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Multinationality and Opaqueness

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Multinationality and Opaqueness

Abstract

We investigate whether and how multinationality affects the opaqueness of the firm. We use multiple alternative measurements of multinationality and opaqueness. Spanning nearly three decades for a large sample of US non-financial firms, we find a statistically and economically significant, positive relationship between multinationality and opaqueness. We find that this positive relationship hinges on whether or not the degree of foreign involvement is compatible with the structure of the firm's foreign operations network. Our results imply that multinationality's impact on opaqueness is alleviated when there is harmony between the size of foreign involvement and the extent of the MNC network's geographic dispersion. Previous literature has implicitly assumed a simple, positive relationship. This is the first study to explicitly address the question in a comprehensive manner.

JEL classification: F23; G14; G30

Keywords: Multiple regression analysis; Internationalization theory; Stock market valuation; Stock prices; Multinationality; Opaqueness

Multinationality and Opaqueness

1. Introduction

Does a firm's multinationality, i.e. its degree of foreign involvement and the structure of its foreign operations network, have an impact on its investors' information environment? The quality of outside investors' information environment should be of great concern to firms because it is argued to affect their cost of capital (Barron et al., 2012; Easley and O'Hara, 2004; Francis et al., 2008; and Hughes et al., 2007), their investment policies (Durnev and Mangen, 2009; Durnev et al., 2004; Shroff et al., 2014), and their capital structure-related decisions (Myers, 1984; Myers and Majluf, 1984; Shyam-Sunder and Myers, 1999). However, in spite of the information environment's importance, its link to multinational corporations' (hereafter, MNCs) geographic expansion has never been directly and thoroughly addressed in the literature. There are many past studies that have either relied on the implicit assumption that internationalization and opaqueness are positively correlated or provided evidence that can be interpreted through the lens of such a link. Moreover, there are just few papers (e.g., Duru and Reeb, 2002; Rivera, 1991; Lewis, 2011) that have employed a single (out of several) measure of opaqueness in an empirical investigation of multinationality and the evidence they provide is not adequate to draw firm conclusions.¹ We fill this void and provide a comprehensive examination of the question using a large sample of US non-financial firms spanning 28 years and employing several

¹ The only measure of opaqueness whose relationship to multinationality has been investigated in the literature is analyst forecast accuracy. The evidence with respect to this measure is scant and the conclusions drawn are fairly mixed. Rivera (1991) utilizes a fairly small sample of about 150 firms over a 4-year period (1983-1986) and performs comparisons between MNCs and domestic firm analyst forecast errors based only on univariate tests. He concludes that multinationality is associated with greater forecast accuracy and attributes this to a portfolio effect. On the other hand, Duru and Reeb (2002) reach diametrically opposite conclusions from their study based on a sample of 3,495 firm-year observations for the period 1995-1998. They find that multinationals are associated with greater analyst optimistic bias and forecast inaccuracy. Herrmann et al. (2008) show that the association between internationalization and optimistic bias diminishes after Regulation Fair Disclosure (Reg FD).

proxies for the quality of the firm's information environment from its investors' perspective, as well as several measures accounting for different dimensions of multinationality.

This study cast two main research questions. First, we examine whether the degree of foreign involvement and network structure dimensions of multinationality and opaqueness are positively related. Second, we determine which aspects of multinationality are driving the positive relationship. More specifically, (1) we confirm a positive relationship between multinationality and opaqueness; (2) we show that this positive relationship holds for alternative dimensions of multinationality and is robust to the use of several measures of opaqueness; (3) we control for endogeneity and show that multinationality is likely to cause opaqueness; (4) we quantify the relationship between multinationality and opaqueness and show that the effect from multinationality on opaqueness is substantial not only in a statistical sense but also in an economic sense, and (5) we provide evidence consistent with the notion that there is an optimal combination of degree of foreign involvement and geographic operations network structure that minimizes the adverse effects of multinationality on firms' information environment.

Multinationality entails corporate expansion across different geographic areas and encounters with a multitude of economic, political and cultural environments. Consequently the success of corporate international diversification hinges on the parent firm's ability to manage much wider spectrums of growth opportunities and risk than otherwise similar domestic firms. It is therefore not surprising that multinational corporations' complex operations and organizational structures that often stretch over vast distances and span diverse cultures are perceived to be less transparent than those of their domestic peers. The literature contains many examples of the effects of information frictions within and around

MNCs' complex organizational structure.² Consistent with past studies' evidence that information asymmetry is especially severe for foreign operations (e.g., Callen et al., 2005; Duru and Reeb, 2002; Hope et al., 2009; Hope and Thomas, 2008; Khurana et al., 2003), MNCs have been shown to suffer from greater agency conflicts (e.g., Doukas and Pantzalis, 2003). Moreover, the resolution of informational asymmetries via external mechanisms such as analyst coverage (e.g., see Kim and Pantzalis, 2003) is much harder in the case of geographically diversified firms. Bodnar and Weintrop (1997) and Thomas (1999) document that foreign earnings are more persistent than are domestic earnings and raise the possibility that this can happen because of poor disclosure of foreign operations (White et al., 2003). Finally, there is also recent evidence that information diffusion into stock prices is slower in the case of MNCs, especially those that are smaller, more opaque and with more geographic segments (Huang, 2012). In sum, there is a considerable body of evidence implying that MNCs are associated with severe information frictions. Yet to our knowledge, there is no study that provides comprehensive evidence on the relationship between opaqueness and the dimensions of multinationality, i.e. the degree of foreign involvement and the structure of a firm's foreign operations network.

