Who Benefits from Corporate Opacity? International Evidence from Informed Trading by Institutional Investors

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November 2011

Abstract

Using cross-country data on trading by international mutual funds, I find that firms with more opaque information environments, as captured by firm- and country-level measures of the availability of financial reporting information, experience more privately-informed trading by institutional investors. The association between firm-level opacity and informed trading is most pronounced where country-level disclosure infrastructures are less developed, when competition for private information is restricted and for those investors for whom the incentives and opportunities to acquire private information are greatest. A difference-in-differences analysis of returns earned by institutions across opaque and transparent firms suggests these results are economically significant.

This paper has benefited tremendously from the guidance and support of my dissertation committee members: Mark Lang (advisor), Jeff Abarbanell, Robert Bushman, Wayne Landsman and Christian Lundblad. I am also grateful for helpful comments from S.P. Kothari (editor), Brian Bushee (*JAE* discussant), an anonymous reviewer, Dan Amiram, John Gallemore, Joseph Gerakos, John Hand, Justin Hopkins, Susan Hughes, Andrew Karolyi, Ed Maydew, Katie McDermott, Derrald Stice and seminar participants at the 2011 *Journal of Accounting & Economics* Conference, the 2011 American Accounting Association Annual Meeting, the University of North Carolina at Chapel Hill and Wake Forest University. I would also like to thank Reena Aggarwal for sharing international corporate governance data. I gratefully acknowledge funding from the Deloitte Foundation, the State Farm Companies Foundation and the AAA/Grant Thornton Doctoral Dissertation Award. E-mail correspondence to maffett@unc.edu.

1. Introduction

A substantial body of prior research explores whether institutional investors trade based on superior information. While many studies show that, on average, institutions underperform their appropriate benchmarks [e.g., Carhart (1997)], others suggest that certain subsets of institutional investors can consistently forecast future returns [e.g., Yan and Zhang (2009)]. However, we know less about how those institutions that can earn excess returns actually do and, in particular, whether the transparency of the target firm's information environment is an important determinant of the extent and profitability of their informed trades. In this paper, I address this question directly and explore how institutional investors create private informational advantages by examining the relation between informed institutional trading, as captured by a positive association between changes in holdings and future returns, and the opacity of firms' public financial reporting.[1] To provide a deeper understanding of this relation, I also investigate where, when and for whom an opaque financial reporting environment provides the greatest benefit for private information-based trading.[2]

At a conceptual level, there are compelling reasons to believe the extent of institutional investors' informed trading could be increasing in the opacity of firms' financial reporting. Specifically, although prior literature suggests that financial reporting transparency can have significant benefits for the average investor [e.g., Lang and Maffett (2011a)], as noted by Verrecchia (1982) and Diamond (1985), less public disclosure can also motivate more private information gathering. A greater extent of private information acquisition increases information asymmetry and creates the possibility for better-informed investors to gain at the expense of others by trading on their information advantages. This suggests that certain subsets of investors may actually benefit from more *opaque* financial reporting. Moreover, although private information acquisition is costly and beyond the means of many investors, sophisticated investors, such as institutions, likely have significant capital and expertise that they can leverage

[1] Throughout the paper, I assume a positive association between changes in institutional holdings and future returns, controlling for risk and prior performance, is indicative of informed trading and frequently refer to it as such.
[2] Throughout the paper, I follow Bushman et al. (2004) and define opacity as the unavailability of firm-specific information to those outside publicly traded firms. For parsimony, I frequently refer to this construct as 'opacity'.

to execute profitable trades based on private information. Thus, if having less publicly available information increases the incentive to acquire private information, for those users capable of profitably exploiting such information, the opacity of firms' financial reporting is likely to be an important factor in determining the extent of informed trade.

I explore the relation between opacity and institutional informed trading in a three-phase empirical analysis using a broad sample of cross-country data on trading by international mutual funds. First, to establish whether opacity significantly affects the extent of informed institutional trade, I examine the relation between firm- and country-level financial reporting and the extent to which changes in institutional holdings predict future returns. Second, to provide deeper insight into the cross-sectional determinants of the association between opacity and informed trade, I examine variation in the relation across varying: country-level disclosure regimes, degrees of competition for private information and types of institutional investor. Finally, to assess the economic significance of these results, I conduct a difference-in-differences analysis.

In the first analysis, I find that changes in institutional holdings are more positively associated with future returns for firms with greater opacity as measured by analyst following, forecast accuracy, forecast diversity, auditor choice and discretionary earnings smoothing. I also find evidence of more informed trading in firms located in countries with a less developed and extensive news media, weaker country-level disclosure, worse corporate governance and no requirement to use International Financial Reporting Standards (IFRS). These results establish that firm- and country-level opacity are individually and incrementally important determinants of the extent of institutional informed trading. Further, my results also indicate a strong interactive relation between firm- and country-level opacity. I find that the association between informed trade and firm-level opacity is strongest where the country-level disclosure environment is weakest and diminishes significantly in countries with more developed disclosure regulation and information dissemination. This result demonstrates that, while an opaque country-level disclosure regime appears to complement firm-level opacity and encourage more private information-based trading, a more transparent country-level infrastructure provides alternate sources of information which may mitigate the effects of poor firm-level disclosure.

Next, I examine whether informed trading by institutional investors in opaque stocks is greater when there is less competition for private information. I find that firm-level opacity is most strongly related to the extent of direct institutional informed trade for firms without exchange-traded stock options and in those countries and industries that banned short selling during the 2008 financial crisis. These results suggest that restrictions on alternative venues for incorporating private information increase the ability of institutional investors to exploit private information through direct trading, particularly in opaque information environments.

Third, I examine whether the association between opacity and informed trade varies based on institutional investor characteristics. I find that firm-level opacity is more strongly related to the extent of informed trade for institutions domiciled in the same country as their target firms ("local") relative to institutions domiciled in different countries than their target firms ("foreign") and for institutions with high portfolio turnover ("transient") relative to institutions with low portfolio turnover ("dedicated"). Moreover, splitting local relative to foreign and transient relative to dedicated institutional trading based on the opacity of the country-level information environment, I find that the association between firm-level opacity and informed trade is strongest among local and transient institutions investing in firms domiciled in countries with relatively more opaque infrastructures. These findings indicate that firm- and country-level opacity provide the greatest benefit to those investors for whom the incentives and opportunities to acquire private information are strongest.

Finally, I use a difference-in-differences analysis to assess the economic importance of my primary findings. I find that opaque firms with the largest change in institutional holdings subsequently earn annualized risk-adjusted returns 4.5% larger than firms with the smallest change. Transparent firms with the largest change in holdings earn returns 2.7% *smaller* than firms with the smallest change. The difference between the returns across opaque and transparent firms of 7.2% suggests that institutions are significantly better at predicting the returns of opaque firms. This difference increases to 12.4% when both firm- and country-level opacity are considered. Moreover, I document that these returns are likely to exceed transactions costs for

most firms in my sample, indicating that some institutions can earn significant gross profits from private information-based trading in opaque firms.[3]

I also conduct an extensive set of additional tests and sensitivity analyses to show my results are robust to the inclusion of firm fixed effects, several alternative constructions of my primary measure of informed trading and a variety of additional controls for liquidity, firm-level governance and risk factors found by prior research to be associated with future returns. Results are also consistent within the vast majority of sample countries and in all sample years.

My study makes several contributions to the existing literature. First, my paper provides novel evidence that the opacity of a firm's information environment, at both the firm- and country-level, is a statistically and economically significant determinant of the extent of informed trading by institutional investors. Second, my paper provides significant additional insight into the relation between opacity and institutional informed trade by demonstrating that the extent of informed trading is significantly influenced by interactive relations between firm-level financial reporting and: the country-level disclosure regime, the availability of other channels for exploiting private information and investors' incentives and opportunities to acquire private information. Finally, in contrast to the extant research on the economic effects of financial reporting, my paper is the first (of which I am aware) to provide direct evidence that some classes of sophisticated investors may actually benefit from more opaque financial reporting.

2. Prior Literature

My primary interest is examining whether the opacity of firms' financial reporting environments is a significant determinant of the extent of informed trading by institutional investors. Prior research on institutional informed trading focuses mainly on whether and, to a lesser extent, what types of institutions are likely to make profitable trades based on private information. We know little about how opacity affects traders' abilities to earn these excess returns. The prior literature

[3] These results suggest that institutions' trades in opaque firms are profitable on a *gross* basis and exceed one measure of transactions costs. However, without a measure of the cost of effort institutions expend acquiring private information, it is difficult to determine whether their trades are profitable net of all costs. Nevertheless, a positive gross return suggests that institutions are rewarded for the effort they expend investing in opaque stocks.

examining the economic effects of financial reporting in equity markets focuses on the ways in which the *average* investor benefits from a *richer* information environment. There is, to my knowledge, no direct research on the potential for sophisticated arm's length investors, such as institutions, to benefit from financial reporting opacity. Nonetheless, several streams of literature provide economic background and help motivate the predictions of my study.

The first related literature examines whether institutional investors possess superior information about firms' future performance. For example, Ali et al. (2004) finds a positive association between changes in aggregate institutional ownership and abnormal returns at the time of the subsequent earnings announcement, consistent with some institutions making informed trades. Ke and Petroni (2004) finds an association between changes in aggregate institutional ownership and breaks in strings of quarterly earnings growth. My paper differs from this literature because it focuses not on *whether* institutions are superiorly informed, but rather on how the opacity of a firm's information environment affects the *extent* of informed trade. Further, unlike prior papers in the literature, my paper provides additional insight into how interactive relations between firm-level financial reporting opacity and the country-level disclosure regime, competition for private information and investors' incentives and opportunities to acquire private information affect the extent of institutional informed trading.

A second related literature examines how regulations intended to limit the selective disclosure of nonpublic information affect insider trading. For example, Ke et al. (2008) finds that selling prior to breaks in strings of consecutive earnings increases by investors with conference call access to management decreased following the implementation of Regulation FD. Ke et al. (2008) attributes this finding to a decrease in privileged access to management. My paper differs from this literature because it focuses on how firms' *public* disclosures affect the extent of informed trading rather than on the effects of regulating access to *inside* information.

The third related literature examines whether characteristics of the institutions themselves explain the extent of profitable private information-based trading. Bushee and Goodman (2007) shows informed trading by institutions is most likely to take place when institutions hold large

positions in particular firms, when the institution itself is large, and when the institution has more lax fiscal responsibilities. Baik et al. (2010) shows, in the U.S., informed trading is concentrated primarily among local (in terms of geographic proximity) institutions. Yan and Zhang (2009) argues that the positive relation between institutional ownership and future stock returns documented in Gompers and Metrick (2001) is driven by short-term investment horizon investors. My study focuses instead on attributes of the target firms and complements this literature by demonstrating that an opaque financial reporting environment benefits most those investors with the greatest abilities, incentives and opportunities to exploit private information.

The final stream of related research examines the association between firms' information environments and information asymmetry. Using a sample of U.S. firms, Brown and Hillegeist (2007) demonstrates that higher AIMR transparency scores are associated with lower values of the Easley et al. (2002) probability of informed trade measure, PIN. Internationally, Leuz and Verrecchia (2000), Daske et al. (2008), Lang et al. (2011) and others show that greater firm-level financial reporting transparency is associated with lower bid-ask spreads and higher liquidity. Although these findings are informative, a negative association between transparency and information asymmetry does not necessarily imply that some investors might actually benefit from less public disclosure. I show that certain subsets of institutional investors may be able to exploit opacity to create a tradable information advantage. Further, these studies offer little insight into the identity and characteristics of the superiorly informed parties. My paper uses data at the investor level, as well as the firm level, to provide direct evidence that financial reporting opacity is associated with the informational advantages of sophisticated investors.

3. Empirical Predictions

Although I do not view it as a test of a particular theory, my analysis is motivated by the intuition underlying papers such as Verrecchia (1982) and Diamond (1985), which theoretically model how public disclosure affects incentives to acquire private information. A common theme is that the amount of costly private information investors choose to acquire is decreasing in the amount of information firms disclose publicly. Building on this prior work, I make five specific

empirical predictions: the first addresses *whether* financial reporting opacity is a significant determinant of the extent of informed trading, the remaining four focus on *where*, *when* and for *whom* an opaque information environment is likely to provide the greatest benefit for private information-based trading. Together, these predictions, and the empirical analyses thereof, are intended to provide an in-depth assessment of the relation between financial reporting opacity and institutional investors' ability to acquire and exploit informational advantages.

Kim and Verrecchia (1997) shows that an investor's demand for a stock is a function of the precision of her private information. In the Kim and Verrecchia (1997) model, investors with more precise information prior to an anticipated public announcement take positions before the disclosure occurs and make trades that are positively associated with future returns. Coupled with the Verrecchia (1982) and Diamond (1985) theories, which suggest that higher opacity may increase the profitability of informed trading, these arguments imply that having a more opaque information environment creates a greater incentive for investors to acquire private information in advance of future information releases. Trades based on such private information create a positive correlation between changes in holdings and future performance.[4]

Despite the incentives created by the absence of public disclosure, acquiring private information is costly. A positive correlation between changes in holdings and future returns arises only if the benefits of exploiting private information exceed the costs of acquisition. I expect that in the face of scant publicly available information, for investors with significant expertise and access to resources, the benefits of informed trade are likely to outweigh the costs. My first empirical prediction is that the magnitude of the positive association between changes in institutional holdings and future returns is increasing in the opacity of firms' financial reporting.

[4] A reasonable question is why uninformed investors are willing to purchase opaque stocks knowing they may face informed trading. Easley and O'Hara (2004) argues that traders price protect by demanding higher returns to hold assets with greater information risk and thus, even with asymmetric information, may optimally include such assets in their portfolios. Consistent with this notion, in an untabulated analysis, I confirm that stocks with greater informed trading have a higher bid-ask spread, a lower Tobin's *q* and a higher cost of equity capital. Further, assuming traders cannot directly observe whether the counter-party is informed, they do not know whether they are trading against an informed party, only that the information risk is high.

Prior research suggests that the implications of firm-level opacity vary based on the quality of the disclosure environment in the country where the firm is domiciled [e.g., Lang and Maffett (2011b)]. Two effects are possible. First, weak country-level disclosure regulations may further increase opacity and thus the potential benefit of private information acquisition. Second, a more developed country-level information dissemination infrastructure, such as, for example, an expansive news media, may serve as a substitute for limited firm-level information. My second empirical prediction is that the association between institutional informed trade and firm-level opacity is increasing in the opacity of the country-level disclosure environment.

