneous effects of foreign institutions on insider trading based on the legal origins of foreign institutions' home countries.

To empirically investigate this hypothesis, we decompose foreign institutional ownership into two components: foreign institutional ownership from civil-law countries ($IO\_Foreign(Civil)$) and foreign institutional ownership from common-law countries ($IO\_Foreign(Common)$). Each variable interacts with NPR to predict future stock returns:

$$
\begin{aligned}
ExRet_{i,t+1 \to t+k} = {} & \beta_1 NPR_{i,t} + \beta_2 NPR_{i,t} * IO\_Total_{i,t} + \beta_3 NPR_{i,t} * IO\_Foreign(Civil)_{i,t} \\
& + \beta_4 NPR_{i,t} * IO\_Foreign(Common)_{i,t} + \beta_5 IO\_Total_{i,t} + \beta_6 IO\_Foreign(Civil)_{i,t} \\
& + \beta_7 IO\_Foreign(Common)_{i,t} + Controls_{i,t} + Controls_{i,t} * NPR_{i,t} + \epsilon_{i,t} \qquad (4)
\end{aligned}
$$

Table 7 shows the results. Across different return horizons, foreign institutional investors from common-law countries seem to consistently reduce the profitability of insider trading more effectively than foreign institutions from civil-law countries do, when both are benchmarked against domestic institutional investors. For example, for three-month excess returns (Column (2)), the interaction between NPR and IO_Total is -0.004, indicating that a 10% increase in domestic institutional ownership reduces excess returns of NPR by 0.04 percentage points. The interac-

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tion between NPR and $IO\_Foreign(Common)$ is -0.022 and statistically significant, suggesting that an increase of the same magnitude in foreign institutional ownership (from common-law countries) reduces insider profits by 0.26 percentage points ($10\% * (-0.004 - 0.022)$). The *incremental* power of common-law foreign institutions is statistically significant.

At the same time, the interaction between NPR and $IO\_Foreign(Civil)$ is negative but insignificant. While the point estimate for this interaction is similar to the point estimate for the interaction term with $IO\_Foreign(Common)$, a higher level of foreign institutional ownership from civil-law countries does not reliably reduce the profitability of insider trading above and beyond the effect of institutional ownership in general. The contrast between the mitigating effect of foreign institutions from common-law countries and that of foreign institutions from civil-law countries suggests that the legal origins of foreign investors are important in curbing insider trading.

5 Channels

Foreign investors can curb opportunistic insider trading through two non-mutually exclusive channels. First, foreign investors might improve firms' information environments and price efficiency by, for example, attracting more sell-side analysts to cover the firm. This reduces the information asymmetry between corporate insiders and outside investors, thereby reducing insider profits — the information channel. Second, foreign investors could directly monitor the top managers of a firm and actively manage litigation risks. These activities deter insiders from trading when their information is most sensitive, hence reducing the average profitability of insider trades — the monitoring channel. In this section, we conduct empirical analyses to disentangle the two channels.

5.1 Controlling for firms' information environments

Past and contemporaneous papers have shown that institutional ownership increases price efficiency, both in the U.S. and worldwide (Boehmer and Kelley (2009); Kacperczyk, Sundaresan, and Wang (2018)). To the extent that a better information environment impounds private information into stock prices more quickly and reduces insiders' information advantage, foreign institutional holdings may alleviate insider profitability.

We measure a firm's information environment using four different proxies. First, we use the number of analysts following a firm's stock. The more analysts following a firm, the better a firm's information environment (Lang, Lins, and Maffett (2012)). To account for the positive skewness of analyst coverage, we transform the variable into Ln(Analyst coverage+1). Second, we use the dispersion of analyst forecasts, whereas a larger forecast dispersion indicates a worse information environment.[26] Third, we use analyst forecast error, which is defined as the absolute value of the difference between the consensus EPS forecast and the actual EPS, scaled by the actual EPS. We assume that firms with a smaller forecast error have a better information environment. Finally, we use price non-synchronicity, as described in Chen, Goldstein, and Jiang (2006), to measure the amount of firm-specific information in stock prices. Higher price non-synchronicity indicates more informative stock prices and a better information environment.[27] All information environment proxies are measured one period before the insider trading is measured.[28]

For each proxy, we estimate the baseline regressions controlling for both the information environment and the interaction between the information environment and

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[26]It should be noted that a firm must have at least two analysts to have a valid forecast dispersion measure, which limits the sample size when we use the forecast dispersion variable.

[27]Papers that use firm-specific return variation as a measure for price informativeness include Chen, Goldstein, and Jiang (2006), Jin and Myers (2006), and Fernandes and Ferreira (2008).

[28]This is to take into account that some of the market-based information environment proxies (for example, price synchronicity) can be directly influenced by contemporaneous insider trading.

insider NPR.

$$ExRet_{i,t+1\rightarrow t+k} = \beta_1 NPR_{i,t} + \beta_2 NPR_{i,t} * IO\_Total_{i,t} + \beta_3 NPR_{i,t} * IO\_Foreign_{i,t}$$

$$+ \beta_4 IO\_Total_{i,t} + \beta_5 IO\_Foreign_{i,t} + \beta_6 Information Env_{i,t-1} * NPR_{i,t}$$

$$+ \beta_7 Information Env_{i,t-1} + Controls_{i,t} + Controls_{i,t} * NPR_{i,t} + \epsilon_{i,t} \qquad (5)$$

Table 8 shows the results. Since the size of samples with available information-environment proxy varies, for each proxy we show the results both with and without information-environment controls in order to compare the coefficients on $NPR *$ $IO\_Foreign$. In Columns (1) and (2), we use analyst coverage as the proxy for information environment, and Column (2) controls for the interaction between insider NPR and Ln(Analyst coverage $+ 1$). From Column (1) to Column (2), the coefficient on $NPR * IO\_Foreign$ slightly decreases from -0.023 to -0.021, but remains significantly negative when the information environment is controlled for. The small change suggests that the major part of the mitigating power of foreign institutional ownership is not derived from the information environment channel. It is also notable that, in Column (2), the interaction between NPR and analyst coverage is significantly negative. This suggests that a better information environment also reduces the profitability of insider trading, but through a different channel.

Columns (3) and (4) use analyst forecast dispersion as the measure for information environment. Comparing Column (4) and Column (3), and controlling for the interaction between NPR and forecast dispersion, the mitigating power of foreign institutional ownership stays unchanged at -0.024. At the same time, a higher forecast dispersion independently correlate with higher insider trading profits. In Columns (5) and (6) of Table 8, we use absolute forecast errors to proxy for stocks' information environments. The coefficient on $NPR * IO\_Foreign$ across the two columns shows that the information environment does not affect the mitigating power of foreign in-

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stitutional ownership. Finally, using price non-synchronicity (Columns (7) and (8)) as the measure for information environment, we find that the mitigating effect of foreign institutional ownership on insider trading profitability is unchanged.

The evidence presented in this section suggests that the mitigation effect of foreign institutional ownership found in our baseline regressions is unlikely to operate through the information channel.

5.2   The distribution of insider trades

If foreign institutional ownership affects insider profitability through the monitoring channel, corporate insiders should alter their trading patterns in response to increased foreign institutional ownership. In this section, we directly examine the distribution of insider trades in relation to foreign institutional holdings. Our hypothesis is that insider trades shift in a way that reduces the information content of an average insider trade. In particular, we examine the size and frequency of insider trades, the direction of these trades, and the timing of insider trades in relation to earnings announcements.

In Columns (1) to (3) of Table 9, we first examine how the total number of transactions ($Log(\#Trades)$), the average transaction size per trade ($Log(Value)$), and the total transaction value ($Log(Total\_Value)$) change with respect to change in foreign institutional ownership. Column (1) suggests that a 10% increase in $IO\_Foreign$ is associated with an insignificant 1.77% ($t = 1.51$) increase in the total number of insider trades for a firm within a year. Accompanying the insignificant change in total transaction number is the reduction in the average size of transactions. Column (2) suggests that each transaction size, calculated as transaction shares times the stock price (in EUR) decreases by -5.79% ($t = 3.19$) when foreign institutional ownership increases by 10%. In combination, the total insider transaction value decreases slightly by -4.63% ($t = 1.94$). Hence, the results suggest that insiders split their transactions to trade in a smaller amount when foreign institutional ownership

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increases, potentially to avoid the scrutiny from foreign shareholders. The evidence is consistent with findings in prior literature that insiders trade less opportunistically in periods characterized by a higher intensity of enforcement (Cohen, Malloy, and Pomorski (2012); Del Guercio, Odders-White, and Ready (2017)).