In addition to tackling the issue of measuring multinationality, such an investigation would require properly accounting for the different components of investors' information environment by employing several measures of opaqueness. Specifically, we create opaqueness measures from three different sources: 1) stock price informativeness (i.e. the ability of current stock returns in tracking future earnings); 2) analyst forecast quality

² There is a long list of papers that focus on how cross-border frictions, such as geo-political and cultural differences, increase information asymmetry between parents and their subsidiaries. As a result, the cost of monitoring within MNCs increases (e.g., Roth and O'Donnell, 1996) and MNCs often respond by adjusting their ownership structure, compensation contracts, and organizational design (Antras et al., 2009; Desai et al., 2004; Siegel and Larson, 2009). However, according to Shroff et al. (2014) the external information environment can also help headquarters to monitor their foreign affiliates' decisions and to manage information frictions within the firm.

(i.e. the ability of analysts in forecasting future earnings); and 3) idiosyncratic risk (i.e. the idiosyncratic component of the volatility of stock returns). Our study fills a void in the literature because it is designed to directly address the relationship between foreign corporate expansion and all different dimensions of investors' information environment. Outside investors are often either left in the dark about the specifics of MNCs' foreign country operations or unable to easily assess foreign activities' impact on firm valuation. We hypothesize that investors' information environment deteriorates with the degree of foreign involvement and when firms' international operations network is spread out over many locations and spans many distant cultures. In addition, we hypothesize that different combinations of the two aforementioned dimensions of multinationality can have a distinct impact on opaqueness.

Our results provide strong support for these hypotheses. For a comprehensive sample of US (domestic and multinational) firms spanning almost three decades, we show that alternative measures of the degree of foreign involvement based on foreign sales, and foreign income are associated with lower stock price informativeness, inferior analyst forecast quality, and lower idiosyncratic volatility. The magnitude of the relationships is economically significant. For example, an increase in foreign sales ratio from the median level of 17% to 50% results in a decrease in stock price informativeness of 45% and a decrease in analyst forecast quality of 29%. We also recognize that a potential limitation of the testing procedure in the main regressions is that the relationship between measures of multinationality and opaqueness could be endogenous. We control for endogeneity of the diversification decision in two ways, using the two-stage instrumental variable (IV) approach as well as Heckman's (1979) self-selection correction model. Our tests that account for endogeneity confirm the positive correlation between foreign involvement and

opaqueness. Moreover, our findings remain unchanged when we exclude small and illiquid firms from our tests and remain unchanged for sub-periods.

MNC networks with greater breadth (i.e. the number of foreign countries in which the firm has subsidiaries) are associated with more opaqueness, whereas the opposite effect is found for the depth dimension of the MNC network (i.e. the concentration of subsidiaries by country). We also find that MNCs with operations in countries whose cultures are distinctly different from the US present a greater challenge for investors in terms of a worsening information environment.

In the latter part of our empirical analysis of multinationality's impact on investors' information environment we jointly consider the degree of foreign involvement and the foreign operations network dimensions of multinationality. This part of the investigation aims at clarifying whether or not a geographic expansion of the MNC network has a different effect on opaqueness conditional on the size of the foreign portion of the firms' overall business. A priori, one can argue that this effect can go either way; on one hand, expanding the MNC network given substantial foreign involvement in terms of foreign sales ratio, should deem the firm as more complicated from an outside investor perspective (e.g. see Doukas and Pantzalis (2003) and Kim and Pantzalis (2003)) and therefore the firm's information environment could worsen relative to the case of a network expansion coupled with limited foreign involvement. On the other hand, if the firm's foreign operations network looms large in comparison to the relative size of the foreign component of the firm's business activities (measured in terms of the foreign sales ratio), it is conceivable that managers may have expanded their firm's foreign network too fast. If a fast MNC network expansion is indicative of managers pursuing empire building (see Jensen (1986)), we would expect to find firms whose degree of foreign involvement is incompatible with the size of their foreign affiliate network to have more opaque information

environments.³ We proceed to provide an answer to this empirical question by dividing our sample into two groups: one consisting of firms with foreign sales comprising a small portion of its overall sales, and the other consisting of firms with high foreign sales ratios. We then investigate how geographic dispersion of the foreign operations network relates to opaqueness measures conditional on the relative size of the firms' foreign revenues. Our findings reveal that expanding the MNC network aggravates opaqueness in the absence of substantial foreign sales ratios, whereas there is no effect on opaqueness in the presence of substantial foreign sales ratios. These findings imply that there is an optimal combination of foreign subsidiaries' structure and portion of foreign revenues in terms of minimizing (ameliorating) the adverse effects of multinationality on the information environment.

We contribute to the existing literature by showing whether and how multinationality and opaqueness are related. Our study provides direct evidence for the existence of a mechanism that many past studies have implicitly assumed to be present when they investigated the effect of foreign involvement on firms' cost of capital, investment policy and capital structure. Furthermore, our study details the more exact construct of the positive relationship between multinationality and opaqueness.