Investors have three primary ways of capitalizing on private information, including: direct buying and selling, short selling and stock options. Prior literature suggests that restrictions on short selling and option trading decrease price efficiency and lead to larger deviations in prices from their full information values [Saffi and Sigurdsson (2011); Roll et al. (2009)]. An investor's decision to acquire, and ability to exploit, private information depends on what she can learn from prices [Verrecchia (1982)]. Thus, restrictions on short selling and options trading are likely to increase an investor's ability to exploit private information by directly buying or selling a stock. Moreover, short selling and options trading are likely to be more important avenues for incorporating private information in high information asymmetry stocks [Boehmer et al. (2008); Roll et al. (2008)]. My third empirical prediction is that the association between informed trade and opacity is greatest when competition from alternative venues for exploiting private information is restricted.

Even among institutional investors, it is unlikely that the ability to acquire and profitably exploit private information is uniformly distributed. Prior research, as discussed in Section 2, indicates that informed trade is most prevalent among (or limited to) those institutions with the greatest ability to acquire private information. Models such as Dumas et al. (2011) suggest local investors are better positioned to acquire private information than foreign investors and thus are most likely to benefit from opacity. My fourth empirical prediction is that the relation between informed trade and opacity is stronger for local relative to foreign institutions.

Finally, Yan and Zhang (2009) finds that the positive relation between institutional ownership and future stock returns documented in Gompers and Metrick (2001) is driven by short-term investors and argues that this finding is consistent with these investors being better informed and trading more frequently to exploit their informational advantages. This suggests short-term investors may more actively seek to acquire private information. As discussed previously, such information is likely both more prevalent and more profitable in opaque information environments. My fifth empirical prediction is that the relation between informed trade and opacity is stronger for transient relative to dedicated institutional investors.

4. Research Design

To test my empirical predictions, I estimate a series of pooled OLS regressions of the following general form:

$$\begin{aligned} Informed\ Trade_{i,t} = {} & \alpha_0 + \beta_1 Control\ Variables_{i,t-1} \\ & + \beta_2 Opacity\ Characteristics_{i,t-1} + Fixed\ Effects + \varepsilon_{i,t} \end{aligned} \qquad (1)$$

Informed Trade is the average level of informed trading by all institutions investing in firm *i* in year *t*. I describe the calculation of *Informed Trade* in detail, along with the control variables and opacity characteristics, in the following sections. To mitigate concerns about endogeneity, I measure each of the control variables and opacity characteristics with a lag. In analyses where the variables of interest are measured at the firm level (country level), I cluster standard errors at the firm level (country-industry level) to account for possible correlation in residuals. To reduce the influence of extreme observations, I winsorize all continuous non-logarithmic variables at the 2.5% level, unless otherwise noted.[5]

4.1 Measuring informed trading by institutional investors

Kim and Verrecchia (1997) shows that pre-announcement trades made by investors with private information are positively associated with future changes in firm value. According to this argument, a positive association between changes in ownership and subsequent stock returns

[5] Inferences are similar winsorising (or truncating) at alternative levels, including 1% and 5%.

provides evidence of informed trading. Drawing on this theoretical motivation, an extensive empirical literature uses the beta coefficient from a regression of changes in institutional holdings on future returns as a basis for assessing the extent of informed trading [e.g., Ke and Petroni (2004); Bushee and Goodman (2007)].[6] I follow this prior theoretical and empirical literature in constructing my measure of informed trade.[7] A positive correlation between changes in holdings and future returns might also be observed if institutions follow positive feedback (momentum) trading strategies [Sias et al. (2006)]. To mitigate this possibility, I include controls for prior and contemporaneous returns when estimating the extent of informed trade.

Specifically, I estimate the extent of informed institutional trading by firm-year using regressions of the following form:

$$\Delta IH_{j,i,t} = \alpha_0 + \beta_1 ABHR_{i,t-90} + \beta_2 ABHR_{i,t} + \beta_3 ABHR_{i,t+90} + \varepsilon_{j,i,t} \qquad (2)$$

ΔIH is the change in percent of total shares held by institution *j* in firm *i* from time *t-1* to *t*.[8] *ABHR* is the risk-adjusted buy-and-hold return for firm *i* less the buy-and-hold return for the market in firm *i's* country of domicile.[9] I require at least 10 observations to estimate the regression for each firm-year. I calculate firm and market buy-and-hold returns over three distinct windows: 1) over the 90-calendar-day window preceding the institutional holdings

[6] A potential disadvantage of this measure of informed trading is that prices may impound investors' private information immediately at the time of the trade (or shortly thereafter during the reporting period over which changes in holdings are measured) rather than over the subsequent 90 days. However, there are several reasons to expect that prices will not fully reveal informed investors' private information immediately. First, if prices incorporated investors' private information immediately, gains from these trades would be significantly reduced. For this reason, informed investors have a strong incentive to break-up or otherwise disguise their trades to minimize price impact [Bushee and Goodman (2007)]. In support of this argument, Campbell et al. (2004) find that institutions trade in very small lot sizes. Consistent with this notion, I find that *Informed Trade* is increasing in trading volume, indicating that gains to private information-based trading are greater where liquidity is higher and it is easier to disguise informed trading. Second, speculating based on private information is risky, giving risk adverse investors an incentive to delay their profit realization until their private information is publicly revealed.

[7] I model changes in holdings as a function of future returns for two reasons. First, this specification is consistent with the most closely related prior empirical research [e.g., Bushee and Goodman (2007)]. Second, this is the direction of causality implied by my theoretical motivation [i.e., Kim and Verrecchia (1997)]. If I instead estimate returns as a function of changes in holdings, inferences are similar.

[8] Institutional holdings reporting intervals range from 3-6 months and, while there is some clustering of reporting around calendar-quarter-end dates (14% of the institutions report in March, 20% in June, 14% in September and 23% in December), a significant portion of the funds report during the other months of the year.

[9] I calculate market buy-and-hold returns within sample using all available firms in a particular country. I require at least 10 firms per country over the return accumulation period (*t* to *t+90*).

reporting period, *t-90*; 2) over the institutional holdings reporting period, *t*; and 3) over the 90-calendar-day window following the institutional holdings reporting period, *t+90*.[10] Before estimating Equation (2), I orthogonalize returns with respect to the risk factors suggested by prior international research: market value of equity, book-to-market and earnings-to-price [e.g. Fama and French (1998) and Pincus et al. (2007)].

The resulting β_3 coefficient from Equation (2) provides a firm-year specific measure of the average correlation between changes in institutional holdings and future returns. Positive values of this coefficient indicate that institutions are able to forecast future performance and thus provide evidence of informed trade. Since my interest is in explaining variation in informed trade, and also to eliminate extreme observations, post-estimation, I constrain β_3 to lie between [0, 1], with zero representing uninformed trade and one representing the most informed trading.[11] I take the resulting value (multiplied by 1,000 for readability) as my primary measure of informed trading by institutions, *Informed Trade*.

4.2 Measuring Firm-Level Opacity

Because opacity is inherently difficult to measure, I use five separate indicators for the availability of firm-specific information (the construction of each of the opacity variables is described in further detail in the Appendix).[12] The first is the number of analysts issuing a forecast of the firm's fiscal year earnings, *Analyst Following*. Lang et al. (2004) provides evidence that, in an international setting, analysts play an important oversight and information-processing role and thus a smaller *Analyst Following* is taken to be indicative of greater opacity.

[10] Inferences are similar if I calculate future returns over shorter (e.g., 30 days) or longer intervals (e.g., six or twelve months).

[11] Because I can identify only one side of each trade, my informed trading measure is subject to several limitations. First, by design, it cannot detect institutions' informed trading against other institutions included in my sample. Second, it is unclear how to interpret negative associations between changes in holdings and future returns in terms of the extent of informed trade. However, these issues are unlikely to be a significant concern as the focus of my paper is on examining potential determinants of informed trading as evidenced by a *positive* association between changes in institutional holdings and future returns. As discussed further in Section 5.4, inferences are similar using alternative methods of constructing *Informed Trade*, including using: unconstrained values of β_3, the log transformation of β_3, percentile ranks and including only positive values.

[12] Throughout the remainder of the paper, for parsimony, I omit detailed variable definitions. Detailed descriptions of all variables, noted in italics, can be found in the Appendix.

In addition to the number of analysts following a firm, greater accuracy of their forecasts also likely reflects greater transparency of the firm's information environment. Lang and Lundholm (1996) suggests forecast accuracy captures both the information acquisition activities of analysts as well as the disclosure policies of firms. I use *Forecast Accuracy* as my second measure of firm-level opacity, where lower levels of *Forecast Accuracy* indicate higher levels of opacity. Relatedly, Jin and Myers (2006) shows that the extent to which analysts' forecasts differ from one another (i.e., their forecast diversity) is proportional to the standard deviation of hidden firm-specific information. I use *Forecast Diversity* as my third measure of firm-level opacity, where higher *Forecast Diversity* indicates greater opacity.

Whether or not management chooses a high quality external auditor of its financial statements may also provide an indication of the firm's commitment to financial reporting transparency. Prior research such as Teoh and Wong (1993) and DeFond and Jiambalvo (1993) suggests 'Big-5' auditor oversight is associated with higher quality accounting data. Accordingly, I use an indicator variable for whether the firm uses a 'Big-5' auditor as my fourth measure of firm-level opacity, where absence of a *Big-5 Auditor* is taken to be indicative of greater opacity.

An extensive literature in accounting shows that firms with earnings that exhibit less earnings management are likely to have higher quality accounting and therefore exhibit greater transparency. One commonly used class of measures seeks to capture the smoothness of the firm's earnings stream. The idea underlying these measures is that insiders can conceal their firm's performance by reducing the variability of reported earnings through the manipulation of accruals (i.e., smoothing). Prior research in an international context, such as Leuz et al. (2003) and Lang et al. (2011), suggests greater discretionary earnings smoothing is associated with greater opacity. For my final measure of opacity, I use *Discretionary Smoothing* as calculated in Lang et al. (2011).

4.3 Measuring Country-Level Opacity

In addition to firm-level measures, I also investigate the relation between four separate country-level measures of opacity and the extent of informed trade (country-level values for each of these

measures are reported in Table 1). Bushman et al. (2004) shows that the lack of a well-developed media communication infrastructure limits the flow of firm-specific information to interested parties. For my first measure of country-level opacity, I follow Bushman et al. (2004) and construct a measure of media development, *Media Penetration*, from the World Bank's World Development Indicators database based on newspaper circulation, television ownership and internet connections per capita from 1994 to 2004. A lower *Media Penetration* ranking indicates greater opacity.

For my second measure of country-level opacity, *Disclosure*, I use a measure of financial disclosure requirements from La Porta et al. (2006). A long line of literature, beginning with La Porta et al. (1997), documents that indicators of the country-level required disclosure intensity are important determinants of a firm's information environment. Lower *Disclosure* scores indicate greater opacity.

For my third country-level measure of opacity, I use the governance disclosure measure from Bushman et al. (2004), *Governance*. Bushman et al. (2004) shows that the quality of a country's corporate governance infrastructure is an important determinant of corporate reporting transparency. Lower *Governance* scores indicate greater opacity.

Finally, a long line of accounting literature shows that the use of a well-developed international form of GAAP, such as IFRS, can have beneficial effects on the overall quality of a firm's information environment [Hail and Leuz (2009)]. Accordingly, my final measure of country-level opacity, *Mandatory IFRS Adopter*, indicates whether the country mandates the use of IFRS.

Overall, use of the various firm- and country-level opacity measures allows me to examine a variety of aspects of firms' public disclosure environments. However, it is important to note that there are likely to be differences among the measures with respect to how the uncertainty they reflect is ultimately resolved. A necessary condition for the realization of informed trading profits is that the private information that serves as the basis for the informed investor's position ultimately becomes public and is incorporated into prices. Measures that primarily reflect an opaque voluntary disclosure environment, (i.e., *Forecast Accuracy*, *Forecast Dispersion* and

Disclosure) as well as those that reflect limited information production by outsiders (i.e., *Analyst Following* and *Media Penetration*), create uncertainty about the firm's performance that can be resolved through mandated firm-specific disclosures. Other measures such as *Discretionary Smoothing*, *Big-5 Auditor* and *Mandatory IFRS Adopter* are direct measures of specific ways that a firm can obscure its performance and the quality of its reported financial information. It is less clear that firm-specific disclosures can resolve such uncertainty. Rather, it is more likely that information obscured by low quality reporting becomes public through channels outside the firm itself, such as macroeconomic reports or the financial disclosures of industry peers and customers. In an effort to capture each of these effects, in the main analyses, I use a future returns window of 90 calendar days, which should be long enough to capture both firm-specific disclosures and considerable external information revelation.

4.4 Control Variables

Prior literature suggests there is more informed trading in smaller, younger, higher growth and more volatile firms [Bushee and Goodman (2007); Baik et al. (2010)]. To ensure the effects I document are incremental to these effects, I include in Equation (1) controls for *Size*, *Firm Age*, *Market-to-Book* and *Return Volatility*.[13] If a firm's shares are rarely traded, it will be more difficult for institutions to exploit private information [Bushee and Noe (2000)]. I include *Turnover* to control for this effect. Prior research shows firms with a U.S. ADR have higher institutional holdings and greater transparency [Lang et al. (2003)]. To control for these effects, I include an indicator variable for whether the firm cross-lists shares in the U.S., *ADR*.

Further, *Informed Trade* is also likely to be a function of the level of institutional holdings. Two competing effects are possible. First, if institutions can profitably exploit private information in some firms, they may tilt their portfolios toward such firms. Alternatively, because I can identify only one side of each trade, *Informed Trade* will not detect institutions trading against other institutions simultaneously included in estimations of Equation (2) and may be decreasing in the

[13] A firm's idiosyncratic return volatility could also serve as a measure of information incorporation into price [e.g., Jin and Myers (2006)]. For this reason, the predicted sign on *Return Volatility* is ambiguous.

level of institutional holdings. I include a control for the percentage of institutional holdings, *Institutional Holdings*, in all analyses to control for these effects. Finally, I include country, industry and year fixed effects in all tests using firm-level measures of opacity and industry and year fixed effects in analyses using country-level measures.

5. Sample and Results

5.1 Sample Selection and Descriptive Statistics

I compile data for the analyses from the intersection of the *Thompson Reuter's International Mutual Fund* (*TIMF*) and *Datastream Advance* (*Datastream*) databases.[14] The *TIMF* database reports quarterly firm-level holdings data for over 40,000 global mutual funds located in 63 countries from 1999 through 2009.[15] To be included in the sample, I require firm-year observations to, at a minimum, have holdings data from *TIMF*, analyst data from *I/B/E/S*, and market data to compute the primary control variables from *Datastream*. I exclude any country with less than 50 firm-year observations.