In Columns (4) and (5) of Table 9, we examine how the composition of buy and sell transactions change when $IO\_Foreign$ changes. We measure the fraction of sell transactions using both the number of sell transactions over total insider transactions ($Sell(\#)Fraction$) and the dollar value of sells over total dollar value of insider trades ($Sell(Value)Fraction$). Insiders trade more cautiously by reducing the sells substantially after foreign institutional ownership increases. The sells number fraction decreases by 1.55% ($t = 3.53$) and the sells dollar fraction decreases by 1.96% ($t = 4.12$) when foreign institutional ownership increases by 10%. This is consistent with the argument that insider sales carry more litigation risks for insiders (Rogers (2008)).

In addition, the cautiousness of insiders may also be reflected in the timing of their trades. Column (6) and (7) of Table 9 examine the fraction of insider trades that occur in the one month *after* the earnings announcement date. This period is supposed to be the *least* information-sensitive period with respect to insider trading, as trading right after an earnings announcement usually indicates the existence of blackout period policies. We also control for the informativeness of earnings announcement by including the absolute earnings announcement returns (CAR[-10,2]) averaged over the following year. Hence, the results are unlikely driven by the changing informativeness of earnings when foreign institutional ownership increases (Kacperczyk, Sundaresan, and Wang (2018)). Consistent with the hypothesis that insiders change trading behavior under the pressure of foreign institutions, the fraction of insider trades after earnings announcements increases by 1.08% when foreign institutional ownership increases by 10%. This finding suggests that insiders adjust their timing of trades due

to either firm-level policy change or insiders' voluntary behaviors. It is consistent with the monitoring channel, but is not predicted by the information channel.

5.3 Top-tier vs. lower-tier insiders

Another implication from the monitoring channel is that foreign institutional ownership should reduce the profitability of trades made by top-tier insiders more than that of trades made by lower-tier insiders. First, institutional investors tend to have direct communication with executives and board members. Second, the potential litigation risks and reputation losses are larger for these top managers. In contrast, if the mitigating effect of foreign ownership operates mainly through the information channel, it is unclear which insiders should lose more profitability.

To test this hypothesis, we construct insider NPR based on top-tier insiders' trades and lower-tier insiders' trade separately. Following 2iQ, top-tier insiders (insider level of A) are defined as the executive board, chairman, and top-five shareholders of the firms. We then regress firms' future three-month excess returns on $NPR(Top)$, $NPR(Low)$, and their interactions with IO and $IO\_Foreign$.

Table 10 shows that the trades of both top- and lower-tier insiders' are positive in predicting future stock returns. When $NPR(Top)$ increases by one unit, it predicts that the future three-month excess return will increase by 0.7% (Column (2)). Similarly, a one unit increase in $NPR(Low)$ is associated with exactly the same amount of future-return changes. The coefficient on $NPR(TOP) * IO\_Foreign$ is -0.026 ($t = 3.85$), indicating that the insider trading profitability decreases by an extra 0.26% when foreign institutional ownership increase by 10%. The same magnitude of increase in foreign institutional ownership only reduce the profitability of $NPR(Low)$ by 0.14%, about half the amount of the top insiders' trades. The results of using dependent variables of one-month and six-month excess returns are also consistent.

Taken together, the analysis, by decomposing insider trades into top and low tier insiders, shows that the monitoring effect of foreign institutional investors comes mostly from monitoring of top-tier corporate insiders.

6   Robustness Tests

In this section, we conduct several additional tests to check the robustness of our findings and rule out several alternative explanations. In each case, we find that foreign institutional ownership significantly reduces the profitability of insider trading.

In Table A4, we run the baseline regression on a subsample of firms that are domiciled outside the U.S. For one-, three-, or six-month future excess return, the coefficient on $NPR*IO\_Foreign$ is significantly negative, while the interaction term $NPR*IO\_Total$ is not distinguishable from zero. This indicates that, for the non-US subsample, foreign institutional ownership lowers the profitability of insider trading, whereas domestic institutional ownership does not curb insider trading.

In Table A5, we control for the cross-listing status of stocks in our sample. Whenever a stock is cross-listed in overseas exchanges, we assign a dummy variable GDR equal to 1. Cross-listed stocks may be subject to more stringent regulatory oversight and disclosure requirements from the stock exchange abroad (Doidge, Karolyi, and Stulz (2004)). As these cross-listed stocks tend to have higher foreign institutional ownership, this may explain our findings. In Table A5, we include an additional interaction term $NPR*GDR$ in the baseline specification, and find that the mitigating effect of foreign institutional ownership is still robust and statistically significant.

In Table A6, we investigate another potential channel through which foreign institutional ownership may affect insider trading profitability. Wei (2010) and Ng, Wu, Yu, and Zhang (2015) suggest that foreign institutional ownership improves the liquidity of a stock. While standard theories and empirical evidence[29] suggest that

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[29]See, for example, Collin-Dufresne and Fos (2015).

an increase in stock liquidity drives insiders to trade more aggressively on private information and leads to an underestimation of our result, we empirically test the robustness of our findings by directly controlling for stock liquidity. We use two stock liquidity measures: the first measure ("Amihud illiquidity") follows Amihud (2002), and the second measure ("fraction of zero return") follows Lesmond (2005). The baseline specification includes the liquidity measure and an interaction term between NPR and the liquidity measure. Columns (1) to (3) of Table A6 shows that, controlling for stock (il)liquidity, foreign institutional ownership still significantly reduces the profitability of insider trading. In addition, using the fraction of zero return days, we find that insider trading profits are higher when a stock is more liquid. Furthermore, in Column (4), we control for the interaction between the average daily return volatility of stocks and NPR. The results suggest that the mitigating power of foreign institutional ownership is unaffected by controlling for return volatility.

7 Conclusions

In this paper, we examine the relation between foreign institutional ownership and the profitability of insider trades. We find that higher foreign institutional ownership significantly reduces insider trading profitability, above and beyond the effect of domestic institutional ownership. This suggests that foreign investors play an important role in mitigating the adverse impact of insider trading, especially in countries with weak legal and institutional environments. The effect of foreign institutional ownership is plausibly causal using variations induced by MSCI ACWI additions and deletions. The mitigation effect of foreign institutional ownership has two plausible channels: the information channel and the monitoring channel. We present evidence that it is more likely that foreign institutions curb insider trading by directly monitoring insiders' illicit behavior.

Beyond providing the first empirical analysis of cross-country firm-level insider trading, our findings have broader implications. For example, previous studies document the positive effect of foreign institutional investors on the quality of financial markets, including liquidity (Ng, Wu, Yu, and Zhang (2015)) and price efficiency (Kacperczyk, Sundaresan, and Wang (2018)). However, the precise channel through which foreign investors improve the efficiency of the stock market is unclear. Because there are clear theoretical arguments and empirical evidence linking insider trading with price efficiency and liquidity, restricting insider trading could well be the underlying channel through which foreign investors make an impact on financial markets. We leave these topics for future research.

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Table 1. Descriptive Statistics

This table shows the summary statistics for insider trades by each country. We include insiders of executives, chairman, and board of directors (Insiderlevel of A, B, C, D). We include regular market transactions, and exclude private placement and private transactions. Multiple trades by the same insider of the same firm in one single day are counted as one trade. We include countries that have insider trades before 2012 and total number of insider buy and sell trades to be large than 1000. Panel A shows the total number of trades ('000), mean and median of each trade size (shares and value in EUR, in thousands) for each country. In the last two columns, we include the monthly average of country-level insider trading volume, out of total dollar trading volume and market capitalization. Panel B shows the summary statistics for insider and firms, by country. # unique insiders (firms) denotes the total number of unique insiders and firms with insider trades coverage in our entire sample. # firms/total represents the number of the firms with insider trades out of total number of listed firms in the country. Similarly, Size firms/total denotes the size fraction of firms with insider trades out of the total market capitalization of the country. We also include the mean and median number of trades made by each insider and firm. Panel C shows the summary statistics of the variables in our sample. NPR is insiders' net purchase ratio calculated as the number of purchases minus the number of sells, divided by total number of transactions for the past six month periods. IO_Total is the total institutional ownership of the firm, and IO_Foreign is the foreign institutional ownership of the firm. We further include IO_Foreign(Common) and IO_Foreign(Civil) that represent the ownership by foreign institutions with common or civil law of origin. NPR(Top) is the insider net purchase ratio constructed only using top insiders' trades (insider level of A). NPR(Low) is the insider net purchase ratios calculated using lower tier insiders' trades, which include insiders of level B, C and D. Other variables include past one month return, past twelve months return, natural logarithm of firm's market capitalization (USD), and book to market (B/M) ratio.