The paper is organized as follows. The next section describes the sample selection process and how key variables are constructed. Section 3 performs the empirical analysis on the relationship between multinationality and opaqueness. Section 4 documents interacted

³ Jensen (1986) puts forth an agency cost hypothesis predicting that managers, when not sufficiently monitored by shareholders, will make self-maximizing decisions which may not necessarily be in the best interest of shareholders. These decisions include aggressively growing the firm ("empire building"), which reduces profitability and destroys firm value. Hope and Thomas (2008) revisit this agency cost hypothesis in the context of geographic earnings disclosures and find that non-disclosing firms, relative to firms that continue to disclose geographic earnings experience greater expansion of foreign sales, produce lower foreign profit margins, and have lower firm value in the post-SFAS 131 period, when most U.S. multinational firms are allowed to no longer disclose earnings by geographic area thereby potentially compromising shareholders monitoring effectiveness with respect to managers' decisions about foreign operations. Doukas (1995) shows that the market does not react positively to news of expansion of foreign operations by US multinational firms, and attributes this finding to the market's perception of increasing agency costs in managing geographically diverse operations.

effects between foreign sales ratio and foreign subsidiary network. Section 5 shows the results controlling for an endogenous relationship. Section 6 tests the robustness of results and the final section concludes.

2. Sample selection and measures

We obtain the initial sample from the Center for Research in Securities Prices (CRSP) that includes all available firms for the period, 1985 to 2012, except for financials (SIC 6000-6999), utilities (SIC 4900-4999), and firms with unclear industry affiliation (i.e., with missing SIC codes). Accounting and financial data are drawn from Compustat. We require that firms have information on the dollar amount of foreign sales, which we use to construct our main measure of multinationality. Firms with market value of equity less than \$20 million are excluded in order to avoid cases where our tests results are distorted by very small firms. These requirements result in a final sample that includes 6,066 firms with 40,486 firm-year observations covering the 28 year period from 1985 to 2012.

We present the descriptive statistics of the sample in Table 1. We winsorize all accounting and financial data at the 1st and the 99th percentiles. The median firm has a total market capitalization of \$341 million ($\exp(19.6483)-1$), a total debt to total assets ratio of 17.57%, a market to book ratio of 2.05 ($\exp(1.1141)-1$), and a net income divided by total assets of 11.11%. The median firm is not industrially diversified, does not pay dividends, and is 12 years old ($\exp(2.5649)-1$).

2.1. Multinationality

The degree of firms' multinationality is measured based on their foreign sales ratio (i.e. foreign sales as a percent of total sales). Our median firm has a foreign sales ratio of almost 17% (Table 1). Following previous studies, we also create a multinationality

indicator variable that takes the value of one if a firm's foreign sales ratio is greater than 30% and takes zero otherwise. About 35% of our sample firms have a foreign sales ratio greater than 30% (Table 1). The 30% foreign sales threshold for the definition of multinationality is chosen to ensure that firms classified as multinationals are truly firms with significant degrees of foreign involvement. We also use foreign affiliate information to construct other measures of multinationality that reflect firms' foreign operations network structure. They are: 1) the breadth of the foreign subsidiary network, measured as the number of foreign countries in which the MNC has operations; 2) the depth of the foreign operations network, measured as the concentration of subsidiaries in few countries; 3) the cultural diversity of foreign countries where the firm operates; and 4) the geographic dispersion index comprised of all three aforementioned individual measures. The results of the tests utilizing the different measures of multinationality are reported and discussed in a separate section.

2.2. Stock price informativeness

Following Durnev et al. (2003) we proxy stock price informativeness by the relationship between 1) current stock returns and 2) unexpected current earnings and changes in expected future earnings. However, unexpected current earnings and changes in expected future earnings are not observable. Thus, we use changes in current earnings as a proxy for unexpected current earnings and a combination of future earnings changes and future stock returns as a proxy for expected future earnings changes.⁴

⁴ We follow Durnev et al. (2003) and include future stock returns to distinguish between expected and unexpected future earnings changes. If the future earnings change is expected, the current stock return should reflect this and the future stock return should be unaffected. If, however, the future earnings change is unexpected, the current stock return should be unaffected and the future stock return should capture the future earnings change once it either is realized or expected. Thus, if future earnings changes are unexpected, we need the future stock return to "counter" the unexpected future earnings change in the regression.

Following Durnev et al. (2003), we regress current annual stock returns, $r_{i,t}$, on current annual earnings changes, $\Delta E_{i,t}$, future (3 years) annual earnings changes, $\Delta E_{i,t+\tau}$, and future (3 years) annual stock returns, $r_{i,t+\tau}$. and get the following regression equation:

$$r_{i,t} = \alpha_0 + \alpha_1 \Delta E_{i,t} + \sum_{\tau=1}^3 \alpha_{2,\tau} \Delta E_{i,t+\tau} + \sum_{\tau=1}^3 \alpha_{3,\tau} r_{i,t+\tau} + \varepsilon_{i,t}. \quad (1)$$

The annual stock return is calculated from fiscal-year end share prices and dividends adjusted for stock splits and distributions. The annual change in earnings is based on earnings before interest, taxes, depreciation, and amortization (EBITDA) scaled by the market capitalization at the beginning of the fiscal year. The regression is performed on a 2-digit SIC industry in each year.