Table 1 Column (1) provides a breakdown of the sample mutual funds by country. Overall, my sample contains data for 42,930 different mutual funds from 42 countries. The United States, Germany, Spain and the United Kingdom have the largest number of distinct funds, while the remaining funds are relatively well dispersed among the other 38 countries. Table 1 Column (3) provides a breakdown of the sample firm-years by country. In total, my sample contains 43,383 firm-year observations from 40 countries. An advantage of this broad international sample is that it is not dominated by the largest most heavily followed international firms. As a result, it contains a substantial number of firms for which opacity issues are likely to be more pronounced. The substantial variation among the funds and firms within the sample should increase the power of my tests.

[14] Several prior papers including Hau and Rey (2008), Chan et al. (2005) and Yu (2010) have used, and discuss in further detail, the *TIMF* database.

[15] According to a representative, Thomson gathers data both directly from the mutual funds themselves as well as from agents of the local authorities. *TIMF* does not report mutual fund holdings in U.S. domiciled firms.

Table 2 provides descriptive statistics for variables used in the regression analyses. Median informed institutional trading (*Informed Trade*) is 0.037, indicating that, for the median firm, changes in institutional holdings have a relatively small positive association with future returns. In terms of the control variables, the descriptive statistics indicate that the sample firms are medium-sized on average and range from very large to much smaller firms (*Size*). The median firm has been publicly-traded for almost twelve years (*Firm Age*), has an annualized volatility of 36% (*Return Volatility*), has a market value in excess of its book value (*Market-to-Book*), turns over its shares about every two years (*Share Turnover*), does not trade shares on a U.S. exchange (*ADR*) and has mutual fund ownership of 8.7% (*Institutional Holdings*). Looking next at the firm-level opacity proxies, the median firm is followed by four analysts (*Analyst Following*) and does not have financial statements audited by a global accounting firm (*Big-5 Auditor*).

Table 3 presents correlation matrices for the primary variables of interest, with Pearson correlation coefficients above the diagonal and Spearman coefficients below the diagonal. Most of the firm- and country-level opacity characteristics are significantly correlated (in the predicted direction), which suggests they capture a shared underlying economic construct. None of the correlations for any simultaneously included variables exceeds 0.53 (between *Size* and *Analyst Following*) indicating multicollinearity is unlikely to be an issue in the regression analyses.

5.2 Analysis of Informed Trading by Institutions and Firm-Level Opacity

My first empirical prediction is that the magnitude of the association between changes in institutional holdings and future returns is increasing in the opacity of firms' financial reporting environments. Table 4 presents results for tests of this prediction using five separate firm-level measures of opacity. In this analysis, I use fixed effects to hold static year-, industry- and country-level factors constant, which allows me to focus explicitly on how firm-level variation in opacity within a particular country, industry and year affects informed institutional trading.

In terms of the control variables, I find larger (*Size*), older (*Firm Age*), more volatile (*Return Volatility*) firms with higher market-to-book ratios (*Market-to-Book*), higher institutional

holdings (*Institutional Holdings*) and U.S. cross-listed shares (*ADR*) experience less informed trading, while firms with greater turnover (*Turnover*) experience more.

Moving next to my primary relations of interest, I find that each of the five firm-level opacity indicators are significantly associated with informed trade in the predicted direction [Columns (1)-(5)]. Looking first at the analyst characteristics, *Analyst Following* and *Forecast Accuracy* are both significantly negatively associated with *Informed Trade*. The association between *Forecast Diversity* and *Informed Trade* is significantly positive. These results suggest that oversight and information acquisition by analysts are associated with a decrease in informed trading. *Big-5 Auditor* is negative and significant, indicating that selection of a high-quality auditor is associated with a decrease in private information-based trading. Finally, *Discretionary Smoothing* is significantly positive, indicating that informed trading by institutions is greater when managers report earnings that are excessively smoothed relative to underlying cash flows.

Column (6) of Table 4 reports results simultaneously including each of the five opacity proxies.[16] *Analyst Following*, *Forecast Accuracy*, *Forecast Diversity*, *Big-5 Auditor* and *Discretionary Smoothing* are each incrementally significantly associated with *Informed Trade*, indicating that, although the measures are unlikely to be independent (e.g., auditor quality likely influences the extent of discretionary smoothing and analyst forecast accuracy), none completely subsumes the others. Nonetheless, the positive correlations among the variables (see Table 3) suggest that each of the five firm-level measures capture a shared underlying construct. For this reason, and for parsimony going forward, I combine the opacity measures by ranking each variable and summing the percentile ranks to compute an aggregate opacity measure, *Firm-Level Opacity*.[17] Column (7) reports results for the aggregate opacity measure, which is, as expected, significantly positively associated with *Informed Trade*.

[16] To keep the number of observations consistent across specifications (3)-(6), I set missing values of *Discretionary Smoothing* equal to the country-specific median. Results are very similar if I do not replace these values.

[17] To preserve sample size, I require only that *Analyst Following* and *Forecast Accuracy* be available to compute the aggregate *Firm-Level Opacity* measure. If *Forecast Diversity*, *Big-5 Auditor* or *Discretionary Smoothing* is missing, the measure captures the average percentile rank of the remaining available variables. Results are consistent if I instead require that all five measures be available.

Overall, the results of the firm-level opacity and informed trading analysis support my first empirical prediction that the magnitude of the association between changes in institutional holdings and future returns is increasing in firm-level financial reporting opacity.

5.3 Analysis of Informed Trading by Institutions and Country-Level Opacity

In the prior analysis, I controlled for fixed country-level effects and showed a positive association between firm-level opacity and informed trading. However, the extent of informed trading also likely varies based on country-level proxies for the opacity of the firm's information environment. The next analysis provides further tests of my first empirical prediction using four separate country-level measures of opacity.

Table 5 reports the results of the country-level opacity analysis. To ensure any potential country-level effects are incremental to the firm-level effects documented in Table 4, I include *Firm-Level Opacity* as an additional control variable. Results for each of the control variables, including *Firm-Level Opacity*, are consistent with the findings in Table 4. In terms of the primary variables of interest, in Columns (1)-(4), I find *Media Penetration* is significantly negatively associated with *Informed Trade*, indicating that information-based trading by institutions is lower in countries with more developed media communications infrastructures. In addition, both *Disclosure* and *Governance* are negatively associated with *Informed Trade*, which suggests that more stringent financial reporting requirements and the quality of a country's corporate governance infrastructure are important determinants of the level of informed trading.

Next, I examine the effect of country-level mandatory IFRS adoption on informed trading. To control for static differences between countries, I include an indicator variable, *Mandatory Adopter*, which equals one if a country requires mandatory adoption during my sample period, and zero otherwise. To control for the possibility of a time-trend in the extent of informed trade, I include an additional indicator variable, *Post-IFRS Adoption*, which equals one for all fiscal years following mandatory adoption, and zero otherwise. Column (4) of Table 5 presents the results of the mandatory IFRS adoption analysis. The coefficient on *Mandatory Adopter* is positive and significant, indicating firms located in IFRS-adopting countries experience more

informed trading. The coefficient on *Post-IFRS Adoption* is negative and significant indicating that there was a decrease in *Informed Trade* during the Post-IFRS adoption period. The primary variable of interest in this analysis, the interaction between *Mandatory Adopter* and *Post-IFRS Adoption*, *Mandatory*Post*, is negative and significant. These findings support the prediction that firms from countries that mandated the use of IFRS experience less informed trading following the adoption of these standards, relative to the non-adopting control group.[18]

Beyond serving as an indicator of higher country-level transparency, countries' mandates to report under IFRS also create an opportunity to more directly identify the effect of opacity on informed trade. Specifically, since individual firms themselves had little control over the country-level decision to require financial reports be prepared in accordance with IFRS, this requirement potentially represents an exogenous shock to the firms' information environments.[19] Thus, finding informed trading by institutions decreased following mandatory IFRS adoption provides additional evidence that the relation between opacity and informed trade is not simply endogenous and gives some indication of the direction of causality.

Again, because the country-level opacity indicators are generally positively correlated (see Table 3) and likely capture a similar underlying construct, I combine the measures into an aggregate measure, *Country-Level Opacity*.[20] *Country-Level Opacity* is constructed by assigning a value of one if a particular country has a *Media Penetration*, *Disclosure*, or *Governance* score below the sample median or is not a *Mandatory IFRS Adopter* and summing the score for each country. As constructed, *Country-Level Opacity* ranges from zero to four, with four representing countries with the most opaque reporting and zero representing countries with the least. Column (5)

[18] This result is consistent with the findings of Brochet et al. (2011), which shows that insider purchases in the U.K. decreased following the mandatory adoption of IFRS.

[19] As discussed in Hail and Leuz (2009), a limitation to this characterization of mandatory IFRS adoption as an exogenous shock to financial reporting transparency is the fact that many other aspects of firms' regulatory infrastructures were changed contemporaneously (e.g., the enforcement and governance regimes). Nonetheless, as shown by Christensen et al. (2011), many of these contemporaneous changes also served to decrease information asymmetry, and thus likely represented shocks to firms' information environments.

[20] Because of high multicollinearity among the country-level opacity proxies, I do not estimate their effects simultaneously. However, I do address each variable's incremental importance in Section 5.5.

reports results for the aggregate country-level opacity measure, which is, as expected, significantly positively associated with *Informed Trade*.[21]

To summarize, the results of this section further support my first empirical prediction that informed trading by institutional investors is increasing in the opacity of the country-level financial reporting environment.

5.4 Additional Analyses and Robustness Tests

In this section, I discuss the results of several additional analyses and robustness tests designed to increase confidence in the interpretation of my results.[22] First, to ensure censoring of *Informed Trade* at zero does not unduly influence my results, I estimate Equation (1) as a Tobit regression. Column (1) of Table 6 presents results for this alternative specification, where I find *Firm-Level Opacity* remains significantly positively related to *Informed Trade*.

Second, to alleviate concerns that the variable's skewness (caused in part by censoring at zero) biases my results, I estimate Equation (1) using the percentile rank of *Informed Trade*. Results for this analysis, presented in Column (2) of Table 6, confirm the association between *Firm-Level Opacity* and *Informed Trade* is robust to this alternative specification. Results (untabulated) are similar if I instead control for skewness by taking the natural log of β_3 (after first adding a small positive constant to values of zero).

Third, I consider the possibility that unmodeled risk factors, correlated with opacity, affect the observed relation between changes in holdings and future returns. As a first step to addressing this concern, throughout the analysis, I orthogonalize abnormal returns with respect to common risk factors shown to be ex ante predictors of returns. Additional research suggests that the

[21] All of the country-level opacity results are robust to clustering standard errors at the country level except for the mandatory IFRS adoption interaction (*Mandatory*Post*) which becomes statistically insignificant. The sensitivity of IFRS adoption effects to country-level clustering is consistent with prior literature [e.g., Daske et al. (2008)].

[22] For comparative purposes, I do not include *Country-Level Opacity* in the tabulated sensitivity analyses, however, with the exception of Table 6 Columns (6), (7) and (8) (the firm fixed effects, changes and firm-level governance analyses), both *Country-Level Opacity* and *Firm-Level Opacity* are both significantly positive when included simultaneously in each of the robustness specifications. Lack of significance in the firm-fixed effects and changes specifications is likely attributable to the limited time-series variation of the country-level variables, while the lack of significance in the *Firm-Level Governance* specification likely stems from the reduction in sample size.

quality of a firm's information environment may have a direct effect on stock returns [e.g., Callen et al. (2011)]. To ensure information risk does not affect my results, I consider an alternative model that includes *Firm-Level Opacity* as an additional control in calculating risk-adjusted returns. Results (untabulated) are very similar controlling directly for the effect of information on returns.

Fourth, to both further address the possibility of a risk-based explanation and to increase confidence that the documented association between changes in institutional holdings and future returns is attributable to trading based on information about future performance, I repeat my primary analyses replacing *ABHR* in Equation (2) with three-day cumulative abnormal earnings announcement returns (*EACAR3*). I use actual earnings announcement dates from *I/B/E/S* (retaining only announcements within one quarter (90 days) of the institutional holdings report date) and calculate cumulative abnormal returns during the three-day window around these dates. Column (3) of Table 6 presents results using *EACAR3*.[23] Although sample size is reduced significantly in this analysis (from 43,383 to 4,548), reflecting both the limited availability of earnings announcement data for international firms and the restriction that the announcement be within one quarter of a holdings report, I continue to find *Firm-Level Opacity* is significantly positively associated with *Informed Trade*. Moreover, the larger coefficient on *Firm-Level Opacity* (relative to the main specification) suggests that a disproportionate share of institutional investors' private information is revealed during this relatively short window. The short window of the earnings announcement returns also provides additional assurance that changes in risk are unlikely to drive the observed association between opacity and informed trade.

Fifth, I consider an *Informed Trade* measure based on an unconstrained β_3 coefficient.[24] As discussed in Section 4, in calculating *Informed Trade*, I constrain the β_3 coefficient from Equation (2) to lie between [0,1]. While my primary interest is in investigating informed trade, as evidenced by a positive association between changes in institutional holdings and future returns,

[23] Because the reduction in number of observations leads to noisier estimates, for this analysis, *Informed Trade* is winsorized at the 5% level. Results are consistent, but weaker, winsorising at 2.5% or 1%.
[24] Rather than censoring, to control for outliers in this specification, I winsorize β_3 at the 5% level. Results are consistent, but weaker, winsorising at 2.5% or 1%.

it is possible that variation within the negative range of the β_3 coefficient also has meaningful explanatory power. Column (4) of Table 6 presents results for this analysis. While *Firm-Level Opacity* remains significantly positive in this alternative specification, the adjusted-R^2 decreases, as does the significance of several of the control variables, suggesting that the unconstrained β_3 coefficient is not as precise a measure of informed trading as is the constrained coefficient.[25]

Sixth, I include a control for bid-ask spread. Prior literature shows that firm-level opacity is positively associated with a stock's illiquidity, as captured by proxies such as the bid-ask spread [e.g., Lang et al. (2011)]. To ensure the association between opacity and informed institutional trading I document does not simply reflect a correlation between *Informed Trade* and illiquidity, in Column (5) of Table 6, I include *Spread* as an additional control variable. The results show that, although *Spread* is significantly positively associated with *Informed Trade*, the *Firm-Level Opacity* coefficient remains positive and significant, indicating that the association between opacity and informed institutional trading is distinct from the association between opacity and illiquidity documented in prior literature.[26]

A related concern is that the relation between changes in institutional holdings and future returns could be affected by the limits of arbitrage, which may be larger for stocks that are more opaque. To investigate the limits of arbitrage explanation, I employ an approach suggested by Brav et al. (2010). Brav et al. (2010) suggests that if the limits of arbitrage is the precipitating factor behind a particular effect, then that effect should be limited to, or at least strongest when, limits of arbitrage are highest. Thus, a limits of arbitrage explanation would be inconsistent with finding that the effects I document are strongest in the lowest limits of arbitrage environments. To address this possibility, I split my sample into deciles based on the two common proxies for limits to arbitrage, idiosyncratic volatility (*IDVOL*) and bid-ask spread (*Spread*), suggested by prior research [e.g., Brav et al. (2010); Cohen et al. (2007)]. Contrary to a limits to arbitrage explanation I find the relation between opacity and informed trade is strongest in low limits to

[25] Results are also robust to excluding negative values of β_3 entirely.
[26] Results are similar using alternative illiquidity proxies such as the proportion of zero return days or the Amihud price impact of trade measure.

arbitrage settings. Specifically, I find that the coefficient on opacity in the lowest *IDVOL* (*Spread*) decile is over 40% (50%) larger than, and is significantly different from, the coefficient on opacity in the highest *IDVOL* (*Spread*) decile (results untabulated).[27]

Seventh, I consider models including firm fixed effects. The primary firm-level analyses include country, industry and year fixed effects and standard errors clustered at the firm level, but it is possible other firm-specific factors could be important as well. A concern with including firm fixed effects is that several of the opacity proxies (i.e., *Big-5 Auditor* and *Discretionary Smoothing*) are constructed either over a several year window or change very infrequently. Despite the stickiness of the opacity characteristics, results including firm fixed effects, presented in Column (6) of Table 6, are consistent with those presented previously, providing additional assurance that unmodeled firm-level factors are unlikely to drive the observed association between opacity and informed trade.