Panel A: Distribution of insider trades, by country

Country/Region	Start	Buy					Sell					Trading volume (%)	
			Shares ('000)		Value (EUR, '000)			Shares ('000)		Value (EUR, '000)		Insider/ Vol	Insider/ Mktcap
		# trade ('000)	Mean	Median	Mean	Median	# trade ('000)	Mean	Median	Mean	Median	Mean	Mean
Australia	2002	38.3	1,693.5	63.5	14,491.3	16.7	7.4	1,533.7	200.0	20,825.5	172.8	0.219	0.011
Belgium	2006	2.0	45.3	2.5	695.3	52.5	2.7	41.4	5.0	1,293.7	139.2	0.428	0.015
Canada	2002	150.0	51.4	10.0	229.5	5.4	151.3	57.6	11.4	344.1	37.7	0.302	0.018
China	2006	18.5	186.6	11.1	322.5	19.3	36.1	550.5	40.4	1,156.3	87.5	0.083	0.022
Denmark	2007	3.5	706.2	1.8	917.5	22.6	1.5	1,924.4	5.6	5,174.3	130.6	0.803	0.051
Finland	2007	6.1	132.5	2.0	234.9	11.6	5.0	53.1	3.0	139.2	13.9	0.470	0.039
France	2005	10.6	131.8	1.6	1,686.4	24.0	11.0	46.9	6.0	1,375.9	163.9	0.246	0.016
Germany	2002	12.5	274.3	4.0	729.1	33.4	6.6	152.7	10.0	4,671.4	149.5	0.135	0.014
Greece	2005	22.6	85.4	3.4	211.4	6.1	8.0	124.3	5.0	530.7	24.5	0.779	0.038
Hong Kong	2003	47.1	25,190.7	400.0	2,002.3	54.8	22.0	32,746.5	560.0	4,184.9	137.3	2.404	0.133
India	2007	9.8	154.7	12.0	241.0	16.9	33.1	66.1	3.0	203.7	24.9	0.276	0.016

Country/Region	Year												
Italy	2003	12.9	537.2	10.3	669.2	36.6	8.2	386.2	20.0	1,110.3	113.1	0.190	0.025
Malaysia	2005	20.1	1,608.2	100.0	361.8	22.2	15.4	1,932.8	100.0	424.3	39.1	2.167	0.052
Netherlands	2001	2.6	114.4	2.9	684.9	31.9	4.3	64.8	6.4	976.9	127.9	0.151	0.011
Norway	2005	8.3	514.0	10.0	424.2	21.2	3.3	295.4	19.1	738.3	114.9	0.353	0.019
Philippines	2006	4.6	4,613.1	40.0	346.5	9.0	4.2	9,792.4	50.0	600.1	18.0	1.568	0.025
Poland	2007	3.6	434.1	6.6	254.2	14.4	2.5	183.1	7.4	399.5	37.9	0.788	0.027
Singapore	2000	8.5	7,854.5	166.0	2,523.0	43.9	2.8	5,866.3	196.0	1,899.6	92.5	1.571	0.076
South Africa	2005	4.1	487.8	26.0	234.6	17.5	6.2	323.1	30.0	483.9	89.7	0.339	0.012
South Korea	2000	32.9	478.0	5.6	1,089.2	30.0	20.3	282.1	10.0	1,072.2	83.9	0.598	0.113
Spain	2006	6.7	314.2	5.4	1,253.2	39.1	2.3	394.0	9.9	2,748.8	89.3	0.118	0.015
Sweden	2004	21.4	167.8	3.2	289.3	12.3	10.2	157.6	6.4	564.2	38.0	0.235	0.018
Switzerland	2005	6.9	25.9	1.0	569.4	52.1	10.0	39.1	2.2	1,638.7	165.5	1.674	0.110
Thailand	2000	25.8	1,551.9	50.0	139.2	8.7	23.6	2,264.7	80.0	210.0	17.4	0.687	0.040
USA	2000	190.8	375.9	2.5	749.1	15.0	543.9	76.2	8.6	924.0	169.7	0.161	0.023
United Kingdom	2003	36.3	662.3	20.0	338.3	27.6	22.2	247.4	38.4	968.6	243.3	0.667	0.025

Panel B. Trades, by insiders and firms

Country/Region	# of unique insiders	# of unique firms	# firms/total	Size firms/total	# trades per insider		# insiders per firm		# trades per firm	
					Mean	Median	Mean	Median	Mean	Median
Australia	10050	2015	63.05	98.02	5	2	6	5	23	16
Belgium	1058	141	42.22	97.50	4	2	8	6	34	19
Canada	43341	4665	81.10	99.27	7	3	10	7	65	33
China	15982	2326	81.41	80.42	3	2	7	6	23	13
Denmark	1821	243	66.94	97.22	3	2	8	6	21	13
Finland	1707	149	63.68	99.75	7	2	13	12	75	53
France	4021	737	40.10	95.79	5	2	6	4	29	15
Germany	4365	817	42.24	90.16	4	2	6	4	23	13
Greece	2392	294	70.33	97.17	13	3	8	4	104	41.5
Hong Kong	7055	1642	81.41	85.69	10	3	5	4	42	19
India	9625	1017	24.11	78.32	4	2	10	2	42	7
Italy	3384	371	57.08	98.73	6	2	10	6	57	31
Malaysia	4456	909	69.50	93.67	8	3	5	4	39	14

Netherlands	1905	238	60.71	90.41	4	2	8	4	29	12.5
Norway	4273	392	77.32	99.76	3	2	12	9	30	18.5
Philippines	1482	196	61.06	92.93	6	2	8	4	45	11
Poland	1444	393	46.90	96.21	4	2	4	3	16	7
Singapore	2161	558	52.30	96.24	5	2	4	3	20	8
South Africa	2664	378	36.73	98.94	4	2	7	6	27	15
South Korea	18700	2308	84.85	98.85	3	2	8	6	23	13
Spain	1706	182	47.52	99.19	5	2	10	7	49	25
Sweden	8828	666	68.17	99.41	4	2	15	10	48	26
Switzerland	650	289	64.51	99.28	26	9	2	2	59	33
Thailand	5474	656	70.92	96.86	9	3	9	7	75	33
USA	98501	11131	60.55	98.70	7	3	11	8	66	28
United Kingdom	17874	2844	48.18	97.99	3	2	7	5	21	10

Panel C: Summary Statistics for Variables

Variable	N	Mean	Median	Q1	Q3	Std.
NPR	1633732	-0.027	0.000	-0.913	0.667	0.727
NPR (Require NPR ≠0)	1019261	-0.043	-0.333	-1.000	1.000	0.920
IO_Total	1633732	22.95%	8.57%	0.07%	35.14%	30.01%
IO_Foreign	1633732	4.09%	0.71%	0.00%	5.19%	6.93%
IO_Foreign (Common)	1633732	2.79%	0.32%	0.00%	3.01%	5.28%
IO_Foreign (Civil)	1633732	1.24%	0.05%	0.00%	1.43%	2.30%
Past month return	1633732	1.24%	0.36%	-6.24%	7.20%	15.95%
Past 12 months return	1633732	20.66%	7.72%	-20.97%	40.41%	86.10%
Log(Size)	1633732	6.591	6.475	4.751	8.257	2.536
B/M	1633732	0.891	0.595	0.291	1.095	0.989
Governance	332490	0.756	0.75	0.688	0.812	0.119
Governance Rank	332490	0.507	0.508	0.258	0.757	0.288
Log(Analyst coverage+1)	1618431	0.993	0.693	0.000	1.945	1.109
Forecast dispersion	828697	0.203	0.083	0.039	0.190	0.361
Forecast error	839524	0.499	0.111	0.036	0.352	1.343
Price non-synchronicity	1501543	0.814	0.881	0.698	0.985	0.197

Table 2. Return predictability of insider trades: Portfolio Analysis

This table reports the returns and alphas for the long-short portfolio formed on firms' six-months net purchase ratio (NPR). Net purchase ratio is calculated following Laknishok and Lee (2001). Each month, we sort firms within each country into quintiles based on the NPR of previous six month. We form equal-weighted portfolios by longing the top quintile and short the bottom quintile stocks, and hold for three months. The table shows the monthly returns and alphas (in percentage) of the long-short portfolio for each country. Portfolio alpha is estimated using global five factors and regional five factors following Fama and French (2015). For US, the alpha is estimated using US five factors. The overall sample period is from 2000 to 2015. *, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