Based on the above regression equation, we create two measures of stock price informativeness. The first measure, *future earnings incremental explanatory power*, is the increase in the coefficient of determination (R^2) from a base regression model that controls only for the change in current earnings (i.e., from $r_{i,t} = \alpha_0 + \alpha_1 \Delta E_{i,t} + \varepsilon_{i,t}$) to a regression model (1) that incorporates future earnings changes and future stock returns. The second measure, *future earnings response coefficient*, is the sum of the coefficients on future changes in earnings (i.e., $\sum_{\tau=1}^3 \alpha_{2,\tau}$). High (low) values of the two measures indicate that the current stock price incorporates a considerable (limited) amount of information on future earnings. Our median firm has a future earnings incremental explanatory power of 0.0662 and a future earnings response coefficient of -0.2173 (Table 1).⁵

⁵ The future earnings response coefficient has a mean of -0.0755, a median of -0.2173, and a range from -5.4294 to 7.6223. We would expect the relationship between 1) current stock returns and 2) unexpected current earnings and changes in expected future earnings to be predominantly positive. However, as discussed previously, distinguishing between expected future earnings and unexpected future earnings is not straightforward and the inclusion of future stock returns is an attempt to perform such a distinction. If we exclude future stock returns from equation (1) we still get a negative mean and median future earnings response coefficient. We observe that the negative mean and median future earnings response coefficient seem to be driven by the most distant years in the equation ($y+2$ and $y+3$). Dropping future stock returns and/or earning changes in distant years do not alter the regression results. We report the results in Table 3 using the original method of Durnev et al. (2003).

2.3. Analyst forecast quality

We use the error and dispersion of analyst forecasts of future earnings as proxies for the ability of outsiders to understand how firm operations affect cash flows. Analyst forecast error is used as a proxy for the predictability of future earnings and therefore serves also as a proxy of informational risk as has been done in many prior studies (e.g. Atiase and Bamber, 1994; Christie, 1987). Barron et al. (1998) show that analyst forecast dispersion reflects both diversity of analyst beliefs and uncertainty in analyst forecasts. Prior studies have also used the dispersion of analyst forecasts as an information asymmetry proxy (Krishnaswami and Subramaniam, 1999).

We measure analyst forecast error as the log of one plus the quotient of the absolute value of the differences between the median forecasts of EPS and the actual EPS divided by the absolute values of the median forecasts. Analyst forecast dispersion is measured as the log of one plus the quotient of the standard deviations of the differences between median forecast and actual EPS divided by the absolute values of median forecasts. High (low) values of analyst forecast errors and dispersions represent low (high) quality levels of the informational environment. Our sample firms are associated (Table 1) with a median analyst forecast error of 15.3% ($\exp(0.1423)-1$) and an analyst forecast dispersion of 5.3% ($\exp(0.0515)-1$).

2.4. Idiosyncratic risk

Jin and Myers (2006) argue that limited information affects the division of risk bearing between insiders and outside investors. In the absence of transparency insiders are able to capture part of the firm's operating cash flows, i.e. they extract more cash than they would receive if investors' property rights could be completely protected. If the firm is

opaque, insiders are likely to reduce the amount of firm-specific risk absorbed by outside investors. It follows that, an increase in opaqueness, combined with capture by insiders, leads to lower idiosyncratic risk and to higher R²s. However, idiosyncratic risk as a proxy for greater informativeness at the firm level is controversial (Pantzaalis and Xu, 2008). This is a further argument for our use of several opaqueness measures.

We estimate R² and idiosyncratic risk variables for each stock for each calendar year. We use weekly data to regress stock returns on the returns of the market index. The choice of weekly data is a compromise solution to the twin problems associated with a) the relatively low number of monthly observations, and b) the missing observations from non-trading occurrences in daily data (Conrad and Kaul, 1988). Following Durnev et al. (2003) and Durnev et al. (2004), we drop firms if they do not have complete return data over 52 weeks in a year to avoid problems associated with firms that experience IPOs, delisting, or trading halts. The regression model estimated for each stock i in year t is as follows:

$$r_{i,w,t} = \alpha_{i,t} + \beta_{i,t} r_{m,w,t} + e_{i,w,t}, \quad (2)$$

where $r_{i,w,t}$ is the excess return for stock i on week w in year t , and $r_{m,w,t}$ is the value-weighted excess return of the US market index on the week w in year t . From this regression equation (2), the idiosyncratic risk is computed by the log of the residuals' variance ($\sigma_{ie,t}^2$). Our sample firms are associated (Table 1) with a median R² of 0.1212 and an idiosyncratic variance of 0.0026 ($\exp(-5.9497)$) corresponding to an idiosyncratic standard deviation of 5.1%. The average R² (0.1738) is similar to that shown in other studies (e.g., 0.146 in Ferreira and Laux, 2007, 0.152 in Kelly, 2007, and 0.20 in Roll, 1988). As alternative measures, we also compute the idiosyncratic risk from a model that regresses the firm's excess return on the value-weighted market excess return and 1) on the

SIC 2-digit industry excess return and 2) from Fama-French-Carhart 4 factor model (Carhart, 1997).⁶

[Insert Table 1 about here]

3. Empirical results

This section contains univariate analysis and multivariate analysis on the relation between firms' multinationality on one hand and stock price informativeness, analyst forecast quality, and idiosyncratic risk on the other hand.

3.1. Univariate analysis

Table 2 shows how average values of different firm characteristics vary with firms' degree of multinationality. It reports mean values of all variables used in the study for the three groups classified by the level of multinationality: 1) purely domestic firms (foreign sales ratio= 0), 2) firms with moderate foreign involvement ($0 < \text{foreign sales ratio} \leq 0.30$), and 3) firms with high foreign involvement (foreign sales ratio >0.30). Also reported are the mean differences between the two extreme groups and the corresponding t -statistics for the mean difference tests.