Eighth, I consider a changes specification. While the firm fixed effects analysis controls for static firm-level effects, an analysis based on first differences explicitly focuses on time-series covariation between the variables. As with my primary analyses, I measure the change in *Firm-Level Opacity* one year prior to the change in *Informed Trade*. Column (7) of Table 6 presents results for this analysis. The coefficient on *Firm-Level Opacity* remains positive and significant, providing further comfort that my results are not driven by omitted firm-level variables.[28]

Ninth, I include a control for firm-level corporate governance. A potential alternative explanation for the relation between changes in holdings and future returns is that institutions play monitoring roles in the firms in which they invest and thereby increase firm value through improvements in corporate governance [Ferreira and Matos (2008)]. To ensure my findings are not attributable to anticipated improvements in firm-level governance, I include the firm-level corporate governance variable, measured one year in advance of the holdings report date, from Aggarwal et al. (2011) as an additional control. Column (8) of Table 6 presents results for this

[27] Results are very similar if I control directly for idiosyncratic volatility.
[28] Because there is no variation in the change in *Firm Age* from year to year, I omit it as a control in the firm fixed effects and changes analysis.

analysis. Although inclusion of *Firm-Level Governance* leads to a significant reduction in sample size, I continue to find *Firm-Level Opacity* is significantly positively associated with *Informed Trade*.

Finally, because it represents a significant portion of the sample (>20%), I repeat the prior analyses eliminating Japanese firms. Results (untabulated) are robust to excluding Japanese firms. Moreover, results are robust to excluding any other individual country from the sample. In fact, repeating the analysis *within* each of the 40 countries, the coefficient on *Firm-Level Opacity* is positive in 36 countries [18 significantly (two-tailed); 22 significantly (one-tailed)] and is never significantly negative. Repeating the analysis within each of the ten years in the sample, the coefficient on *Firm-Level Opacity* is significantly positive in all ten years. Overall, these results confirm the consistency of my primary findings across a wide range of countries and time periods.

5.5 Analysis of Firm- and Country-Level Opacity Interactions

In this section, I investigate whether firm- and country-level opacity have an interactive effect on informed trading. Prior research suggests that while an opaque country-level disclosure regime can exacerbate firm-level opacity, more extensive country-level disclosure regulation and information dissemination can mitigate the effects of poor firm-level reporting [e.g., Lang and Maffett (2011b)]. To investigate this possibility, as well as to assess the incremental importance of the individual country-level opacity proxies, I examine the strength of the relation between *Firm-Level Opacity* and *Informed Trade* across *Country-Level Opacity* groups.

Table 7 reports results across each of the five separate *Country-Level Opacity* groups. From Column (1), the group of firms with the lowest scores, to Column (5), the group with the highest, I find that there is a monotonic increase in the *Firm-Level Opacity* coefficient. Moreover, the *Firm-Level Opacity* coefficient for the most opaque group of countries is nearly two and a half times larger than (and is significantly different from) the coefficient for the least opaque group.[29]

[29] Throughout the paper, assessments of significance across subgroups are based on the p-value (one-sided) associated with firm-clustered robust standard errors of the coefficient on the interaction of *Firm-Level Opacity* and

This finding suggests that, while high country-level opacity may exacerbate the relation between firm-level opacity and informed trade, an extremely strong country-level disclosure environment can have a significant mitigating effect. These results also confirm the incremental importance of each of the individual country-level opacity variables.

In summary, the results in this section are consistent with my second empirical prediction and provide evidence of a significant interactive relation between country- and firm-level opacity. This interactive effect is interesting because, although it suggests that, when combined, firm- and country-level opacity can significantly enhance the ability of institutional investors to exploit private information, it also suggests that, even when firms maintain highly opaque information environments, regulators may nonetheless be able to reduce informed trading through improvements in country-level accounting, disclosure and governance.

5.6 Analysis of Alternative Trading Venues and Firm-Level Opacity

In this section, I investigate whether institutional investors' ability to exploit private information in opaque stocks is greater when competition for private information from other trading venues is constrained. Prior literature suggests that the inability to short sell or trade stock options is likely to decrease price efficiency [Saffi and Sigurdsson (2011); Roll et al. (2009)]. I expect that less efficient prices make private information more profitable, particularly in opaque stocks where short selling and options trading are especially important mechanisms for price discovery, and increase investors' ability to exploit private information through direct buying and selling.

To test this prediction, I first examine variation in the relation between opacity and informed trade based on whether short selling is permitted. Shortly after the collapse of Lehman Brothers in the fall of 2008, many countries elected to institute bans or regulatory restrictions on short selling. These bans ranged from financial industry-specific bans lasting for a few weeks (e.g., in the U.S. and U.K.) to countrywide bans lasting for many months (e.g., Australia and Japan) [Beber and Pagano (2011)]. I use the shorting bans of the 2008 financial crisis as a proxy for

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the partitioning variable in a fully interacted specification (i.e., I allow each variable, including the fixed effects, to vary by the partitioning variable).

instances where short selling is prohibited. I collect data on the country and industry specific short sale ban dates from Beber and Pagano (2011). Based on these dates, I create a country-industry specific indicator variable, *Short Ban*, equal to one if shorting is banned for a particular industry, in a particular country, for a particular quarter, and zero otherwise.

Restrictions on short selling explicitly constrain *pessimistic* trading and are thus likely to increase the potential to exploit private information by directly *selling* a stock. Reca et al. (2011) argues that a trade that completely closes out an existing position (i.e., an exit trade) is the clearest indication of negative information. In order to capture this effect, for this analysis, I modify my measure of informed trading to reflect only the correlation between exit trades and future returns. Specifically, I create an indicator variable, *Exit*, which equals one if an institution fully closes out an existing position over the holdings reporting interval, and zero otherwise. I then use this indicator variable as the dependent variable in quarterly, firm-specific regressions on future returns similar to Equation (2) and take the resulting coefficient estimates as a measure of the extent of informed institutional exit trades, *IT Exit*.[30] Estimating the regressions at a quarterly frequency allows for better alignment between the timing of the institutional trades and the short sale ban periods.

To limit the possibility that other confounding events unique to the financial crisis affect inferences from this analysis, I limit my sample period to the onset of the financial crisis in September 2008 to the following September, by which point many of the bans had expired. To further control for country and time-specific factors, I include country, and year-quarter fixed effects. Given that *Short Ban* is measured at the country-industry-quarter level, this research design relies on cross-sectional variation in the timing, duration and industry-concentration of the short sale ban to identify its effect on informed trade.

[30] For simplicity, I estimate Equation (2) as a linear probability model. As in the prior analyses, I constrain the coefficient on future returns to lie between zero and one, the natural bounds of a probability. Results are similar, but weaker, if I instead use the primary *Informed Trade* variable in this analysis. Further, because quarterly estimation significantly reduces the number of observations, I do not include controls for prior and contemporaneous returns when estimating Equation (2) for this analysis.

Table 2 presents descriptive statistics for variables included in the short selling ban analysis. On average, institutional exit trades (*IT Exit*) are positively associated with future returns and 9.0% of the firms in my sample were subject to a short sale ban (*Short Ban*) during the financial crisis of 2008. Table 8 Panel A, reports regression results for the short selling ban analysis. First, in Column (1), the coefficient on *Short Ban* is positive and significant, indicating that the extent to which institutional exit trades were informed increased during short sale bans. Next, in Columns (2) and (3), I split the sample based on whether or not a short sale ban was in effect. As predicted, the association between *Firm-Level Opacity* and *IT Exit* is significantly larger in those instances where short sales were restricted, supporting the prediction that restrictions on short sales lead to more informed direct trading in opaque stocks.

An inability to exploit private information in the derivatives market is also likely to increase the informativeness of direct institutional trading in opaque stocks. Accordingly, I also separately examine the effects of firm-level opacity on informed trade for firms with and without publicly traded stock options. I collect data on stock options from *Datastream's* equity options database.[31] I then create an indicator variable, *Option*, that is equal to one if a firm has publicly traded stock options in a particular year, and zero otherwise. The descriptive statistics in Table 2 indicate that 10.8% of the firms in my sample have publicly traded stock options (*Option*).

Table 8 Panel B reports regression results for the stock options analysis. In Columns (1) and (2), I separately estimate the effect of *Firm-Level Opacity* on *Informed Trade* splitting the sample based on the *Option* indicator variable. Consistent with the prediction that direct informed trading by institutions in opaque stocks is higher when other avenues of incorporating private information are restricted, the coefficient on *Firm-Level Opacity* for those firms without publicly traded options is positive, significant and nearly twelve times larger than the same coefficient for the group with publicly traded stock options, which is statistically insignificant.

[31] I limit the options analysis to firms domiciled in countries for which *Datastream* reports option market data. These countries include: Australia, Austria, Belgium, Canada, France, Germany, Hong Kong, India, Italy, Netherlands, Norway, Spain, Sweden, Switzerland and the United Kingdom.

In summary, the results of this section confirm my third empirical prediction that the association between institutional informed trade and firm-level opacity is greatest when competition from other avenues of exploiting private information is restricted.

5.7 Analysis of Informed Trading and Opacity by Institutional Type

In the next set of analyses, I investigate whether the relation between opacity and informed trading varies by type of institution. Prior empirical research suggests that certain kinds of investors have greater incentives and opportunities to acquire private information. Theory suggests private information is both more prevalent and profitable when public disclosure is limited. Together these findings suggest that the relation between opacity and informed trading will be stronger when the ability of institutions to acquire private information is greater.

I use two proxies for institutions' ability to acquire private information: 1) whether the institution is foreign or local and 2) whether the institution has a long or short investment horizon. To calculate the extent of informed trading for each category of institution, I estimate Equation (2) separately for each group. To ensure that the fund characteristic partitions are independent, I use an approach similar to the hierarchal linear modeling (HLM) technique discussed in Bushee and Goodman (2007). Specifically, when estimating Equation (2) across partitions, to isolate the extent to which informed trade is attributable to a particular fund characteristic, I include a control for the other investor type as well as an interaction between the fund characteristic and the future returns variable (e.g., I include a control for *Transient* investors when estimating informed trading by *Local* investors). This approach allows the splits based on fund-type to be interpreted as independent partitions of the data.

For the first set of tests, I separate institutional investors into the categories of *Local* and *Foreign* based on whether the institution is located in the same or a different country as its target firm. Prior research suggests that local institutions will have an information acquisition advantage over foreign institutions [Baik et al. (2010); Dumas et al. (2011)]. Columns (1) and (2) of Table 9 Panel A present results splitting the sample based on *Foreign* and *Local* institutional investors. I find the coefficient on *Firm-Level Opacity* is over two times larger for the *Local* institutional

group than for the *Foreign* group. These results suggest that institutions located in the same country as the firms in which they invest are better positioned than foreign investors to exploit opaque firm information environments through private information-based trading.

My second measure of an institution's ability to acquire private information is based on the institutions investment horizon. Prior research suggests transient institutions (i.e., those that have shorter investment horizons) are more likely to acquire and trade based on private information than dedicated (i.e., long-term investment horizon) investors [e.g., Yan and Zhang (2009)]. Bushee (2001) characterizes transient institutions as those with high portfolio turnover and highly diversified holdings. I adopt a similar approach and identify as *Transient* those institutions in the highest quintile of portfolio turnover and *Dedicated* as those in the lowest quintile. Columns (1) and (2) of Table 9 Panel B present results splitting the sample based on *Dedicated* and *Transient* institutional investors. The results show the relation between *Firm-Level Opacity* and *Informed Trade* is over six times as large for *Transient* as for *Dedicated* institutions. These results indicate that institutions with greater portfolio turnover profit more from informed trading in firms with high opacity than institutions with relatively long-term investing strategies.

I next investigate the relation between firm-level opacity and informed trade across partitions based on both investor type and the country-level information environment. The results of Section 5.4 show that the relation between *Informed Trade* and *Firm-Level Opacity* is strongest when the country-level information environment is also opaque and significantly mitigated when country-level transparency is high. This finding, coupled with the results based on institution type, suggests that institutions with the greatest incentives and opportunities to gather private information may be best able to exploit this information by investing in opaque firms that are domiciled in countries with opaque information environments. The previous results also suggest that a strong country-level disclosure and information dissemination infrastructure may limit the private information-based trading opportunities of even the most capable institutional investors.

Columns (3)-(6) of Table 9 Panel A present results splitting *Foreign* and *Local* institutional investors into *High C-L Opacity* (*Country-Level Opacity* equal to 3 or 4) and *Low C-L Opacity*

(*Country-Level Opacity* equal to 0, 1, or 2) groups. Columns (3)-(6) of Table 9 Panel B report similar results splitting the sample by *Dedicated* and *Transient*. Because conclusions for these groups are very similar, for parsimony, I discuss results only for the *Foreign* versus *Local* split.

There are several comparisons of interest in Table 9 Panel A. First, the coefficient on *Firm-Level Opacity* is significantly larger for *Local* institutions in the *High C-L Opacity* group than for *Local* institutions in the *Low C-L Opacity* group. This result indicates that *Local* institutions are better able to exploit firm-level opacity when country-level opacity is also high. Second, the coefficient on *Firm-Level Opacity* is larger (although not significantly) for *Foreign* institutions in the *High C-L Opacity* group than for *Foreign* institutions in the *Low C-L Opacity* group. This finding suggests that foreign institutions are less capable of further exploiting firm-level opacity when country-level opacity is also high. Third, the coefficient on *Firm-Level Opacity* is significantly larger for *Local* institutions in the *High C-L Opacity* group than for *Foreign* institutions in the *High C-L Opacity* group. This implies *Local* institutions are better able to exploit firm-level opacity than *Foreign* institutions in countries with more opaque infrastructures. Finally, the coefficient on *Firm-Level Opacity* is significantly larger for *Local* institutions relative to the *Foreign* institutions in the *Low C-L Opacity* group, implying that *Local* institutions are better able to exploit firm-level opacity even when country-level opacity is low. These results are also consistent with the notion that, across both types of investors, a highly transparent country-level information environment mitigates the relation between informed trading and firm-level opacity.