Country/Region	Calendar-time portfolio returns and alphas							
	Raw return				Alpha			
	Buy	Sell	Buy-Sell	t-stat	Buy	Sell	Buy-Sell	tstat
Thailand	2.41	0.93	1.48	(6.00)***	0.56	-0.17	0.73	(5.66)***
Canada	2.26	0.82	1.44	(6.20)***	0.71	0.18	0.53	(4.25)***
South Korea	1.67	0.31	1.35	(6.87)***	0.56	-0.06	0.62	(5.06)***
USA	2.52	1.19	1.33	(2.86)***	0.75	0.38	0.37	(1.93)*
Greece	0.18	-1.14	1.32	(2.37)**	0.11	-0.51	0.62	(2.14)**
India	2.30	1.16	1.13	(4.08)***	0.79	0.19	0.60	(3.91)***
Poland	0.47	-0.57	1.04	(3.18)***	0.34	-0.25	0.59	(2.68)***
Australia	2.16	1.19	0.97	(4.07)***	0.64	0.12	0.52	(4.64)***
Germany	1.54	0.61	0.93	(1.77)*	0.58	0.35	0.23	(1.02)
South Africa	1.22	0.42	0.80	(2.54)**	0.18	-0.21	0.40	(1.97)*
Malaysia	1.68	0.89	0.79	(4.90)***	0.46	0.06	0.39	(4.49)***
Sweden	1.54	0.76	0.78	(4.29)***	0.48	0.07	0.41	(4.29)***
Switzerland	1.31	0.54	0.76	(3.59)***	0.54	0.08	0.45	(4.15)***
France	1.15	0.51	0.64	(2.75)***	0.29	-0.10	0.38	(3.76)***
Philippines	2.59	2.06	0.53	(0.97)	0.77	0.57	0.20	(0.76)
Belgium	0.89	0.36	0.53	(1.06)	0.27	-0.06	0.33	(0.82)
Netherlands	1.09	0.64	0.45	(1.47)	0.37	0.03	0.35	(2.24)**
Singapore	1.34	0.88	0.45	(1.74)*	0.09	-0.18	0.27	(1.78)*
Italy	0.84	0.40	0.44	(1.93)*	-0.06	-0.29	0.24	(1.72)*
Norway	0.44	0.13	0.31	(1.03)	0.03	-0.31	0.34	(2.03)**
Hong Kong	1.87	1.58	0.28	(1.10)	0.36	0.24	0.12	(0.90)
Denmark	0.12	-0.13	0.26	(0.75)	-0.07	-0.18	0.11	(0.63)
China	3.31	3.07	0.24	(0.95)	1.76	1.62	0.14	(1.05)
Finland	0.54	0.38	0.16	(0.48)	0.19	-0.03	0.23	(1.34)
Spain	0.02	-0.04	0.06	(0.21)	-0.03	-0.07	0.05	(0.27)
United Kingdom	1.11	1.09	0.02	(0.13)	0.21	0.15	0.06	(0.55)

Table 3. Foreign institutional ownership and insider trading profitability

This table reports the panel regression results of the effect of foreign institutional ownership on insider trading profitability. The dependent variable is future 1, 3, and 6 months cumulative excess returns. Cumulative excess return is calculated as the cumulative raw return in excess of the corresponding country's market return. Control variables include past one month and past 12 months returns, the natural logarithm of stocks' market capitalization, book-to-market ratio (B/M) in Columns (2), (4), (6), (8). In Columns (7) and (8), we further control for the percentile rank of corporate governance index and its interaction with NPR. Corporate governance index is constructed using risk metrics data following Albuquerque et al., (2018). All models include firm and country*time fixed effects. Standard errors are clustered at the firm level. *, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively. The sample period is from 2000 to 2015.

	Whole Sample						Sample with governance index	
	Cum 1 month		Cum 3 months		Cum 6 months		Cum 3 month	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NPR	0.006	0.005	0.015	0.011	0.027	0.019	0.010	0.011
	(26.62)***	(8.03)***	(24.63)***	(7.03)***	(22.94)***	(6.61)***	(2.19)**	(2.47)**
NPR*IO_Total	0.001	-0.001	0.003	-0.004	0.008	-0.006	-0.002	-0.001
	(1.56)	(2.17)**	(1.95)*	(2.23)**	(2.71)***	(2.15)**	(0.58)	(0.42)
NPR*IO_Foreign	-0.010	-0.008	-0.029	-0.023	-0.053	-0.042	-0.033	-0.032
	(4.82)***	(3.45)***	(5.10)***	(3.69)***	(5.11)***	(3.66)***	(3.02)***	(2.94)***
IO_Total	-0.039	-0.008	-0.120	-0.023	-0.225	-0.033	-0.050	-0.050
	(20.15)***	(3.77)***	(20.45)***	(3.86)***	(19.68)***	(2.85)***	(4.01)***	(4.03)***
IO_Foreign	-0.057	-0.015	-0.183	-0.057	-0.386	-0.136	-0.045	-0.045
	(13.55)***	(3.31)***	(14.27)***	(4.12)***	(15.22)***	(5.09)***	(1.74)*	(1.73)*
Past month return		-0.027		-0.024		-0.020	-0.017	-0.017
		(25.76)***		(13.85)***		(8.62)***	(4.25)***	(4.27)***
Past 12 months return		0.004		0.007		0.011	0.007	0.007
		(13.69)***		(11.48)***		(10.32)***	(4.72)***	(4.73)***
Log(Size)		-0.022		-0.065		-0.131	-0.080	-0.080
		(59.52)***		(61.64)***		(64.04)***	(19.97)***	(19.94)***
B/M		0.002		0.007		0.011	0.004	0.004
		(8.01)***		(9.15)***		(6.98)***	(1.56)	(1.56)
NPR*Past month return		0.001		0.002		0.007	0.017	0.017
		(0.59)		(0.91)		(2.41)**	(4.01)***	(4.01)***
NPR*Past 12 month return		0.002		0.005		0.007	-0.001	-0.001
		(7.09)***		(7.79)***		(6.90)***	(0.53)	(0.56)
NPR*Log(Size)		-0.000		-0.000		-0.001	-0.000	-0.000
		(2.05)**		(1.92)*		(2.12)**	(0.97)	(0.81)
NPR*B/M		0.000		0.000		0.000	0.002	0.002
		(1.22)		(0.67)		(0.11)	(1.57)	(1.60)
Governance								-0.005
								(1.77)*
NPR*Governance								0.002
								(0.68)
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y
*Country*time FE*	Y	Y	Y	Y	Y	Y	Y	Y
R2	0.08	0.09	0.11	0.14	0.16	0.20	0.18	0.18
N	1,618,431	1,618,431	1,618,431	1,618,431	1,618,431	1,618,431	307,859	307,859

Table 4. Insider purchases and sales

This table reports the panel regression results of the effect of foreign institutional ownership on the profitability of insider purchases and sales. We decompose NPR into positive NPR, constructed as Max(NPR, 0) and negative NPR constructed as Min(NPR, 0). Max(NPR, 0) equals NPR for positive NPR, and zero otherwise, and similarly for Min(NPR, 0). The dependent variable is future 1, 3, and 6 months cumulative excess returns. Control variables include past one month and past 12 months returns, the natural logarithm of stocks' market capitalization, and book-to-market ratio (B/M). All models include firm and country*time fixed effects. Standard errors are clustered at the firm level. *, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively. The sample period is from 2000 to 2015.