The results show that, on average, multinationality is associated with 1) lower future earnings incremental explanatory power and future earnings response coefficient 2) lower analyst forecast error and 3) lower idiosyncratic risk and higher R^2 , respectively. Thus, the results related to future earnings incremental explanatory power, future

⁶ In addition to the absolute measures of idiosyncratic risk ($\sigma_{ie,t}^2$) we use in the manuscript, we use relative measures of idiosyncratic risk, $\ln\left(\frac{\sigma_{ie,t}^2}{\sigma_{i,t}^2 - \sigma_{ie,t}^2}\right)$ and $\ln\left(\frac{\sigma_{ie,t}^2}{\sigma_{i,t}^2}\right)$, which are also widely used in other studies (e.g., Ferreira and Laux, 2007; Hutton et al., 2009; and Morck et al., 2000). The results with these measures are similar to the ones we obtain using the absolute idiosyncratic risk.

earnings response coefficient, and R^2 / idiosyncratic risk indicate a positive relationship between multinationality and opaqueness while the result related to analyst forecast error indicates a negative relationship. Moreover, the mean difference in analyst forecast dispersion between extreme groups is not statistically significant. However, this is a simple univariate analysis that also shows that multinationals tend to be larger and have more liquid stocks than domestic firms. We proceed to a multivariate analysis in the next section.

[Insert Table 2 about here]

3.2. Multivariate analysis

The univariate evidence does not account for the possibility that other effects might drive a negative or positive association between measures of multinationality on one hand and stock price informativeness, analyst forecast quality, and idiosyncratic risk on the other hand. To account for this, we regress these variables on the degree of foreign involvement (i.e., foreign sales variables) along with other firm characteristics that prior studies have shown to affect our opaqueness measures. The control variables are Size (the log of one plus market capitalization), Leverage (total debt to total assets), Market-to-book (the log of one plus market-to-book equity ratio), Profitability (income before extraordinary items divided by total assets), Dividend payer (an indicator of dividend paying firm), Firm age (the log of one plus the number of years since the stock inclusion in the CRSP database), together with variables related to capital, R&D, and advertising expenditures. Finally, we include year and industry fixed effects (Petersen, 2009; Faulkender and Petersen, 2012).⁷

[Insert Table 3 about here]

⁷ We do not include industry fixed effects in Table 3 where the dependent variables (future earnings incremental explanatory power and future earnings response coefficient) are the industry-level variables.

Tables 3-5 show the results obtained from estimating OLS regressions using standard errors robust to heteroskedasticity and clustered at the firm level. Tables 3-5 show consistently that foreign involvement – whether measured by a continuous variable or a dummy variable – is associated with more opaqueness no matter if measured in terms of stock price informativeness (Table 3), analyst forecast quality (Table 4), or idiosyncratic risk (Table 5). Specifically, both the degree and an indicator of foreign involvement are associated with 1) a lower future earnings incremental explanatory power and a lower future earnings response coefficient, 2) a higher analyst forecast error and a higher analyst forecast dispersion, and 3) a lower idiosyncratic risk.

[Insert Table 4 about here]

Our two foreign involvement measures are the only independent variables that consistently points to more opaqueness across the different proxies for opaqueness. For example, even size that all things equal would be expected to be associated with less opaqueness because it entails an inherently higher level of scrutiny from investors, is associated with a higher degree of stock price informativeness and analyst forecast quality but a lower idiosyncratic risk. This seeming discrepancy with respect to idiosyncratic volatility may, however, be in line with the view that idiosyncratic risk is controversial as a proxy for greater informativeness at the firm level.

The economic impact of foreign involvement on opaqueness is significant. Our median firm has a foreign sales ratio of almost 17%, a future earnings incremental explanatory power of 0.0662, a future earnings response coefficient of -0.2173, an analyst forecast error of 0.1423 (corresponding to 15.3%), an analyst forecast dispersion of 0.0515 (corresponding to 5.3%), and an idiosyncratic risk of -5.9497 (corresponding to 5.1% in terms of standard deviation) according to Table 1. If we *ceteris paribus* change the foreign sales ratio to 50% (an increase of 33.41%) and use the coefficients from Tables 3-5, we get a

future earnings incremental explanatory power of 0.0430 ($0.0662-0.0694*0.3341$), a future earnings response coefficient of -0.3151 ($-0.2173-0.2928*0.3341$), an analyst forecast error of 0.1821 ($0.1423+0.1191*0.3341$, corresponding to 19.8%), an analyst forecast dispersion of 0.0665 ($0.0515+0.0449*0.3341$, corresponding to 6.9%), and an idiosyncratic risk of -6.0595 ($-5.9497-0.3017*0.3341$, corresponding to 4.9% in terms of standard deviation). Thus, going from a foreign sales ratio of 17% to 50% we get a 35% decrease in future earnings incremental explanatory power, a 45% decrease in future earnings response coefficient, a 28% increase in analyst forecast error, a 29% increase in analyst forecast dispersion, and a 2% decrease in idiosyncratic risk.