Overall, these analyses are consistent with my fourth and fifth empirical predictions and demonstrate that the interactive effects between firm- and country-level opacity are particularly pronounced for those institutional investors with significant incentives and opportunities to acquire private information. Moreover, predictable variation in the strength of the association between opacity and informed trade across different types of institutions, based on the incentives those institutions have to acquire private information, increases the likelihood that my findings are attributable to a private-information-acquisition-based explanation. Specifically, because these analyses effectively hold the firm constant, potential alternative explanations based on

unmodeled firm-specific characteristics, such as information risk, are limited and more difficult to envision.[32]

5.8 Difference-in-Differences Returns Tests

In the final set of analyses, I use a difference-in-differences design to assess the potential economic importance of my main findings.[33] To conduct this analysis, I first, on each institutional holdings report date, separate firms into deciles based on *Firm-Level Opacity*. Then, on each institutional holdings report date and for each of the *Firm-Level Opacity* deciles, I again sort the stocks into deciles based on the total change in institutional ownership from reporting period t-1 to t. Next, I calculate the time-series average risk-adjusted annualized 90-day-ahead return for each of the decile portfolios.[34] Then, separately for the most opaque (*Firm-Level Opacity* decile 10) and the most transparent (*Firm-Level Opacity* decile 1) firms, I calculate the difference in returns between firms with the largest *increase* in institutional ownership (change in holdings decile 10) and firms with the largest *decrease* in institutional ownership (change in holdings decile 1). The resulting difference in the change in holdings return spread across opaque and transparent firms provides an economically meaningful way to assess differences in the degree to which the trades made by institutions across these two groups appear to be informed.[35]

Table 10 presents results for the difference-in-differences returns tests. In Panel A, I find that opaque firms with the largest change in institutional holdings earn risk-adjusted returns 4.5% larger than firms with the smallest change. Transparent firms with the largest change in holdings

[32] Because not all firms have investors of both types, not every firm is included in both partitions. Results are very similar if I compare only those firms that appear in both groups (i.e., I constrain the firms to be identical across partitions).

[33] This approach is similar to the calendar-time hedge portfolio tests commonly used in both the finance and accounting literatures [e.g. Piotroski (2000); Baik et al. (2010)].

[34] Returns are risk-adjusted by orthogonalizing the raw 90-day buy-and-hold returns with respect to size, book-to-market and earnings-to-price, as discussed in Section 4.1. Results are very similar if I instead use benchmark-adjusted returns based on size and book-to-market calculated following Daniel et al. (1997).

[35] It is important to note that a trading strategy based on changes in institutional holdings is unlikely to be implementable, as institutional holdings data are made public only with a significant lag. Further, these tests do not imply any sort of market inefficiency. The motivation for my analysis relies on the idea that, in order to acquire and profit from private information, it is likely that institutions must exert significant effort and/or apply proprietary expertise. Without a measure of the cost of this effort, or other costs of acquiring information, it is impossible to gauge the actual profits available from implementing such strategies.

earn returns 2.7% *smaller* than firms with the smallest change. The difference in the return spreads of 7.2% is statistically significant and suggests that institutions are considerably better at predicting the returns of opaque firms.[36] Looking next at Panel B, I find that the change in holdings return spread for firms domiciled in countries with the most opaque infrastructures (*Country-Level Opacity* = 4) is 5.7% larger than for firms domiciled in countries with the most transparent (*Country-Level Opacity* = 0). Next, in Panel C, I simultaneously consider both firm- and country-level opacity. These tests show that the change in holdings return spread for the most opaque firms (*Firm-Level Opacity* decile 10) in the most opaque countries (*Country-Level Opacity* = 4 or 3) is 12.4% larger than for the most transparent firms (*Firm-Level Opacity* decile 1) in the most transparent countries (*Country-Level Opacity* = 0, 1 or 2).[37]

In Panels D and E of Table 10, I compare the change in holdings return spread for the most opaque decile of firms (*Firm-Level Opacity* decile 10) across different types of institutional investors. In Panel D, I find that for *Local* investors investing in the most opaque firms the change in holdings return spread is 2.7% larger than for *Foreign* investors investing in those same firms. In Panel E, I find that for *Transient* investors the return spread is 7.8% larger than for *Dedicated* investors. These results indicate that there is an economically significant difference across types of institutional investors in terms of their ability to exploit private information in opaque firms.

Finally, to provide a basis for assessing the magnitude of the returns net of transactions costs, I note that the median bid-ask spread for the most opaque decile of firms is 1.1%. While this is over twice as large as the median bid-ask spread for the most transparent decile of firms (0.4%), it is still well below the reported return differences. The fact that the returns exceed the median transactions costs provides some indication that institutions may be able to earn net profits from their trading in opaque firms. However, without a measure of the institution's cost of effort in acquiring private information, it is impossible to assess the return net of all costs. Nevertheless,

[36] I assess statistical significance across portfolios using t-tests (one-sided) of the mean difference in returns for the top and bottom decile portfolios of changes in institutional holdings across *Firm-Level Opacity* deciles.
[37] Inferences are similar if I consider less extreme deciles (i.e., decile 9 versus decile 2 or decile 8 versus decile 3).

the focus of my analysis is whether institutional investors benefit from opacity – a positive gross return suggests that they do, in the sense that they are rewarded for the effort they expend investing in opaque stocks.

Overall, the results of the difference-in-differences returns tests indicate that the relation between opacity and informed institutional trading is of a sufficient magnitude to be economically important. Moreover, this non-parametric approach provides additional assurance that my prior results are not driven by the constraints of a linear regression specification.

6. Conclusion

The prior literature examining institutional trading typically focuses on whether, and what types of, institutions make profitable trades based on private information about future performance. We know significantly less about how the target firm's public information environment affects institutional traders' ability to earn excess returns. Given their dominant role in the financial markets, a thorough understanding of the determinants of institutions' trading behavior is clearly important. This paper contributes to a deeper understanding of these determinants by examining how financial reporting opacity affects informed institutional trading.

Overall, my results suggest that firm- and country-level features of the public financial reporting environment significantly affect institutional investors' ability to create profitable trading advantages. My findings also demonstrate that the extent of institutional investors' informed trading is significantly influenced by interactive relations between firm-level financial reporting and: the country-level disclosure regime, the extent of competition for private information and investors' incentives and opportunities to acquire private information. A difference-in-differences analysis of returns earned by institutions across opaque and transparent firms suggests these results are economically significant.

These conclusions are, of course, subject to caveats. Foremost, they do not imply causality. However, several features of my empirical design do provide some insight into the causal direction of the relation between opacity and informed trade. Foremost, reverse causality is

unlikely to be an issue in this setting as it is difficult to envision a scenario in which higher levels of informed trading by institutions lead to increases in financial reporting opacity. Further, the fact that informed trade decreases following the mandatory adoption of IFRS, increases for those firms subject to bans on short selling and varies predictably across different types of investors reduces the potential alternative explanations for my results. Finally, my empirical results are consistent with the intuition underlying prior analytical research. Nonetheless, causal inferences should be drawn with caution.

Second, prior literature finds higher opacity is associated with lower liquidity and that lower liquidity can make it more difficult to disguise informed trades. In the main analyses, I control for the indirect effect of liquidity in order to focus on the direct effect of opacity on private information acquisition. My findings suggest that, for my sample, opacity does not constrain liquidity to such an extent that informed trading is prohibitively costly. However, it is important to note that these results may not necessarily generalize to firms where opacity is so great that the costs of transacting exceed the value of private information.

References

AGGARWAL, R.; I. EREL; M. FERREIRA; and P. MATOS. "Does Governance Travel around the World? Evidence from Institutional Investors." *Journal of Financial Economics* 100 (2011): 154-181.

ALI, A.; C. DURTSCHI; B. LEV; and M. TROMBLEY. "Changes in Institutional Ownership and Subsequent Earnings Announcement Abnormal Returns." *Journal of Accounting, Auditing & Finance* 19 (2004): 221-48.

BAIK, B.; J. KANG; and J. KIM. "Local Institutional Investors, Information Asymmetries, and Equity Returns." *Journal of Financial Economics* 97 (2010): 81-106.

BEBER, A., and M. PAGANO. "Short-Selling Bans around the World: Evidence from the 2007-2009 Crisis." Unpublished paper, University of Amsterdam and CEPR, 2011.

BOEHMER, E.; C. JONES; and X. ZHANG. "Which Shorts are Informed." *The Journal of Finance* 63 (2008): 491-527.

BRAV, A.; J. HEATON; and S. LI. "The Limits of the Limits of Arbitrage." *Review of Finance* 14 (2010): 157-187.

BROCHET, F.; A. JAGOLINZER; and E. RIEDL. "Mandatory IFRS Adoption and Financial Statement Comparability." Unpublished paper, Harvard Business School, 2011.

BROWN, S., and A. HILLEGEIST. "How Disclosure Quality Affects the Level of Information Asymmetry." *Review of Accounting Studies* 12 (2007): 443-477.

BUSHEE, B. "Do Institutional Investors Prefer Near-Term Earnings over Long-Run Value?" *Contemporary Accounting Research* 18 (2001): 207–246.

BUSHEE, B., and T. GOODMAN. "Which Institutional Investors Trade Based on Private Information About Earnings and Returns?" *Journal of Accounting Research* 45 (2007): 289-322.

BUSHEE, B., and C. NOE. "Corporate Disclosure Practices, Institutional Investors, and Stock Return Volatility." *Journal of Accounting Research* 38 (2000): 171-202.

BUSHMAN, R.; J. PIOTROSKI; and A. SMITH. "What Determines Corporate Transparency?" *Journal of Accounting Research* 42 (2004): 207-252.

CAMPBELL, J.; T. RAMADORAI; and T. VUOLTEENAHO. "Caught on Tape: Institutional Order Flow and Stock Returns." Unpublished paper, National Bureau of Economic Research, 2005.

CARHART, M. "On Persistence in Mutual Fund Performance." *The Journal of Finance* 52 (1997): 57-82.

CHAN, K.; V. COVRIG; and L. NG. "What Determines the Domestic Bias and Foreign Bias? Evidence from Mutual Fund Equity Allocations Worldwide." *The Journal of Finance* 60 (2005): 1495-1534.

CHRISTENSEN, H.; L. HAIL; and C. LEUZ. "Capital-Market Effects of Securities Regulation: The Role of Implementation and Enforcement." Unpublished paper, University of Chicago, 2011.

COHEN, D.; A. DEY; T. LYS; and S. SUNDER. "Earnings Announcement Premia and the Limits to Arbitrage." *Journal of Accounting and Economics* 43 (2007): 153-180.

COVRIG, V.; M. DEFOND; and M. HUNG. "Home Bias, Foreign Mutual Fund Holdings, and the Voluntary Adoption of International Accounting Standards." *Journal of Accounting Research* 45 (2007): 41-70.

DANIEL, K.; M. GRINBLATT; S. TITMAN; and R. WERMERS. "Measuring Mutual Fund Performance with Characteristic-Based Benchmarks." *The Journal of Finance* 52 (1997): 1035-1058.

DASKE, H.; L. HAIL; C. LEUZ and R. VERDI. "Mandatory IFRS Reporting around the World: Early Evidence on the Economic Consequences." *Journal of Accounting Research* 46 (2008): 1085-1142.

DEFOND, M., and J. JIAMBALVO. "Factors Related to Auditor-Client Disagreements Over Income-Increasing Accounting Methods." *Contemporary Accounting Research* 9 (1993): 415-431.

DIAMOND, D. "Optimal Release of Information by Firms." *The Journal of Finance* 40 (1985): 1071-1094.

DUMAS, B.; K. LEWIS; and E. OSAMBELA. "Differences of Opinion and International Equity Markets." Unpublished paper, National Bureau of Economic Research, 2011.

EASLEY, D.; S. HVIDKJAER; and M. O'HARA. "Is Information Risk a Determinant of Asset Returns?" *The Journal of Finance* 57 (2002): 2185-2221.

EASLEY, D., and M. O'HARA. "Information and the Cost of Capital." *The Journal of Finance* 59 (2004): 1553-1583.

FAMA, E., and K. FRENCH. "Value versus Growth: The International Evidence." *The Journal of Finance* 53 (1998): 1975-1999.

FERREIRA, M., and P. MATOS. "The Colors of Investors' Money: The Role of Institutional Investors around the World." *Journal of Financial Economics* 88 (2008): 499-533.

GOMPERS, P., and A. METRICK. "Institutional Investors and Equity Prices." *The Quarterly Journal of Economics* 116 (2001): 229-259.

HAIL, L., and C. LEUZ. "Capital Market Effects of Mandatory IFRS Reporting in the EU: Empirical Evidence." Unpublished paper, University of Pennsylvania – The Wharton School, 2009.

HAU, H., and H. REY. "Home Bias at the Fund Level." *American Economic Review* 98 (2008): 333-338.

JIN, C., and S. MYERS. "R^2 Around the World: New Theory and New Tests." *Journal of Financial Economics* 79 (2006): 257-292.

KE, B., and K PETRONI. "How Informed are Actively Trading Institutional Investors? Evidence from Their Trading Behavior before a Break in a String of Consecutive Earnings Increases." *Journal of Accounting Research* 42 (2004): 895-927.

KE, B.; K. PETRONI; and Y. YU. "The Effect of Regulation FD on Transient Institutional Investors' Trading Behavior." *Journal of Accounting Research* 46 (2008): 853-883.

KIM, O., and R. VERRECCHIA. "Pre-Announcement and Event-Period Private Information." *Journal of Accounting and Economics* 24 (1997): 395-419.

LA PORTA, R.; F. LOPEZ-DE-SILANES; and A. SHLEIFER. "What Works in Securities Laws." *The Journal of Finance* 61 (2006): 1-32.

LA PORTA, R.; F. LOPEZ-DE-SILANES; A. SHLEIFER; and R. W. VISHNY. “Legal Determinants of External Finance.” *The Journal of Finance* 52 (1997): 1131–50.

LANG, M.; K. LINS; and M. MAFFETT. “Transparency, Liquidity and Valuation: International Evidence.” Unpublished paper, University of North Carolina at Chapel Hill, 2011.