	Cumulative 1 month	Cumulative 3 months	Cumulative 6 months
	(1)	(2)	(3)
Max(NPR, 0)	0.005	0.011	0.016
	(7.57)***	(6.15)***	(5.04)***
Min(NPR, 0)	0.004	0.011	0.023
	(5.66)***	(5.90)***	(6.69)***
Max(NPR, 0)*IO_Total	0.000	0.002	0.008
	(0.20)	(0.48)	(1.43)
Min(NPR, 0)*IO_Total	-0.002	-0.007	-0.017
	(1.97)**	(2.67)***	(3.74)***
Max(NPR, 0)*IO_Foreign	-0.005	-0.012	-0.004
	(1.11)	(1.05)	(0.23)
Min(NPR, 0)*IO_Foreign	-0.012	-0.037	-0.082
	(3.39)***	(3.88)***	(4.80)***
IO_Total	-0.008	-0.026	-0.040
	(3.95)***	(4.18)***	(3.45)***
IO_Foreign	-0.018	-0.064	-0.159
	(3.53)***	(4.38)***	(5.63)***
Past month return	-0.027	-0.024	-0.020
	(25.76)***	(13.85)***	(8.63)***
Past 12 months return	0.004	0.007	0.011
	(13.70)***	(11.49)***	(10.35)***
Log(Size)	-0.022	-0.065	-0.130
	(59.57)***	(61.64)***	(64.00)***
B/M	0.002	0.007	0.011
	(8.05)***	(9.16)***	(6.97)***
NPR*Past month return	0.001	0.002	0.007
	(0.55)	(0.88)	(2.41)**
NPR*Past 12 month return	0.002	0.005	0.007
	(7.32)***	(7.89)***	(6.91)***
NPR*Log(Size)	-0.000	-0.000	-0.001
	(1.61)	(1.74)*	(2.15)**
NPR*B/M	0.000	0.000	0.000
	(0.95)	(0.57)	(0.13)
Firm FE	Y	Y	Y
*Country*time FE*	Y	Y	Y
R2	0.09	0.14	0.20
N	1,618,431	1,618,431	1,618,431

Table 5. Identification using MSCI index inclusion and exclusion

This table reports results from estimating difference-in-differences regression models of institutional ownership and insider trading profitability around the year a stock is added to or excluded from the MSCI ACWI. MSCI is a dummy that equals one when the firm is included in the MSCI index in that year. The sample is restricted to firms in the 20% bandwidth of the number of stocks around the MSCI ACWI cutoff point in each country. Panel A shows the results with foreign and domestic institutional ownership as dependent variables. Panel B shows the effect of MSCI index inclusion and exclusion on insider trading profitability. Panel C shows the results when controlling for MSCI(t=-1), MSCI(t=-2), MSCI(t=0), MSCI(t=1), MSCI(t>=2), and their interactions with NPR. MSCI(t=-1) is a dummy variable that equals one for the first year before the inclusion into MSCI index. Similarly, MSCI(t=-2), MSCI(t=0), MSCI(t=1) are dummy variables that equals one for the second year before inclusion, the year of inclusion, and the first year after inclusion into the MSCI index respectively. MSCI(t>=2) equals one for the second year after inclusion and for the remaining years when the stock stays in the MSCI index. All models include firm and Country*time fixed effects. Standard errors are clustered at the firm level. *, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

Panel A: MSCI and Institutional Ownership

	Foreign IO		Domestic IO	
MSCI	0.020	0.012	-0.002	-0.008
	(14.30)***	(8.84)***	(0.95)	(3.22)***
Past month return		-0.012		-0.011
		(17.86)***		(11.68)***
Past 12 months return		-0.003		-0.001
		(8.08)***		(1.97)**
Log(Size)		0.013		0.010
		(17.92)***		(7.28)***
B/M		-0.001		0.000
		(0.80)		(0.00)
Firm FE	Y	Y	Y	Y
*Country*Time FE*	Y	Y	Y	Y
R^2	0.86	0.86	0.97	0.97
N	597,854	597,854	597,854	597,854

Panel B. MSCI and insider trading profitability

	Cumulative 1 month	Cumulative 3 months	Cumulative 6 months
NPR	0.007	0.021	0.053
	(4.39)***	(4.61)***	(5.44)***
NPR*MSCI	-0.001	-0.004	-0.007
	(1.51)	(2.12)**	(2.07)**
MSCI	0.017	0.046	0.077
	(16.27)***	(13.56)***	(9.68)***
Past month return	0.003	0.018	0.024
	(0.96)	(2.61)***	(2.02)**
Past 12 months return	0.000	-0.004	-0.015
	(0.95)	(2.81)***	(4.05)***
Log(Size)	-0.043	-0.132	-0.268
	(47.79)***	(36.78)***	(25.88)***
B/M	0.003	0.012	0.019
	(4.77)***	(5.58)***	(4.25)***
NPR*Past month return	0.006	-0.004	0.001
	(2.21)**	(0.91)	(0.11)
NPR*Past 12 month return	0.000	0.001	0.001
	(1.12)	(1.13)	(0.42)
NPR*Log(Size)	-0.001	-0.003	-0.007
	(3.56)***	(4.12)***	(5.14)***
NPR*B/M	0.001	0.004	0.009
	(3.71)***	(3.68)***	(3.90)***
Firm FE	Y	Y	Y

Country*time FE	Y	Y	Y
R^2	0.17	0.25	0.32
N	593,908	593,908	593,908

Panel C. Pre-MSCI inclusion and insider trading profitability

	Cumulative 1 month	Cumulative 3 months	Cumulative 6 months
NPR	0.006	0.019	0.049
	(3.73)***	(4.02)***	(4.97)***
NPR*MSCI(t=-2)	-0.001	0.002	0.021
	(0.35)	(0.45)	(1.80)*
NPR*MSCI(t=-1)	0.001	0.010	0.027
	(0.68)	(1.73)*	(2.49)**
NPR*MSCI(t=0)	0.001	0.004	0.007
	(0.75)	(0.85)	(0.89)
NPR*MSCI(t=1)	-0.002	-0.009	-0.012
	(1.74)*	(2.52)**	(1.84)*
NPR*MSCI(t>=2)	-0.002	-0.007	-0.013
	(3.26)***	(3.72)***	(3.55)***
MSCI(t=-2)	0.016	0.051	0.116
	(8.96)***	(9.02)***	(9.24)***
MSCI(t=-1)	0.031	0.099	0.214
	(16.99)***	(17.27)***	(17.39)***
MSCI(t=0)	0.031	0.091	0.163
	(19.39)***	(17.34)***	(14.27)***
MSCI(t=1)	0.020	0.056	0.110
	(13.16)***	(11.93)***	(10.69)***
MSCI(t>=2)	0.022	0.063	0.118
	(17.19)***	(15.03)***	(12.05)***
Past month return	0.002	0.017	0.023
	(0.88)	(2.52)**	(1.94)*
Past 12months return	0.000	-0.005	-0.016
	(0.70)	(3.12)***	(4.27)***
Log(Size)	-0.044	-0.134	-0.275
	(47.94)***	(36.88)***	(26.06)***
B/M	0.003	0.012	0.020
	(4.89)***	(5.70)***	(4.39)***
NPR*Past month return	0.006	-0.004	0.001
	(2.21)**	(0.92)	(0.09)
NPR*Past 12 month return	0.000	0.001	0.001
	(1.00)	(0.97)	(0.27)
NPR*Log(Size)	-0.001	-0.002	-0.006
	(2.74)***	(3.43)***	(4.62)***
NPR*B/M	0.001	0.004	0.009
	(3.71)***	(3.69)***	(3.93)***
Firm FE	Y	Y	Y
Country*time FE	Y	Y	Y
R^2	0.17	0.25	0.32
N	593,908	593,908	593,908

Table 6. The heterogeneous effects of foreign institutional ownership on insider trading profitability

This table shows the heterogeneous effects of foreign investors on insider trading profitability conditioning on country characteristics. We classify all countries into two groups based on the proportion of insider trades in blackout period, insider-trading restriction, legal origin, government effectiveness, rule of law, and regulatory quality, and accounting and auditing quality. The dependent variable is future three months' cumulative excess returns. We control for past one-month return, past twelve-month return, log(Size), book to market ratio, and the interaction of controls and NPR in all the regressions. All models include firm and country*time fixed effects. Standard errors are clustered at the firm level. *, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Low blackout	High blackout	Low Insider trading restriction	High insider trading restriction	Non-Common law	Common Law	Low Government Effectiveness	High Government Effectiveness
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NPR	0.010	0.014	0.006	0.018	0.014	0.012	0.013	0.016
	(3.92)***	(6.60)***	(1.96)**	(9.03)***	(5.47)***	(5.70)***	(5.40)***	(7.30)***
NPR*IO_Total	0.008	0.001	0.011	0.003	0.004	-0.001	0.005	-0.009
	(0.95)	(0.33)	(0.95)	(1.40)	(0.46)	(0.58)	(2.03)**	(3.74)***
NPR*IO_Foreign	-0.039	-0.017	-0.055	-0.004	-0.035	-0.023	-0.044	0.016
	(2.75)***	(1.96)**	(3.24)***	(0.56)	(2.65)***	(2.53)**	(4.24)***	(1.95)*
IO_Total	-0.024	-0.025	-0.032	-0.024	-0.033	-0.022	-0.026	0.002
	(1.64)	(3.75)***	(1.67)*	(3.88)***	(2.28)**	(3.33)***	(2.94)***	(0.26)
IO_Foreign	-0.050	-0.057	-0.128	-0.024	-0.017	-0.071	-0.013	-0.104
	(1.92)*	(3.42)***	(4.14)***	(1.51)	(0.70)	(4.17)***	(0.58)	(5.90)***
*Controls, Controls*NPR*	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y
*Country*time FE*	Y	Y	Y	Y	Y	Y	Y	Y
R2	0.16	0.12	0.14	0.14	0.17	0.12	0.16	0.15
N	614,019	994,729	542,961	1,065,787	496,014	1,122,417	746,318	866,923