[Insert Table 5 about here]

3.3. Foreign income based measure of foreign involvement

In this section, we use an alternative way to measure foreign involvement. In a recent paper, Jang (2012) identifies multinationals by obtaining firm reports on foreign income and taxes as well as information on foreign operations. Based on Jang (2012), we construct an alternative foreign involvement indicator variable that takes a value of 1 if the firm reports foreign pretax income (Compustat item: PIFO) or foreign income tax (Compustat item: TXFO) at least once over the previous three years and has at least one subsidiary outside the United States. This variable is ideal in that it combines both financial statement information (foreign income and taxes) and foreign subsidiary information.

In Table 6, we regress this alternative foreign involvement measure separately on each of the five opaqueness variables used in our previous tables. We find that the foreign income based foreign involvement measure is also positively associated with firm opaqueness, consistent with our previous results. The estimated coefficient is statistically

significant at least at the 5% level. Thus, we confirm that our results are not sensitive to the specific measurement of foreign involvement.

[Insert Table 6 about here]

3.4. Foreign subsidiary network

In this section, we examine the relationship between opaqueness and measures of the other dimension of multinationality, i.e. that involving the structure of the MNC network. Our primary measure used in the tests thus far was the foreign sales ratio extracted from Compustat. However, prior studies have suggested that multinationality has different aspects not adequately captured by a single measure. We therefore need to also account for the structure of MNC's network of operations. We hand-collected MNCs' foreign affiliate information from Dun and Bradstreet's Who Owns Whom.⁸ This dataset allows us to construct a number of network-based proxies for multinationality, originally developed in an early study by Allen and Pantzalis (1996).

First, we use the number of foreign countries in which the MNC has operations to proxy for the breadth of foreign subsidiary network. Firms with larger numbers (high level of breadth) are regarded as more multinational firms.

$$\text{Breadth of foreign subsidiary network}_{i,t} = \sum_j \text{COUNTRY}_{i,j,t}, \quad (3)$$

Where $\text{COUNTRY}_{i,j,t}$ is the country j where the MNC i 's foreign subsidiary is located in year t .

⁸ Collecting subsidiary information every year is a considerably time-consuming task. Therefore, we assume that firms experience no change in their foreign subsidiary locations in a short period. We use two issues to fill the subsidiary information: the issue of 1998/1999 for 1995-2001 and the issue of 2004/2005 for 2002-2009. Although it may not be true in every case, it is reasonable to assume that the location and structure of subsidiaries is fairly stable for a short period.

Second, we measure the depth of the network by computing the Herfindahl index of foreign subsidiary concentration across foreign countries.

$$\text{Depth of foreign subsidiary network}_{i,t} = \sum_j (NFS_{i,j,t})^2 / \left(\sum_j NFS_{i,j,t} \right)^2, \quad (4)$$

where $NFS_{i,j,t}$ is the MNC i 's number of foreign subsidiaries in country j in year t . Higher values indicate that the network of foreign subsidiaries is concentrated in major countries (i.e., less multinational). The degrees of breadth and depth have been widely used in international business studies. Allen and Pantzalis (1996) suggest that these variables proxy for MNCs' operating flexibility with breadth (depth) indicating higher (lower) flexibility.

Third, we measure the cultural distance between the headquarters (US) and other countries in which the MNC has operations. We expect that, if a US MNC's subsidiary network is well diversified in a geographic sense, it is likely to span a great array of diverse cultures. To quantify cultural distance, we use the country scores for Hofstede's five cultural dimensions. They are 1) power distance, 2) individualism, 3) masculinity, 4) uncertainty avoidance, and 5) long term orientation.⁹ For each MNC i , we compute five cultural distance measures, one for each of Hofstede's five cultural dimensions. Cultural distance is measured by summing over all countries' weighted absolute differences between the US and the country dimension score.¹⁰

$$CD_{i,t}^\gamma = \sum_j [w_{i,j,t} \times |D_{i,j,t}^\gamma - D_{i,us,t}^\gamma|], \quad (5)$$

⁹ 1) Power distance focuses on the degree of equality, or inequality, between people in the country's society. 2) Individualism focuses on the degree the society reinforces individual or collective, achievement and interpersonal relationship. 3) Masculinity focuses on the degree the society reinforces, or does not reinforce, the traditional masculine work role model of make achievement, control, and power. 4) Uncertainty avoidance focuses on the level of tolerance for uncertainty and ambiguity within the society. 5) Long-term orientation focuses on the degree the society embraces, or does not embrace long-term devotion to traditional, forward thinking values.

¹⁰ This measure was inspired by Antia et al. (2007).

where $D_{i,j,t}^\gamma$ is the MNC i's score of γ^{th} cultural dimension in country j in year t . The absolute difference of each country's cultural dimension score from that of the US is multiplied by the weight $w_{i,j,t}$, which is computed as the ratio of the number of foreign subsidiaries located in country j divided by the total number of foreign subsidiaries, $NFS_{j,i,t} / \sum_j NFS_{j,i,t}$. Then, we compute the average of CD from all dimensions.

$$Cultural\ distance = \left[\sum_{\gamma=1}^5 CD_{i,t}^\gamma \right] / 5. \quad (6)$$

Finally, we construct an index of multinationality by combining the ranks of individual measures above.