LANG, M.; K. LINS; and D. MILLER. “ADRs, Analysts, and Accuracy: Does Cross Listing in the United States Improve a Firm’s Information Environment and Increase Market Value?” *Journal of Accounting Research* 41 (2003): 317-345.

LANG, M.; K. LINS; and D. MILLER. “Concentrated Control, Analyst Following, and Valuation: Do Analysts Matter Most When Investors are Protected Least?” *Journal of Accounting Research* 42 (2004): 581-623.

LANG, M., and R. LUNDHOLM. “Corporate Disclosure Policy and Analyst Behavior.” *The Accounting Review* 71 (1996): 467-493.

LANG, M., and M. MAFFETT. “Economic effects of Transparency in International Equity Markets: A Review and Suggestions for Future Research.” *Foundations and Trends in Accounting* 5 (2011a): 175-241.

LANG, M., and M. MAFFETT. “Transparency and Liquidity Uncertainty in Crisis Periods.” *Journal of Accounting and Economics*, forthcoming (2011b).

LEUZ, C.; D. NANDA; and P. WYSOCKI. “Earnings Management and Investor Protection: An International Comparison.” *Journal of Financial Economics* 69 (2003): 505-527.

LEUZ, C., and R. VERRECCHIA. “The Economic Consequences of Increased Disclosure.” *Journal of Accounting Research* 38 (2000): 353-386.

PINCUS, M.; S. RAJGOPAL; and M. VENKATACHALAM. “The Accrual Anomaly: International Evidence.” *The Accounting Review* 82 (2007): 169-203.

PIOTROSKI, J. “Value Investing: The Use of Historical Financial Statement Information to Separate Winners from Losers.” *Journal of Accounting Research* 38 (2000): 1-41.

RECA B.; R. SIAS; and H. TURTLE. “Are Institutional Investors Informed? Evidence from Entry, Exit and Adjustments.” Unpublished paper, Washington State University, 2011.

ROLL, R.; E. SCHWARTZ; and A. SUBRAHMANYAM. “Options trading activity and firm valuation.” *Journal of Financial Economics* 94 (2009): 345-360.

SAFFI, P., and K. SIGURDSSON. “Price Efficiency and Short Selling.” *Review of Financial Studies* 24 (2011): 821-852.

SIAS, R.; L. STARKS; and S. TITMAN. “Changes in Institutional Ownership and Stock Returns: Assessment and Methodology.” *Journal of Business* 79 (2006): 2869-2910.

TEOH, S., and T. WONG. “Perceived Auditor Quality and the Earnings Response Coefficient.” *The Accounting Review* 68 (1993): 346-366.

VERRECCHIA, R. “Information Acquisition in a Noisy Rational Expectations Economy.” *Econometrica* 50 (1982): 1415-1430.

YAN, X., and Z. ZHANG. “Institutional Investors and Equity Returns: Are Short-term Institutions Better Informed?” *The Review of Financial Studies* 22 (2009): 893-924.

YU, G. “Accounting Standards and International Portfolio Holdings: Analysis of Cross-Border Holdings Following Mandatory Adoption of IFRS.” Unpublished paper, Harvard University, 2010.

Appendix: Variable Definitions

Variable	Definition
ABHR	the firm's risk-adjusted buy-and-hold return less the buy-and-hold return for the market in the firm's country of domicile, where the risk-adjusted return is the residual value from a regression of the market-adjusted buy-and-hold return on *Market Value of Equity*, *Book-to-Market* and *E/P Ratio*, as defined below
Market Value of Equity	the natural log of the market value of equity in U.S.D. (millions) (*Datastream* item MV)
Book-to-Market	book value of common equity (*WorldScope* item 03501) divided by market value of common equity (*Datastream* item MV)
E/P Ratio	net income before extraordinary items (*WorldScope* item 01551) divided by market value of common equity (*Datastream* item MV)
Informed Trade	the beta coefficient from a regression of changes in institutional holdings on future returns calculated as described in Section 4.1, multiplied by 1,000 for readability
Size	the natural log of total assets in U.S.D. (millions) (*WorldScope* item 02999)
Firm Age	the age of the firm in months (*Datastream* item BDATE) divided by 1,000
Return Volatility	the annualized standard deviation of daily stock returns (*Datastream* item RI)
Market-to-Book	market value of common equity (*Datastream* item MV) divided by book value of common equity (*WorldScope* item 03501)
Turnover	is the total annual volume of shares traded over the firm's fiscal year (*Datastream* item VO), divided by the total number of shares outstanding at the end of the fiscal year (*Datastream* item NOSH)
ADR	an indicator variable equal to one if the firm trades on a U.S. exchange during the year, and zero otherwise (data are hand-collected from a variety of sources including the Bank of New York, Citibank, JP Morgan and *Datastream*)
Institutional Holdings	the firm's total shares held by institutions in the *TIMF* database, divided by the total number of shares outstanding (*Datastream* item NOSH) at the end of the calendar year
Analyst Following	the number of unique analysts making a forecast of the firm's annual earnings, obtained from the *I/B/E/S* Summary File
Forecast Accuracy	the percentile-ranked residual value from a regression of *Raw Accuracy* on *Earnings Surprise* and *Forecast Bias*, where *Raw Accuracy* is the absolute value of the forecast error multiplied by -1, scaled by the stock price at the end of the prior fiscal year and where the forecast error is the analysts' mean annual earnings forecast less the actual earnings as reported in the *I/B/E/S* Summary File
Forecast Diversity	the percentile-ranked residual value from a regression of *Raw Diversity* on *Earnings Surprise* and *Forecast Bias*, where *Raw Diversity* is the standard deviation of analysts' forecasts of the firm's earnings in the following year, normalized by the mean forecast and then divided by the square root of the number of analysts following that firm, where all values are taken from the *I/B/E/S* Summary File
Earnings Surprise	unexpected earnings scaled by stock price at the end of the prior fiscal year (*Datastream* item P), where unexpected earnings is defined as earnings per share (*WorldScope* item 05201) less earnings per share from the prior fiscal year

Forecast Bias	the signed value of the forecast error scaled by stock price at the end of the prior fiscal year, where the forecast error is the *I/B/E/S* analysts' mean annual earnings forecast less the actual earnings as reported in the *I/B/E/S* Summary File
Big-5 Auditor	an indicator variable equal to one if the firm is audited by a 'Big-5' auditing firm during the fiscal year, and zero otherwise (collected from a variety of sources, including historical point-in-time *Datastream* data and *Compustat Global*)
Discretionary Smoothing	the firm's discretionary earnings smoothing, calculated following Lang et al. (2011)
Firm-Level Opacity	the average scaled percentile rank of the variables: (1-*Analyst Following*), (1-*Forecast Accuracy*), (1-*Big-5 Auditor*), *Forecast Diversity* and *Discretionary Smoothing*
Media Penetration	is an index constructed from the World Bank's World Development Indicators, in which each country is ranked based on the number of newspapers, internet connections and televisions per capita from 1994 to 2004 and higher scores correspond to better media penetration (the best possible score is 100)
Disclosure	is the disclosure index as reported in La Porta et al. (2006)
Governance	the governance index as reported in Bushman et al. (2004)
Mandatory IFRS Adopter	an indicator variable equal to one if the firm is domiciled in a country that mandates the use of IFRS during that year, and zero otherwise.
Country-Level Opacity	is a country-level index, ranging from 0-4, constructed by summing the instances in which a country has a median value of *Media Penetration*, *Disclosure* or *Governance* below the median or has not mandated the use of IFRS
Spread	the natural log of the median bid-ask spread over the fiscal year, where the bid ask spread is equal to (ASK-BID)/((ASK+BID)/2))
IDVOL	the unexplained variation (i.e., $1 - R^2$) from a firm-year regression of daily firm returns (Datastream item *RI*) on daily market returns and industry returns, where market returns are based on the appropriate Datastream country market index and industry returns are calculated within sample based on the firm's two digit Datastream ICB code
Firm-Level Governance	the firm level governance variable from Aggarwal et al. (2011), obtained from Reena Aggarwal's webpage: http://faculty.msb.edu/aggarwal/
Exit	is an institution-level indicator variable equal to one if the institution closes out a position in a particular firm over a particular reporting interval, and zero otherwise
IT Exit	the beta coefficient from a regression of *Exit* on future returns calculated as described in Section 5.6, multiplied by 1,000 for readability
Short Ban	a country-industry specific indicator variable, based on the data in Beber and Pagano (2011) equal to one if short selling was banned in a particular industry in a particular country for a particular calendar-quarter, and zero otherwise
Option	a firm-year indicator variable equal to one if a firm has exchange-traded stock options listed on the *Datastream* equity options database, and zero otherwise
Foreign	is an institution-level indicator variable equal to one if the institution is located in a different country than the target firm, and zero otherwise
Local	is an institution-level indicator variable equal to one if the institution is located in the same country as the target firm, and zero otherwise

Dedicated	is an institution-level indicator variable equal to one if an institution is in the lowest quintile of portfolio turnover in a particular year, and zero otherwise
Transient	is an institution-level indicator variable equal to one if an institution is in the highest quintile of portfolio turnover in a particular year, and zero otherwise

Table 1 - Breakdown of the Sample by Country

	Funds		Firms		Media			IFRS Adoption
Country	N	%	N	%	Penetration	Disclosure	Governance	Date
Argentina	131	0.4%	120	0.3%	76	0.50	68	-
Australia	533	1.5%	1,746	4.0%	87	0.75	94	12/31/2005
Austria	390	1.1%	291	0.7%	90	0.25	79	12/31/2005
Belgium	803	2.3%	582	1.3%	83	0.42	76	12/31/2005
Bermuda	20	0.1%	-	-	-	-	-	-
Brazil	1,824	5.2%	598	1.4%	68	0.25	66	-
Canada	1,674	4.8%	-	-	-	-	-	-
Chile	177	0.5%	253	0.6%	78	0.58	76	-
China	293	0.8%	665	1.5%	67	-	-	-
Czech Republic	30	0.1%	-	-	-	-	-	-
Denmark	387	1.1%	443	1.0%	91	0.58	77	12/31/2005
Egypt	-	-	61	0.1%	-	0.50	-	-
Finland	222	0.6%	646	1.5%	89	0.50	89	12/31/2005
France	3,087	8.8%	2,434	5.6%	80	0.75	66	12/31/2005
Germany	7,657	21.9%	2,356	5.4%	84	0.42	73	12/31/2005
Greece	262	0.7%	634	1.5%	82	0.33	66	12/31/2005
Hong Kong	640	1.8%	1,894	4.4%	89	0.92	91	12/31/2005
Hungary	8	0.0%	125	0.3%	77	-	-	12/31/2005
India	535	1.5%	914	2.1%	64	0.92	76	-
Indonesia	6	0.0%	435	1.0%	63	0.50	-	-
Ireland	237	0.7%	188	0.4%	80	0.67	92	12/31/2005
Israel	-	-	193	0.4%	79	0.67	66	1/1/2008*
Italy	1,020	2.9%	1,174	2.7%	-	0.67	66	12/31/2005
Jamaica	36	0.1%	-	-	-	-	-	-
Japan	1,436	4.1%	10,095	23.3%	95	0.75	83	-
Liechtenstein	101	0.3%	-	-	-	-	-	-
Luxembourg	582	1.7%	-	-	-	-	-	-
Malaysia	219	0.6%	1,441	3.3%	76	0.92	97	-
Mexico	162	0.5%	372	0.9%	73	0.58	66	-
Netherlands	386	1.1%	672	1.5%	91	0.50	86	12/31/2005
New Zealand	-	-	206	0.5%	90	0.67	95	12/31/2005
Norway	291	0.8%	645	1.5%	97	0.58	90	12/31/2005
Panama	320	0.9%	-	-	-	-	-	-
Peru	18	0.1%	-	-	-	-	-	-
Philippines	15	0.0%	290	0.7%	67	0.83	66	12/31/2005
Poland	84	0.2%	302	0.7%	75	-	-	12/31/2005
Portugal	-	-	235	0.5%	83	0.42	70	12/31/2005
Russian Federation	-	-	67	0.2%	-	-	-	-
Singapore	382	1.1%	897	2.1%	90	1.00	100	-
South Africa	363	1.0%	931	2.1%	65	0.83	94	12/31/2005
South Korea	-	-	711	1.6%	-	-	78	-
Spain	4,597	13.1%	808	1.9%	83	0.50	80	12/31/2005
Sweden	535	1.5%	1,095	2.5%	91	0.58	97	12/31/2005
Switzerland	1,139	3.2%	1,127	2.6%	92	0.67	87	12/31/2005
Taiwan	411	1.2%	1,696	3.9%	-	0.75	-	-
Thailand	143	0.4%	610	1.4%	72	0.92	68	-
Turkey	-	-	324	0.7%	-	0.50	67	-
United Kingdom	3,885	11.1%	5,107	11.8%	92	0.83	95	12/31/2005
United States	7,889	22.5%	-	-	-	-	-	-
	42,930	100.0%	43,383	100.0%				

This table presents the country distribution of the sample mutual funds and firm-years during the period from 1999-2009 with sufficient data from the *Thomson Financial International Mutual Fund* and *Datastream Advance* databases to estimate the least restrictive specification (Model 1 for *Informed Trade* in Table 4). Following the *Datastream* convention, I refer to Hong Kong as a country. Any country with less than 50 observations is excluded. * Indicates mandatory IFRS adoption was required for all firms except banks.

Table 2 - Descriptive Statistics

Variable	N	Mean	Std	P25	Median	P75
Informed Trade	43,383	1.226	2.773	0.000	0.037	0.931
Size	43,383	13.766	1.940	12.412	13.554	14.895
Firm Age	43,383	0.172	0.122	0.073	0.142	0.238
Return Volatility	43,383	0.393	0.166	0.271	0.359	0.478
Market-to-Book	43,383	2.367	2.179	1.039	1.672	2.796
Turnover	43,383	0.934	1.199	0.237	0.537	1.097
ADR	43,383	0.116	0.320	0.000	0.000	0.000
Institutional Holdings	43,383	0.117	0.105	0.034	0.087	0.170
Analyst Following	43,383	6.530	6.514	2.000	4.000	9.000
Forecast Accuracy	43,383	-0.029	0.063	-0.022	-0.007	-0.002
Forecast Diversity	33,612	0.045	0.116	0.012	0.029	0.068
Big-5 Auditor	33,612	0.255	0.436	0.000	0.000	1.000
Discretionary Smoothing	33,612	0.464	0.215	0.320	0.467	0.600
Firm-Level Opacity	43,383	0.498	0.156	0.387	0.489	0.601
Media Penetration	39,350	86.343	9.172	80.333	90.000	94.667
Disclosure	41,513	0.710	0.166	0.583	0.750	0.833
Governance	40,032	83.149	10.450	76.450	82.610	93.840
Mandatory IFRS Adopter	43,383	0.258	0.437	0.000	0.000	1.000
Country-Level Opacity	43,383	2.266	1.078	2.000	2.000	3.000
Spread	29,170	0.012	0.013	0.004	0.007	0.014
Firm-Level Governance	7,187	0.438	0.088	0.366	0.415	0.488
IT Exit	11,278	0.542	1.091	0.000	0.000	0.560
Short Ban	11,278	0.090	0.286	0.000	0.000	0.000
Option	21,080	0.108	0.311	0.000	0.000	0.000

This table presents descriptive statistics for all firm-level variables included in the regression analyses, displayed in the order in which they appear, based on all firm-years between 1999 and 2009 with sufficient data to estimate the least restrictive regression model in which the data item is included. All variables are calculated as defined in the Appendix.