	Low Rule of Law	High Rule of Law	Low Regulatory Quality	High Regulatory Quality	Low Accounting	High Accounting	Poor Auditing	Good Auditing
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
NPR	0.011	0.014	0.008	0.016	0.012	0.016	0.007	0.021
	(3.93)***	(7.14)***	(2.88)***	(7.74)***	(3.82)***	(7.83)***	(3.29)***	(7.87)***
NPR*IO_Total	0.022	0.002	0.002	0.004	0.012	0.001	-0.007	-0.003
	(4.36)***	(1.22)	(0.61)	(2.01)**	(0.66)	(0.56)	(1.26)	(1.34)
NPR*IO_Foreign	-0.067	-0.012	-0.041	-0.015	-0.043	-0.018	-0.015	-0.013
	(5.61)***	(1.51)	(3.56)***	(1.90)*	(1.79)*	(2.17)**	(1.33)	(1.38)
IO_Total	-0.060	-0.026	-0.068	-0.032	-0.022	-0.021	-0.011	-0.027
	(3.36)***	(3.90)***	(4.25)***	(4.98)***	(0.85)	(3.29)***	(0.96)	(3.73)***
IO_Foreign	-0.033	-0.041	-0.029	-0.031	-0.063	-0.059	-0.087	-0.026
	(1.13)	(2.53)**	(1.06)	(1.87)*	(1.78)*	(3.63)***	(4.17)***	(1.36)
*Controls, Controls*NPR*	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y
*Country*time FE*	Y	Y	Y	Y	Y	Y	Y	Y
R^2	0.18	0.13	0.17	0.13	0.18	0.13	0.15	0.12
N	522,959	1,090,306	541,464	1,071,846	353,755	1,145,890	827,387	781,361

Table 7. Legal origin of foreign institutional investors

This table shows the panel regression results of the effect of foreign investors on insider trading profitability. The dependent variable is future 1, 3, and 6-months cumulative excess returns. IO_Foreign(Civil) and IO_Foreign(Common) represents the ownership of the firm by foreign institutional investors from civil- and common-law countries, respectively. All models include firm and country*time fixed effects. Standard errors are clustered at the firm level. *, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively. The sample period is from 2000 to 2015.

	Cumulative 1 month	Cumulative 3 months	Cumulative 6 months
	(1)	(2)	(3)
NPR	0.006	0.011	0.019
	(7.72)***	(7.00)***	(6.58)***
NPR*IO_Total	-0.002	-0.004	-0.006
	(2.96)***	(2.12)**	(2.12)**
NPR*IO_Foreign(Civil)	-0.015	-0.031	-0.038
	(1.62)	(1.49)	(1.03)
NPR*IO_Foreign(Common)	-0.007	-0.022	-0.045
	(1.66)*	(2.44)**	(2.69)***
IO_Total	-0.010	-0.022	-0.032
	(3.74)***	(3.75)***	(2.77)***
IO_Foreign(Civil)	-0.009	-0.084	-0.187
	(0.73)	(2.68)***	(3.11)***
IO_Foreign(Common)	-0.006	-0.057	-0.135
	(0.96)	(3.43)***	(4.22)***
Past month return	-0.028	-0.024	-0.020
	(17.88)***	(13.86)***	(8.63)***
Past 12 months return	0.004	0.007	0.011
	(11.93)***	(11.46)***	(10.30)***
Log(Size)	-0.030	-0.065	-0.130
	(60.92)***	(61.55)***	(63.95)***
B/M	0.003	0.007	0.011
	(7.18)***	(9.15)***	(6.99)***
NPR*Past month return	-0.001	0.002	0.007
	(0.48)	(0.91)	(2.41)**
NPR*Past 12 month return	0.002	0.005	0.007
	(5.88)***	(7.78)***	(6.89)***
NPR*Log(Size)	-0.000	-0.000	-0.001
	(3.73)***	(1.87)*	(2.08)**
NPR*B/M	0.001	0.000	0.000
	(2.27)**	(0.69)	(0.11)
Firm FE	Y	Y	Y
*Country*time FE*	Y	Y	Y
R^2	0.09	0.14	0.20
N	1,618,431	1,618,431	1,618,431

Table 8. Controlling for information environment proxies

This table shows the panel regression results of the effect of foreign investors on insider trading profitability, controlling for the information environment proxies of the firm. The dependent variable is future 3-months cumulative excess returns. In Column (2), Ln(Analyst coverage+1) is the natural logarithm of the number of analysts following a given firm. In Column (4), forecast dispersion is the standard deviation of analyst EPS forecasts scaled by the absolute value of consensus forecast, provided at least two analysts following a given firm. In Column (6), forecast error is the absolute value of the difference between consensus EPS forecast and actual EPS, scaled by the absolute value of actual EPS. In Column (8), price non-synchronicity is defined as in Chen, Goldstein, and Jiang (2006). We control for past one-month return, past twelve-month return, log(Size), book to market ratio, and the interaction of controls and NPR in all the regressions. All models include firm and country*time fixed effects. Standard errors are clustered at the firm level. *, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively. The sample period is from 2000 to 2015.

	Cumulative 3 months return							
	Ln(Analyst coverage+1)		Forecast dispersion		Forecast error		Price non-synchronicity	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NPR	0.011	0.011	0.016	0.014	0.013	0.012	0.011	0.012
	(7.03)***	(6.91)***	(6.48)***	(5.21)***	(5.31)***	(4.97)***	(7.03)***	(4.17)***
NPR*IO_Total	-0.004	-0.002	-0.005	-0.004	-0.001	-0.001	-0.004	-0.005
	(2.23)**	(1.06)	(2.71)***	(2.01)**	(0.45)	(0.29)	(2.23)**	(2.60)***
NPR*IO_Foreign	-0.023	-0.021	-0.024	-0.024	-0.025	-0.025	-0.023	-0.026
	(3.69)***	(3.32)***	(3.26)***	(3.25)***	(3.42)***	(3.38)***	(3.69)***	(4.05)***
IO_Total	-0.023	-0.023	-0.027	-0.026	-0.027	-0.027	-0.023	-0.023
	(3.86)***	(3.76)***	(3.61)***	(3.56)***	(3.36)***	(3.36)***	(3.86)***	(3.76)***
IO_Foreign	-0.057	-0.056	-0.060	-0.061	-0.046	-0.047	-0.057	-0.051
	(4.12)***	(4.11)***	(3.59)***	(3.64)***	(2.75)***	(2.80)***	(4.12)***	(3.67)***
NPR*Information proxy		-0.001		0.007		0.001		-0.001
		(2.25)**		(3.75)***		(1.08)		(0.41)
Information proxy		-0.000		-0.029		-0.002		-0.007
		(0.48)		(14.80)***		(5.07)***		(2.67)***
*Controls, Controls*NPR*	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y
*Country*time FE*	Y	Y	Y	Y	Y	Y	Y	Y
R^2	0.14	0.14	0.17	0.17	0.17	0.17	0.14	0.14
N	1,618,431	1,618,431	828,697	828,697	839,524	839,524	1,501,543	1,501,543

Table 9. Foreign institutional ownership and insider trading behavior

This table reports the effect of foreign institutional ownership on the distribution of insider trades, estimated using firm-year panel for the sample 2000-2015. Column (1) to (3) examine the size and number of insider trades. *Log(#Trades)* denotes the natural logarithm of number of insider trades for each firm within a year. *Log(Value)* is the natural logarithm of the average transaction size (in EUR). *Log(Total_Value)* represents the natural logarithm of the total transaction size within the year. Column (4) and (5) examine the distribution of insider sells, including both the sells number fraction ($\frac{\#Sell}{\#Sell+\#Buy}$) and the total sells size fraction ($\frac{Sell_{Size}}{Sell_{Size}+Buy_{Size}}$). Column (6) and (7) show distribution of insider trades that lie in the one month after the earnings announcement date. Dependent variable *After_EA*(#) *Fraction* is the fraction of insider trades for the firm-year that occurs in the one month after the earnings announcement date. Similarly, *After_EA(Value) Fraction* represents the specification calculated using total transaction size. We control for beginning of year one-month return, twelve-months return, natural logarithm of market capitalization, and B/M ratio. We also control for the informativeness of earnings announcements by including the average absolute earnings announcement cumulative abnormal return (CAR) in the contemporaneous year. CAR is defined over the t-10 to t+2 window around the earnings announcement date t. All models include firm and country*time fixed effects. Standard errors are clustered at the firm level. *, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively. The sample period is from 2000 to 2015.