$$Geographic\ dispersion\ index_{i,t} = \frac{1}{K_{i,t}} \sum_{k=1}^{K_{i,t}} \frac{Rank_{i,t}^k(MULTI_{i,t}^k)}{N_t^k}, \quad (7)$$

where $Rank_{i,t}^k(MULTI_{i,t}^k)$ is the rank function that assigns rank for each observation from the least geographically and culturally diverse to the most diverse. $MULTI_{i,t}^k$ is the k^{th} measure of multinationality (breadth of foreign subsidiary network, depth of foreign subsidiary network, and cultural distance) for firm i in our sample, and K is the dimensions of multinationality. For each variable, the firm with the greatest geographically or culturally diverse network (i.e. with the highest value of breadth or highest inverse value of depth, or cultural distance) is ranked as N_t^k while the firm with the least multinationality is ranked as one. The denominator, $K_{i,t}$, averages the ranks regardless of the number of available values of the firm in the sample. For instance, the firm that has all three measures in records is divided by $K_{i,t} = 3$. This construction scales the variable, geographic dispersion index, to a value between 0 (least multinational) and 1 (most multinational).

In Table 7, we re-estimate the regression models from the previous three tables but use the measures of MNC subsidiary network structure instead of the foreign sales ratio.

For the sake of brevity we only show the coefficients for the MNC network measures (and only one of our idiosyncratic risk measures) and suppress coefficients for all other control variables. Consistently and regardless of which of the five proxies for opaqueness is used, we find that MNC networks with more breadth, less depth and spanning more distant cultures are associated with more opaqueness. The results confirm our previous conclusions in relation to Tables 3-5.

[Insert Table 7 about here]

4. Foreign subsidiary network, foreign sales, and opaqueness: Joint effects

We have so far shown that various measures of two distinct dimensions of multinationality, i.e. the degree of foreign involvement and the geographic and cultural diversity of the MNC network, are significantly and positively associated with various measures of opaqueness. Our next test is designed to further investigate which aspects of multinationality are driving this positive relationship by considering the joint effects of the aforementioned two dimensions of multinationality. Therefore, our next research question is: For a given foreign sales ratio, does it matter, in terms of its effect on opaqueness, if the MNC network consists of subsidiaries that are distributed across many countries or concentrated in a few countries? To operationalize this test, we split our sample into two groups. One group includes firms with foreign sales ratio higher than 30%, while the other includes all other firms, even firms with no foreign sales. We then proceed to replicate the main tests by regressing the MNC network's geographic dispersion index (i.e., the one that includes breadth, depth, and cultural distance) on each opaqueness measure separately for these two groups, and report the results in Panel A of Table 8.

As presented, the coefficients of the geographic dispersion index are generally smaller in absolute terms and often insignificant for the firms that have high foreign sales

compared with those of the firms that have no or low foreign sales. The latter are also always significant at conventional levels. The results indicate that information environment seems to deteriorate with geographical dispersion that is not coupled with a substantially-sized foreign involvement. However, the impact on opaqueness seems to be less pronounced in the congruent case, where the extent of geographic dispersion is matched by the size of foreign involvement. This finding is consistent with the notion that information environment opaqueness can emerge from, or is symptomatic of, sub-optimal combinations of degree of foreign involvement and geographic operations network structure. We find similar, albeit expectedly a bit weaker, results when we examine the effects on opaqueness of each of the components of the geographic dispersion index, conditional on the extent of foreign involvement. These results are shown in Panel B of Table 8.

[Insert Table 8 about here]

5. Endogeneity

The relationship between multinationality and opaqueness could at least to some extent be endogenous.¹¹ There are two types of endogeneity that apply in this case. First, it is possible that more opaque firms tend to be involved in foreign business. Since our underlying argument is based on the effect of foreign involvement on opaqueness, it may be difficult to identify the cause and effect between two variables, and if we do not properly account for the possibility of the endogenous relationship, the regression coefficients in previous tables could be biased. Second, there may be some other important characteristics,

¹¹ In this section we will account for endogeneity by using tests utilizing the foreign involvement dimension of multinationality. This is done for two reasons: First, for the sake of brevity we do not show results using the MNC network variables. Second, we have more data on foreign involvement, which allows for more power in our statistical tests.

which we did not account for but are significantly correlated with firm's decision to engage in foreign business. Consider, for example, that multinational activity is highly correlated with firm size, financial leverage, profitability, as well as market conditions. If our model fails to determine the impact of potential variables on foreign involvement, the empirical results on opaqueness could be mistakenly attributed to foreign involvement rather than to the real reasons, which in this case would be firm characteristics and market variables.

We control for endogeneity of geographic diversification decision in two ways. First, we model the firm's foreign involvement as a function of firm, industry, and macroeconomic characteristics. Second, we use the Heckman's correction to control for the self-selection bias, which is induced on account of firms' choosing to diversify globally. Thus, we provide results based on both the two-stage instrumental variable (IV) model and the Heckman's (1979) self-selection correction model.

In the first stage of the models, we employ the firm, industry, macroeconomic characteristics similar to the ones in Campa and Kedia (2002), in order to estimate the probability that a firm is involved in foreign business.¹² We include firm variables such as size, leverage, profitability, and capital expenditure. We control for the scaled trading volume to control for firm's stock liquidity. We instrument time effects on the diversification decision. First, we capture the existence of merger waves by including the log of total value of M&A announcements in a given year. Second, we capture time trends in macroeconomic conditions and business cycles. To do so, we include real growth rates of GDP and contraction variable that counts the number of months in the year when the

¹² Although Campa and Kedia (2002) originally create the model for corporate industrial diversification, we implicitly assume that their instrumental variables are also relevant for firms' multinationality.

economy was in a recession. Major exchange is a dummy that equals 1 if the firm is listed in NYSE, NASDAQ, or AMEX, and 0 otherwise.¹³

We use the probit model and control for the aforementioned variables to estimate the probability that the firm is going to diversify its business geographically. The results are reported in Appendix. The results show that larger firms with low leverage, low profitability and low investment are more likely to make firms multinational. Firms also tend to be involved in foreign business if their industry has a higher fraction of conglomerates and if the total value of announced acquisitions in the US is large. Finally foreign involvement is more likely when the growth rate in real US GDP is low.