Table 3 - Correlation Matrices

VARIABLE	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Informed Trade (1)	.	**-0.25**	**-0.13**	**0.04**	**-0.03**	0.00	**-0.08**	**-0.03**	**-0.18**	**-0.03**	**0.07**	**0.04**	**0.03**	**0.13**
Size (2)	**-0.14**	.	**0.39**	**-0.22**	**-0.16**	**0.07**	**0.30**	**-0.02**	**0.53**	**0.04**	**-0.07**	**-0.06**	**-0.06**	**-0.26**
Firm Age (3)	**-0.06**	**0.41**	.	**-0.24**	**-0.16**	**-0.02**	**0.11**	-0.01	**0.13**	**0.03**	**-0.05**	**-0.10**	**-0.10**	**-0.07**
Return Volatility (4)	**0.02**	**-0.20**	**-0.24**	.	**0.06**	**0.21**	**-0.03**	**-0.02**	**-0.07**	0.00	**0.07**	**-0.03**	**0.02**	**0.07**
Market-to-Book (5)	**-0.03**	**-0.12**	**-0.16**	**-0.02**	.	**0.09**	-0.01	**0.17**	**0.13**	**0.07**	**-0.18**	0.00	-0.01	**-0.17**
Turnover (6)	**-0.02**	**0.14**	**0.04**	**0.19**	**0.16**	.	**0.06**	**0.15**	**0.07**	**0.03**	-0.01	**0.05**	**-0.05**	**-0.07**
ADR (7)	**-0.05**	**0.28**	**0.10**	**-0.03**	0.00	**0.09**	.	**0.01**	**0.32**	**0.03**	**-0.06**	**0.17**	**-0.06**	**-0.21**
Institutional Holdings (8)	**-0.02**	**-0.02**	-0.02	**-0.04**	**0.25**	**0.27**	**0.02**	.	**0.18**	**0.01**	**-0.12**	**0.09**	**-0.06**	**-0.17**
Analyst Following (9)	**-0.11**	**0.48**	**0.07**	**-0.06**	**0.21**	**0.17**	**0.27**	**0.23**	.	**0.09**	**-0.22**	**0.11**	**-0.07**	**-0.56**
Forecast Accuracy (10)	**-0.02**	**0.04**	**0.02**	0.02	**0.08**	**0.05**	**0.03**	**0.03**	**0.11**	.	**-0.11**	**-0.05**	**-0.02**	**-0.56**
Forecast Diversity (11)	**0.04**	**-0.07**	**-0.04**	**0.11**	**-0.21**	-0.06	**-0.06**	**-0.13**	**-0.22**	**-0.11**	.	**0.03**	0.00	**0.62**
Big-5 Auditor (12)	**0.02**	**-0.07**	**-0.10**	**-0.05**	-0.02	**0.02**	**0.17**	**0.07**	**0.10**	**-0.05**	**0.03**	.	**-0.05**	**-0.39**
Discretionary Smoothing (13)	**0.02**	**-0.06**	**-0.10**	**0.01**	-0.03	**-0.07**	**-0.06**	**-0.07**	**-0.07**	**-0.02**	0.00	**-0.05**	.	**0.45**
Firm-Level Opacity (14)	**0.07**	**-0.26**	**-0.06**	**0.07**	**-0.21**	**-0.15**	**-0.22**	**-0.21**	**-0.64**	**-0.54**	**0.61**	**-0.38**	**0.43**	.

VARIABLE	(15)	(16)	(17)	(18)	(19)
Informed Trade (1)	**-0.06**	-0.01	0.01	**-0.02**	**0.03**
Size (2)	0.01	**-0.08**	**-0.16**	0.02	**0.12**
Firm Age (3)	**0.25**	**0.10**	**0.07**	0.00	**-0.21**
Return Volatility (4)	**-0.07**	-0.04	**-0.05**	**-0.10**	**0.11**
Market-to-Book (5)	**-0.05**	0.01	**0.05**	**0.12**	**-0.08**
Turnover (6)	**0.04**	**0.02**	**0.02**	**-0.05**	**0.05**
ADR (7)	**-0.08**	-0.02	**-0.04**	**-0.11**	**0.09**
Institutional Holdings (8)	**0.03**	**-0.08**	**0.14**	**0.22**	**-0.21**
Firm-Level Opacity (14)	**0.01**	0.01	**-0.07**	0.00	**0.02**
Media Penetration (15)	.	**0.09**	**0.37**	**0.03**	**-0.54**
Disclosure (16)	**0.02**	.	**0.49**	**-0.09**	**-0.59**
Governance (17)	**0.25**	**0.52**	.	**0.08**	**-0.75**
Mandatory IFRS Adopter (18)	**-0.11**	**-0.06**	**0.09**	.	**-0.42**
Country-Level Opacity (19)	**-0.51**	**-0.56**	**-0.79**	**-0.39**	.

This table reports Pearson correlation coefficients (above the diagonal) and Spearman correlation coefficients (below the diagonal) for variables used in the primary analyses. Correlations that are statistically significant at the 5% level (or higher) are presented in bold.

Table 4 - Informed Trading by Institutions and Firm-Level Opacity

VARIABLES	Prediction	(1) *IT*	(2) *IT*	(3) *IT*	(4) *IT*	(5) *IT*	(6) *IT*	(7) *IT*
Size	(-)	-0.374***	-0.436***	-0.389***	-0.392***	-0.394***	-0.337***	-0.404***
		(0.013)	(0.011)	(0.012)	(0.012)	(0.012)	(0.014)	(0.012)
Firm Age	(-)	-0.403***	-0.316**	-0.238*	-0.202	-0.199	-0.255**	-0.353***
		(0.125)	(0.125)	(0.125)	(0.125)	(0.125)	(0.125)	(0.124)
Return Volatility	(?)	-0.374***	-0.316***	-0.308**	-0.307**	-0.290**	-0.350***	-0.337***
		(0.120)	(0.119)	(0.130)	(0.130)	(0.130)	(0.130)	(0.119)
Market-to-Book	(?)	-0.077***	-0.090***	-0.078***	-0.083***	-0.082***	-0.068***	-0.078***
		(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Turnover	(+)	0.080***	0.069***	0.072***	0.073***	0.073***	0.080***	0.073***
		(0.015)	(0.015)	(0.016)	(0.016)	(0.016)	(0.016)	(0.015)
ADR	(-)	-0.011	-0.076**	-0.095**	-0.098***	-0.098***	-0.040	-0.039
		(0.038)	(0.038)	(0.038)	(0.038)	(0.038)	(0.037)	(0.038)
Institutional Holdings	(?)	-0.454***	-0.781***	-0.638***	-0.678***	-0.683***	-0.391**	-0.554***
		(0.173)	(0.169)	(0.178)	(0.178)	(0.178)	(0.181)	(0.170)
Analyst Following	(-)	-0.028***					-0.022***	
		(0.003)					(0.003)	
Forecast Accuracy	(-)		-0.084*				-0.097*	
			(0.048)				(0.052)	
Forecast Diversity	(+)			0.252***			0.172***	
				(0.053)			(0.054)	
Big-5 Auditor	(-)				-0.101**		-0.101**	
					(0.043)		(0.043)	
Discretionary Smoothing	(+)					0.148**	0.109*	
						(0.066)	(0.066)	
Firm-Level Opacity	(+)							1.023***
								(0.103)
Fixed Effects		C,I,Y	C,I,Y	C,I,Y	C,I,Y	C,I,Y	C,I,Y	C,I,Y
Observations		43,383	43,383	33,612	33,612	33,612	33,612	43,383
Adjusted R-squared		0.093	0.091	0.092	0.092	0.092	0.094	0.093

This table presents results of OLS estimation of the Informed Trading by Institutions and Firm-Level Opacity analysis using firm-level annual observations. In all specifications, *Informed Trade* (abbreviated *IT*) is the dependent variable. All variables are calculated as described in the Appendix. Robust standard errors, clustered at the firm level are in parentheses. Country (C), industry (I) and year (Y) fixed effects are included in the models as indicated, but I do not report the coefficients. All continuous non-logarithmic variables are winsorized at the 2.5% level. For the regression analyses, statistical significance is based on two-sided t-tests and indicated as follows: *** p-value<0.01, ** p-value<0.05, * p-value<0.1.

Table 5 - Informed Trading by Institutions and Country-Level Opacity

VARIABLES	Prediction	(1) *IT*	(2) *IT*	(3) *IT*	(4) *IT*	(5) *IT*
Size	(-)	-0.389***	-0.419***	-0.419***	-0.385***	-0.411***
		(0.015)	(0.014)	(0.014)	(0.015)	(0.015)
Firm Age	(-)	-0.718***	-0.801***	-0.740***	-1.072***	-0.775***
		(0.153)	(0.167)	(0.171)	(0.158)	(0.179)
Return Volatility	(?)	-0.306**	-0.474***	-0.526***	-0.289**	-0.403***
		(0.131)	(0.136)	(0.137)	(0.139)	(0.134)
Market-to-Book	(?)	-0.079***	-0.089***	-0.088***	-0.084***	-0.079***
		(0.007)	(0.006)	(0.006)	(0.007)	(0.007)
Turnover	(+)	0.104***	0.082***	0.067***	0.108***	0.091***
		(0.023)	(0.018)	(0.019)	(0.016)	(0.017)
ADR	(-)	-0.067	0.005	0.032	-0.034	-0.043
		(0.045)	(0.043)	(0.043)	(0.044)	(0.042)
Institutional Holdings	(?)	0.067	-0.086	0.156	-0.359	0.090
		(0.213)	(0.221)	(0.225)	(0.234)	(0.226)
Firm-Level Opacity	(+)	0.871***	0.815***	0.787***	0.950***	0.827***
		(0.113)	(0.112)	(0.109)	(0.110)	(0.109)
Media Penetration	(-)	-0.017***				
		(0.003)				
Disclosure	(-)		-0.534***			
			(0.116)			
Governance	(-)			-0.007***		
				(0.002)		
Mandatory Adopter	(?)				0.230***	
					(0.058)	
Post-IFRS Adoption	(?)				-0.399***	
					(0.123)	
*Mandatory*Post*	(-)				-0.123*	
					(0.070)	
Country-Level Opacity	(+)					0.115***
						(0.020)
Fixed Effects		I,Y	I,Y	I,Y	I,Y	I,Y
Observations		39,350	41,513	40,032	43,383	43,383
Adjusted R-squared		0.082	0.087	0.086	0.082	0.083

This table presents results of OLS estimation of the Informed Trading by Institutions and Country-Level Opacity analysis using firm-level annual observations. In all specifications, *Informed Trade* (abbreviated *IT*) is the dependent variable. All variables are calculated as described in the Appendix. Robust standard errors, clustered at the country-industry level are in parentheses. Industry (I) and year (Y) fixed effects are included in the models as indicated, but I do not report the coefficients. All continuous non-logarithmic variables are winsorized at the 2.5% level. For the regression analyses, statistical significance is based on two-sided t-tests and indicated as follows: *** p-value<0.01, ** p-value<0.05, * p-value<0.1.

Table 6 – Additional Analyses and Robustness Tests

VARIABLES	Prediction	(1) *Tobit*	(2) *Rank Reg.*	(3) *EACAR3*	(4) *Uncensored*	(5) *Inc. Spread*	(6) *FFE*	(7) *ΔIT*	(8) *F-L Gov.*
Size	(-)	-0.516***	-0.022***	-2.036***	-0.120***	-0.374***	-0.319***	-0.380***	-0.211***
		(0.020)	(0.001)	(0.181)	(0.015)	(0.017)	(0.042)	(0.084)	(0.018)
Firm Age	(-)	-0.320	-0.005	-1.186	0.100	-0.097			-0.110
		(0.230)	(0.013)	(1.916)	(0.169)	(0.155)			(0.159)
Return Volatility	(?)	-0.428**	-0.013	-2.641	-0.109	-0.620***	0.199	0.759***	-0.283
		(0.203)	(0.011)	(2.119)	(0.171)	(0.156)	(0.145)	(0.207)	(0.213)
Market-to-Book	(?)	-0.091***	-0.004***	-0.290***	-0.007	-0.061***	-0.047***	-0.007	-0.044***
		(0.012)	(0.001)	(0.106)	(0.009)	(0.008)	(0.010)	(0.014)	(0.008)
Turnover	(+)	0.094***	0.003**	0.596***	0.047**	0.114***	0.075***	0.149***	-0.026
		(0.025)	(0.001)	(0.216)	(0.021)	(0.019)	(0.020)	(0.032)	(0.024)
ADR	(-)	-0.038	-0.009**	0.162	0.005	0.026	-0.263***	-0.126*	0.017
		(0.073)	(0.004)	(0.516)	(0.049)	(0.047)	(0.072)	(0.073)	(0.032)
Institutional Holdings	(?)	-0.711**	-0.006	-0.126	-0.151	-0.595***	-0.013	0.352	0.280
		(0.290)	(0.016)	(2.570)	(0.239)	(0.204)	(0.232)	(0.360)	(0.287)
Spread	(+)					0.185***			
						(0.030)			
Firm-Level Governance	(?)								-0.629**
									(0.303)
Firm-Level Opacity	(+)	1.308***	0.050***	3.569**	0.459***	1.158***	0.412***	0.388**	0.391***
		(0.178)	(0.010)	(1.785)	(0.149)	(0.132)	(0.120)	(0.160)	(0.150)
Fixed Effects		C,I,Y	C,I,Y	C,I,Y	C,I,Y	C,I,Y	F,Y	C,I,Y	C,I,Y
Observations		43,383	43,383	4,548	43,383	29,016	43,383	33,564	7,187
Adjusted R-squared			0.028	0.085	0.004	0.096	0.225	0.005	0.092
Pseudo R-squared		0.0138							

This table presents results of the Additional Analyses and Robustness Tests using firm-level annual observations. The modifications for each test are indicated in the column heading. All variables are calculated as described in the Appendix. Robust standard errors, clustered at the firm level are in parentheses. Country (C), industry (I), firm (F) and year (Y) fixed effects are included in the models as indicated, but I do not report the coefficients. All continuous non-logarithmic variables are winsorized at the 2.5% level. For the regression analyses, statistical significance is based on two-sided t-tests and indicated as follows: *** p-value<0.01, ** p-value<0.05, * p-value<0.1.