|	Log(#Trades)	Log(Value)	Log(Total_Value)	Sell(#) Fraction	Sell(Value) Fraction	After_EA(#) Fraction	After_EA(Value) Fraction
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
IO_Total	-0.106	-0.122	-0.243	-0.017	-0.031	0.007	0.014
	(2.15)**	(1.81)*	(2.56)**	(1.01)	(1.70)*	(0.46)	(0.85)
IO_Foreign	0.177	-0.579	-0.463	-0.155	-0.196	0.108	0.115
	(1.51)	(3.19)***	(1.94)*	(3.53)***	(4.12)***	(2.87)***	(2.50)**
Past month return	0.009	0.146	0.169	0.072	0.073	-0.008	-0.018
	(0.40)	(3.79)***	(3.36)***	(7.77)***	(7.40)***	(1.10)	(1.95)*
Past 12 months return	0.050	0.102	0.156	0.022	0.024	-0.004	-0.003
	(11.71)***	(11.76)***	(13.81)***	(9.29)***	(9.25)***	(2.96)***	(1.72)*
Log(Size)	0.121	0.429	0.562	0.054	0.070	0.017	0.038
	(19.21)***	(38.72)***	(39.99)***	(21.45)***	(25.91)***	(8.65)***	(15.86)***
B/M	-0.004	-0.004	-0.008	-0.000	-0.001	0.000	0.001
	(3.25)***	(0.57)	(0.98)	(0.79)	(0.92)	(2.11)**	(1.91)*
|CAR[-10,2]|	0.383	0.409	0.808	-0.078	-0.045	0.378	0.523
	(7.10)***	(4.65)***	(6.84)***	(3.91)***	(2.13)**	(17.48)***	(18.15)***
Firm FE	Y	Y	Y	Y	Y	Y	Y
*Country*Year FE*	Y	Y	Y	Y	Y	Y	Y
R²	0.52	0.60	0.59	0.54	0.51	0.48	0.47
N	112,464	112,464	112,464	112,464	112,461	112,464	112,464

Table 10. Top tier vs. Low tier insiders

This table reports the panel regression results of the effect of foreign investors on insider trading profitability. Insiders' net purchase ratio NPR is decomposed into NPR(Top) and NPR(Low) depending on whether the trade is conducted by top insiders or non-top insiders. Top insiders are defined as the executive board, chairman, and top 5 executives. Non-top insiders are the remaining insiders. *NPR(Top)* is constructed using only top insiders' trades. Similarly, *NPR(Low)* is constructed using only non-top insiders' trades. The dependent variables are future 1, 3 and 6 months cumulative excess returns. Cumulative excess return is calculated as the cumulative raw return in excess of the corresponding country's market return. All models include firm and country*time fixed effects. Standard errors are clustered at the firm level. *, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively. The sample period is from 2000 to 2015.

	Cumulative 1 month	Cumulative 3 months	Cumulative 6 months
	(1)	(2)	(3)
NPR(Top)*IO_Total	-0.002	-0.005	-0.009
	(3.48)***	(2.90)***	(2.73)***
NPR(Top)*IO_Foreign	-0.008	-0.026	-0.047
	(3.42)***	(3.85)***	(3.98)***
NPR(Low)*IO_Total	-0.001	-0.003	-0.006
	(1.36)	(2.02)**	(1.92)*
NPR(Low)*IO_Foreign	-0.004	-0.014	-0.025
	(1.82)*	(2.06)**	(2.14)**
IO_Total	-0.008	-0.023	-0.033
	(3.78)***	(3.88)***	(2.88)***
IO_Foreign	-0.015	-0.057	-0.136
	(3.30)***	(4.11)***	(5.09)***
NPR(Top)	0.003	0.007	0.013
	(9.10)***	(7.67)***	(7.33)***
NPR(Low)	0.003	0.007	0.011
	(7.98)***	(7.27)***	(6.47)***
Past month return	-0.027	-0.024	-0.020
	(25.79)***	(13.88)***	(8.65)***
Past 12 months return	0.004	0.008	0.011
	(13.72)***	(11.51)***	(10.37)***
Log(Size)	-0.022	-0.065	-0.131
	(59.43)***	(61.55)***	(63.97)***
B/M	0.002	0.007	0.011
	(7.94)***	(9.09)***	(6.93)***
NPR*Past month return	0.001	0.002	0.006
	(0.55)	(0.85)	(2.32)**
NPR*Past 12 month return	0.002	0.005	0.007
	(6.99)***	(7.69)***	(6.81)***
NPR*Log(Size)	-0.000	-0.000	-0.000
	(0.94)	(0.83)	(0.94)
NPR*B/M	0.000	0.001	0.001
	(2.03)**	(1.36)	(0.79)
Firm FE	Y	Y	Y
*Country*Time FE*	Y	Y	Y
R2	0.09	0.14	0.20
N	1,618,431	1,618,431	1,618,431

Figure 1. Cross-country insider trading profitability and country characteristics

The figures plot the cross-country relation between insider trading profitability and several country characteristics. Insider trading profitability for each country, measured by the average monthly long-short portfolio return based on NPR, is shown in y axis. The x axis shows country characteristics, including the average foreign and domestic institutional ownership, the accounting quality index in LaPorta et al. (1998), auditing quality, fraction of trades in Blackout period from Brochet (2017), insider trading restriction score from Du and Wei (2004), and three worldwide governance indicators including government effectiveness, rule of law, and regulatory quality.

$y = -0.1137x + 0.841$
(1.03)
$R^2 = 0.0423$
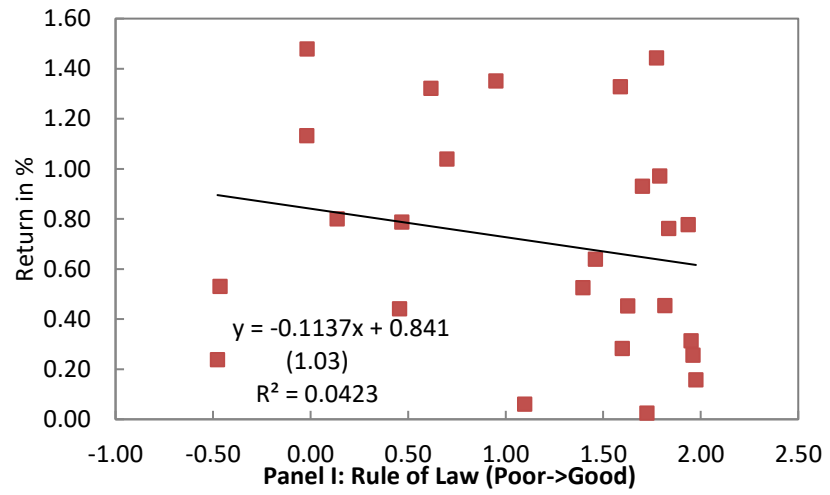
Panel I: Rule of Law (Poor->Good)