Table 7 – Firm- and Country-Level Opacity Interactions

VARIABLES	Prediction	(1) C-L Opacity = 0	(2) C-L Opacity = 1	(3) C-L Opacity = 2	(4) C-L Opacity = 3	(5) C-L Opacity = 4
Size	(-)	-0.343***	-0.465***	-0.376***	-0.423***	-0.405***
		(0.046)	(0.026)	(0.019)	(0.025)	(0.032)
Firm Age	(-)	-0.048**	-0.072***	-0.086***	-0.089***	-0.060***
		(0.022)	(0.012)	(0.012)	(0.015)	(0.020)
Return Volatility	(?)	-0.121	0.082	-0.880***	-0.636*	0.759*
		(0.384)	(0.252)	(0.188)	(0.339)	(0.444)
Market-to-Book	(?)	-0.524	-0.864***	0.149	-0.598*	-0.350
		(0.561)	(0.269)	(0.187)	(0.308)	(0.302)
Turnover	(+)	-0.185***	0.107**	0.041*	0.122***	0.102***
		(0.059)	(0.045)	(0.023)	(0.031)	(0.037)
ADR	(-)	-0.229	0.024	0.074	-0.145*	-0.080
		(0.171)	(0.082)	(0.056)	(0.078)	(0.104)
Institutional Holdings	(?)	-0.428	-0.378	-0.803**	-1.354***	-0.126
		(0.549)	(0.338)	(0.314)	(0.352)	(0.423)
Firm-Level Opacity	(+)	0.481	0.660***	1.063***	1.064***	1.278***
		(0.518)	(0.236)	(0.158)	(0.235)	(0.273)
Opacity Difference (5 - 1) (P-Value)						0.797 (0.08)
Fixed Effects		C,I,Y	C,I,Y	C,I,Y	C,I,Y	C,I,Y
Observations		2,117	7,293	18,221	8,433	7,319
Adjusted R-squared		0.098	0.100	0.099	0.102	0.080

Table 7 presents results of OLS estimation of the Firm- and Country-Level Opacity Interactions analysis using firm-level annual observations. Results are presented for each partition of the aggregate *Country-Level Opacity* variable. All variables are calculated as described in the Appendix. Robust standard errors, clustered at the firm level are in parentheses. Country (C), industry (I) and year (Y) fixed effects are included in the models as indicated, but I do not report the coefficients. All continuous non-logarithmic variables are winsorized at the 2.5% level. Statistical significance, in the regressions, is based on two-sided t-tests and indicated as follows: *** p-value<0.01, ** p-value<0.05, * p-value<0.1. Assessments of significance across subgroups are based on the p-value (one-sided) associated with the firm-clustered robust standard errors of the coefficient on the interaction of *Firm-Level Opacity* and the partitioning variable in a fully-interacted specification.

TABLE 8 - Alternative Trading Venues and Firm-Level Opacity

Table 8 - Alternative Trading Venues and Firm-Level Opacity

Panel A: Short-Selling Ban

VARIABLES	Prediction	(1)	(2) Short Ban = 0	(3) Short Ban = 1
Size	(-)	-0.086***	-0.088***	-0.099***
		(0.010)	(0.011)	(0.026)
Firm Age	(-)	-0.033	-0.038	-0.062
		(0.125)	(0.132)	(0.407)
Return Volatility	(?)	-0.281**	-0.325**	0.038
		(0.126)	(0.133)	(0.393)
Market-to-Book	(?)	-0.007	-0.010	0.011
		(0.008)	(0.009)	(0.021)
Turnover	(+)	-0.008	-0.015	0.100
		(0.017)	(0.018)	(0.061)
ADR	(-)	-0.050	-0.039	0.135
		(0.052)	(0.056)	(0.205)
Institutional Holdings	(?)	-0.879***	-0.788***	-1.775***
		(0.169)	(0.177)	(0.558)
Short Ban	(+)	0.220***		
		(0.069)		
Firm-Level Opacity	(+)	0.465***	0.414***	1.064***
		(0.122)	(0.128)	(0.377)
Opacity Difference (P-Value)			0.650 (0.03)	
			(3)-(2)	
Fixed Effects		C,Y-Q	C,Y-Q	C,Y-Q
Observations		11,278	10,261	1,017
Adjusted R-squared		0.031	0.030	0.054

Table 8 - Alternative Trading Venues and Firm-Level Opacity

Panel B: Publicly Traded Stock Options

VARIABLES	Prediction	(1) Option = 1	(2) Option = 0
Size	(-)	-0.102***	-0.459***
		(0.015)	(0.018)
Firm Age	(-)	0.196	-0.178
		(0.157)	(0.187)
Return Volatility	(?)	-0.023	-0.840***
		(0.154)	(0.171)
Market-to-Book	(?)	-0.004	-0.091***
		(0.006)	(0.009)
Turnover	(+)	0.030	0.029
		(0.025)	(0.027)
ADR	(-)	-0.090**	-0.016
		(0.043)	(0.064)
Institutional Holdings	(?)	0.071	-0.817***
		(0.297)	(0.223)
Firm-Level Opacity		0.097	1.132***
		(0.111)	(0.160)
Opacity Difference (P-Value)		1.035 (0.00)	
		(2)-(1)	
		C,I,Y	C,I,Y
		2,279	18,801
		0.067	0.084

Table 8 Panels A and B present results of OLS estimation of the Alternative Trading Venues and Firm-Level Opacity analysis using firm-level annual observations. All variables are calculated as described in the Appendix. Robust standard errors, clustered at the firm level are in parentheses. Country (C), year-quarter (Y-Q), industry (I) and year (Y) fixed effects are included in the models as indicated, but I do not report the coefficients. All continuous non-logarithmic variables are winsorized at the 2.5% level. Statistical significance, in the regressions, is based on two-sided t-tests and indicated as follows: *** p-value<0.01, ** p-value<0.05, * p-value<0.1. Assessments of significance across subgroups are based on the p-value (one-sided) associated with the firm-clustered robust standard errors of the coefficient on the interaction of *Firm-Level Opacity* and the partitioning variable in a fully-interacted specification.

Table 9 – Informed Trading and Opacity by Institutional Type

Panel A: Foreign vs. Local

VARIABLES	Prediction	(1) Foreign	(2) Local	(3) Foreign Low C-L Opacity	(4) Foreign High C-L Opacity	(5) Local Low C-L Opacity	(6) Local High C-L Opacity
Size	(-)	-0.327***	-0.695***	-0.315***	-0.352***	-0.631***	-0.815***
		(0.011)	(0.027)	(0.014)	(0.019)	(0.031)	(0.051)
Firm Age	(-)	-0.052***	-0.154***	-0.045***	-0.067***	-0.132***	-0.189***
		(0.006)	(0.014)	(0.008)	(0.011)	(0.016)	(0.028)
Return Volatility	(?)	-0.438***	-0.027	-0.359**	-0.800***	-0.120	-0.158
		(0.121)	(0.272)	(0.142)	(0.225)	(0.300)	(0.691)
Market-to-Book	(?)	-0.595***	-0.864***	-0.441***	-0.852***	-0.146	-2.107***
		(0.124)	(0.274)	(0.151)	(0.220)	(0.311)	(0.565)
Turnover	(+)	0.073***	0.088**	0.050***	0.102***	-0.014	0.189***
		(0.014)	(0.038)	(0.017)	(0.025)	(0.038)	(0.073)
ADR	(-)	-0.078**	-0.006	-0.060	-0.088	-0.074	0.122
		(0.033)	(0.094)	(0.038)	(0.061)	(0.095)	(0.187)
Institutional Holdings	(?)	0.059	-0.606	-0.103	0.283	-1.542***	0.933
		(0.174)	(0.424)	(0.218)	(0.285)	(0.478)	(0.784)
Firm-Level Opacity	(+)	0.772***	1.576***	0.680***	0.863***	1.286***	2.018***
		(0.099)	(0.244)	(0.122)	(0.172)	(0.281)	(0.474)
Opacity Difference (P-Value)		0.804 (0.00) (2)-(1)		0.184 (0.19) (4)-(3)		0.732 (0.09) (6)-(5)	
Opacity Difference (P-Value)				0.607 (0.02) (5)-(3)		1.155 (0.01) (6)-(4)	
Fixed Effects		C,I,Y	C,I,Y	C,I,Y	C,I,Y	C,I,Y	C,I,Y
Observations		28,743	35,241	19,291	9,452	23,657	11,584
Adjusted R-squared		0.092	0.083	0.087	0.100	0.084	0.075

TABLE 9 – (continued)

Panel B: Dedicated vs. Transient

VARIABLES	Prediction	(1) Dedicated	(2) Transient	(3) Dedicated Low C-L Opacity	(4) Dedicated High C-L Opacity	(5) Transient Low C-L Opacity	(6) Transient High C-L Opacity
Size	(-)	-0.458***	-1.157***	-0.433***	-0.489***	-1.110***	-1.260***
		(0.021)	(0.048)	(0.026)	(0.038)	(0.059)	(0.085)
Firm Age	(-)	-0.074***	-0.195***	-0.051***	-0.127***	-0.137***	-0.311***
		(0.012)	(0.027)	(0.015)	(0.022)	(0.033)	(0.047)
Return Volatility	(?)	-0.541***	-0.650	-0.509**	-0.545	-0.727	-0.475
		(0.201)	(0.488)	(0.230)	(0.438)	(0.581)	(0.936)
Market-to-Book	(?)	-0.415	-1.508***	-0.726**	0.241	-1.571**	-1.206
		(0.252)	(0.574)	(0.289)	(0.504)	(0.718)	(1.006)
Turnover	(+)	0.094***	0.003	0.069*	0.108*	-0.053	0.055
		(0.030)	(0.057)	(0.036)	(0.055)	(0.076)	(0.089)
ADR	(-)	-0.154**	-0.365***	-0.195***	-0.139	-0.438***	-0.195
		(0.061)	(0.120)	(0.063)	(0.125)	(0.141)	(0.218)
Institutional Holdings	(?)	0.897***	-0.474	0.489	1.697***	-0.593	-0.360
		(0.337)	(0.695)	(0.412)	(0.582)	(0.884)	(1.102)
Firm-Level Opacity	(+)	0.432**	2.754***	0.303	0.746**	2.395***	3.098***
		(0.200)	(0.458)	(0.239)	(0.376)	(0.553)	(0.798)
Opacity Difference (P-Value)		2.322 (0.00) (2)-(1)		0.443 (0.16) (4)-(3)		0.703 (0.23) (6)-(5)	
Opacity Difference (P-Value)				2.092 (0.00) (5)-(3)		2.352 (0.00) (6)-(4)	
Fixed Effects		C,I,Y	C,I,Y	C,I,Y	C,I,Y	C,I,Y	C,I,Y
Observations		23,690	23,303	16,363	7,327	15,132	8,171
Adjusted R-squared		0.074	0.074	0.076	0.073	0.069	0.082

Table 9 Panels A and B present results of OLS estimation of the Informed Trading and Opacity by Institutional Type analysis using firm-level annual observations. Panel A presents results for *Foreign* and *Local* institutional subgroups. Panel B presents results for *Dedicated* and *Transient* institutional subgroups. All variables are calculated as described in the Appendix. Robust standard errors, clustered at the firm level are in parentheses. Country (C), industry (I) and year (Y) fixed effects are included in the models as indicated, but I do not report the coefficients. All continuous non-logarithmic variables are winsorized at the 2.5% level. Statistical significance, in the regressions, is based on two-sided t-tests and indicated as follows: *** p-value<0.01, ** p-value<0.05, * p-value<0.1. Assessments of significance across subgroups are based on the p-value (one-sided) associated with the firm-clustered robust standard errors of the coefficient on the interaction of *Firm-Level Opacity* and the partitioning variable in a fully-interacted specification.

TABLE 10 – Difference-in-Differences Returns Tests

Panel A: Portfolios based on Firm-Level Opacity

ΔHoldings Decile	Opaque	Transparent	
D10 (High)	6.8%	0.6%	
D1 (Low)	2.3%	3.3%	
High - Low	4.5%	-2.7%	7.2%
		p-value	(0.03)

Panel B: Portfolios based on Country-Level Opacity

ΔHoldings Decile	Opaque	Transparent	
D10 (High)	9.2%	-4.3%	
D1 (Low)	5.3%	-2.5%	
High - Low	3.9%	-1.8%	5.7%
		p-value	(0.04)

Panel C: Portfolios based on Firm- and Country-Level Opacity

ΔHoldings Decile	Opaque	Transparent	
D10 (High)	18.3%	0.3%	
D1 (Low)	9.0%	3.4%	
High - Low	9.3%	-3.1%	12.4%
		p-value	(0.01)

Panel D: Portfolios based on Investor Location

ΔHoldings Decile	Local Opaque	Foreign Opaque	
D10 (High)	3.9%	7.7%	
D1 (Low)	-1.6%	4.9%	
High - Low	5.5%	2.8%	2.7%
		p-value	(0.29)

Panel E: Portfolios based on Investment Horizon

ΔHoldings Decile	Transient Opaque	Dedicated Opaque	
D10 (High)	4.1%	0.6%	
D1 (Low)	-2.3%	2.0%	
High - Low	6.4%	-1.4%	7.8%
		p-value	(0.09)

Table 10 Panels A-E present results for the Difference-in-Differences Returns tests. Panel A presents results for portfolios partitioned based on deciles of changes in institutional holdings and deciles of *Firm-Level Opacity*. Panel B presents results for portfolios partitioned based on deciles of changes in institutional holdings and *Country-Level Opacity*, where the 'Opaque' firms are domiciled in countries with *Country-Level Opacity* scores of 4 and the 'Transparent' firms are domiciled in countries with *Country-Level Opacity* scores of 0. Panel C presents results for portfolios partitioned based on deciles of changes in institutional holdings and deciles of *Firm-Level Opacity*, where the 'Opaque' firms are domiciled in countries with *Country-Level Opacity* scores of 3 or 4 and the 'Transparent' firms are domiciled in countries with *Country-Level Opacity* scores of 0, 1 or 2. Panel D presents results for portfolios partitioned based on deciles of changes in institutional holdings and *Foreign* and *Local* investors for firms in the highest decile of *Firm-Level Opacity*. Panel E presents results for portfolios partitioned based on deciles of changes in institutional holdings and *Transient* and *Dedicated* investors for firms in the highest decile of *Firm-Level Opacity*. Statistical significance across portfolios is based on p-values (one-sided) of the mean difference in returns for the top and bottom decile portfolios of changes in institutional holdings across the partitioning variable.