Return in %
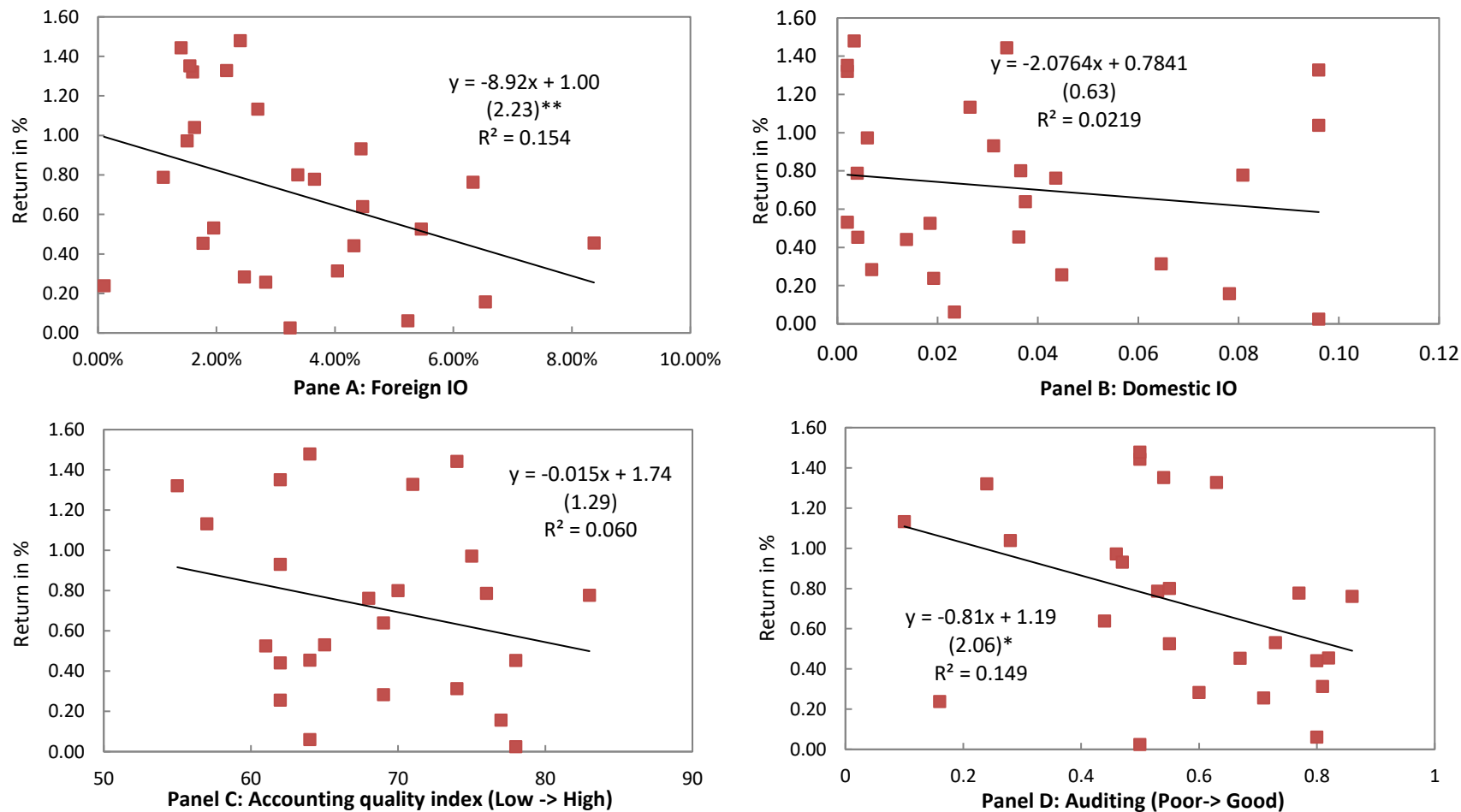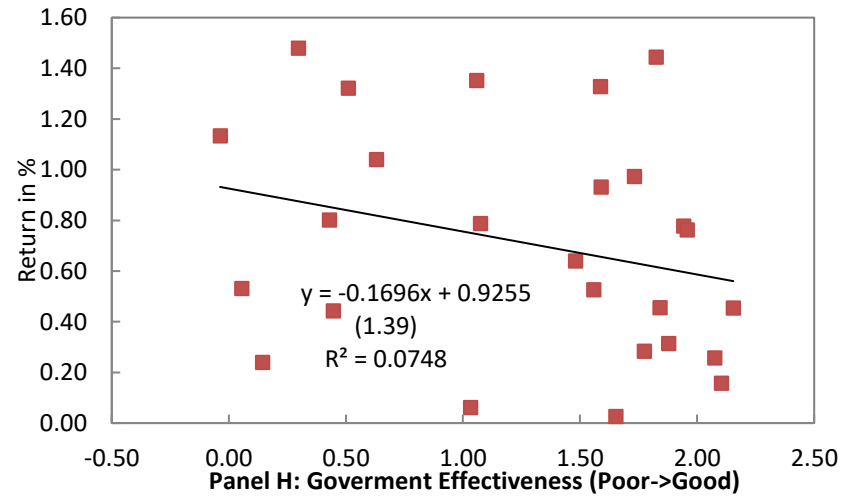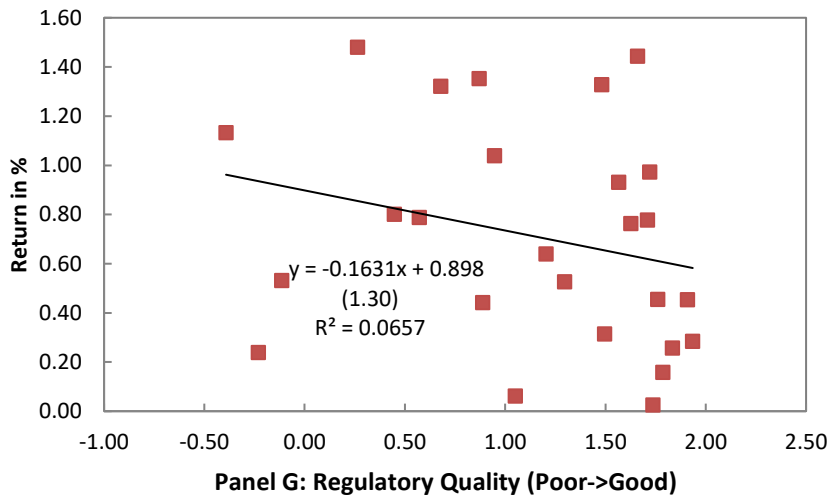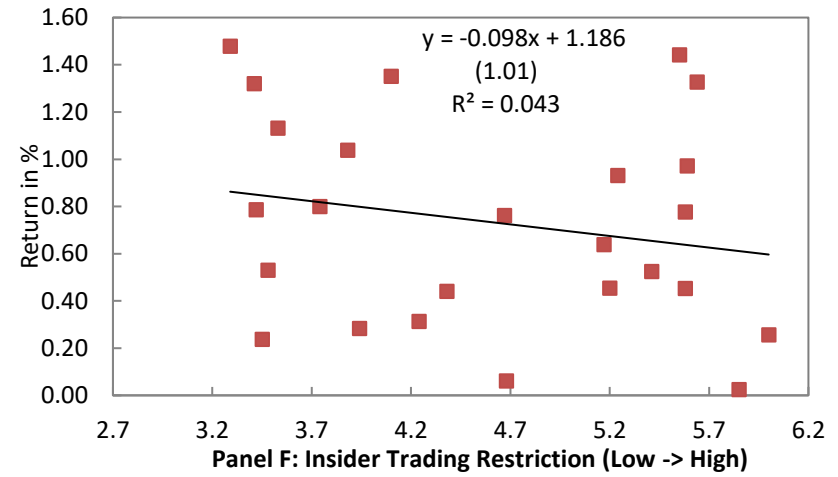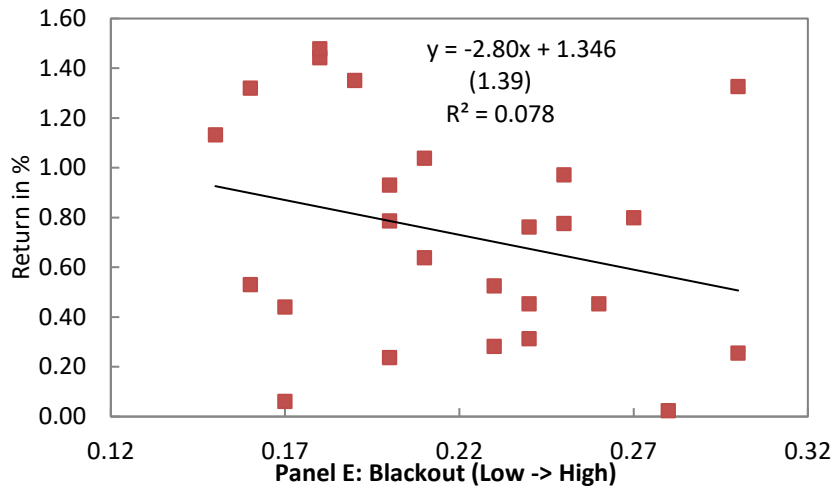
Figure 2. Predictability of insider trading Surrounding the Additions to MSCI

This figure shows coefficient estimates and 95% confidence interval of the differences in NPR predictability between treated firms and control forms around stock additions to the MSCI ACWI index. The sample is restricted to firms in the 20% bandwidth of the number of stocks around the MSCI ACWI cutoff point in each country. The difference in NPR predictability is captured by the coefficient estimates of the interaction terms of NPR and MSCI timing dummies, as in Table 5 Panel C. Year 0 is the year when the treated firms added to the MSCI ACWI index. Graph A shows the coefficients plot for dependent variable of future three-month cumulative excess return. Graph B shows the coefficients plot for dependent variable of future six-month cumulative excess return.