After controlling for the endogenous relation, we see that foreign involvement still has positive effects on opaqueness. The coefficient on foreign sales dummy is significant in the IV and Heckman’s models (Panels A and B of Table 9, respectively).

[Insert Table 9 about here]

6. Robustness checks

To ensure that our results are not driven by small, illiquid firms (a concern particularly relevant for the idiosyncratic risk tests) we re-estimate the regressions after excluding highly illiquid firms or small firms from our original sample. We construct a scaled Amihud’s illiquidity measure (2002) and a scaled trading volume liquidity measure. Amihud’s measure of illiquidity is the average over the year of the daily ratio of stock’s absolute return to its trading volume scaled by the number of outstanding shares.

$$\text{Scaled Amihud's illiquidity} = \frac{1}{D_{i,t}} \sum_{d=1}^{D_{i,t}} \left[\frac{R_{i,d,t}}{(VOL_{i,d,t}/S_{i,d,t})} \right], \quad (8)$$

¹³ We do not control for industry and year effects due to the bias of the fixed effects estimator in nonlinear models (Greene, 2002).

where $D_{i,t}$ is the number of days for which data are available for stock i at year t . $R_{i,d,t}$, $VOL_{i,d,t}$, and $S_{i,d,t}$ are firm i 's return, daily volume in dollars, the market value of common shares on day d at year t , respectively. Scaled trading volume is the average over the year of the daily trading volume scaled by the number of outstanding shares.

$$\text{Scaled trading volume} = \frac{1}{D_{i,t}} \sum_{d=1}^{D_{i,t}} \left[\frac{VOL_{i,d,t}}{S_{i,d,t}} \right]. \quad (9)$$

We rank firms based on liquidity measures and then retest the previous models after excluding most illiquid firms (i.e., the top quartile of Scaled Amihud's illiquidity or the bottom quartile of scaled trading volume) or excluding smallest firms (i.e., the bottom quartile of firm size). The results in Table 10 show that our previous conclusions are not driven by illiquid and/or small firms.

[Insert Table 10 about here]

Our final robustness test involves re-estimating the regressions for two sub-periods. Our previous conclusions are based on 28 years of observations (1985-2012). In Table 11 we divide these 28 years into the 15 years' period before the millennium (1985-1999) and the 13 years' period after the millennium (2000-2012). Table 11 shows that our previous conclusions are not driven by a specific sub-period and that our previous conclusions hold both before and after the millennium.¹⁴

[Insert Table 11 about here]

7. Summary and conclusions

In this study we investigate the nature of the relationship between multinationality and opaqueness, i.e. the quality of investors' information environment. We account for two

¹⁴ We also test other sub-periods and found similar patterns. These results are left out of the paper for the sake of brevity, but are available upon request.

dimensions of multinationality: the degree of foreign involvement measured by the foreign sales ratio and the MNC network structure measured based on the geographic dispersion of the firm's foreign subsidiaries across countries and cultures. We find a strong, positive relationship between both dimensions of multinationality, examined in isolation, and opaqueness. Firm opaqueness is measured by stock price informativeness, analyst forecast quality, and idiosyncratic risk.

We confirm that our results are robust to the use of a foreign income measure as a proxy for multinationality and that our results are not driven by small, illiquid firms. A sub-period analysis reveals that the effect of multinationality on investor information environment is sizeable in sub-sample periods.

In addition, we find that this positive relationship hinges on whether the degree of foreign involvement is compatible with the structure of the firm's foreign operations network. Our results imply that multinationality's impact on opaqueness is alleviated when there is harmony between the size of foreign involvement and the extent of the MNC network's geographic dispersion.

Our study illustrates the impact – in terms of if and how - of foreign involvement on the investor information environment and contributes to the literature by providing confirming evidence on an important notion that many past studies have implicitly assumed but never explicitly tested nor elaborated.

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Table 1

Descriptive statistics.

Reported are descriptive statistics for our sample firms. The sample contains 40,486 firm-years (6,066 firms) over the period 1985-2012. Foreign sales ratio = foreign sales divided by total sales. Foreign sales dummy = a dummy that takes a value of 1 if the firm's foreign sales ratio is greater than 30% and takes zero otherwise. Future earnings incremental explanatory power = the increase in R-square of the complete regression on future earning changes and future stock returns relative to the base regression on current earning change. Future earnings response coefficient = the sum of the coefficients on future earning changes in the regression of annual stock return. Analyst forecast error = the log of one plus absolute value of difference between median forecast and actual EPS divided by the absolute value of median forecast. Analyst forecast dispersion = the log of one plus standard deviation of difference between median forecast and actual EPS divided by the absolute value of median forecast. R-square = R-square from the market model of weekly returns. Idiosyncratic risk = the log of variance of residuals ($\sigma_{ie,t}^2$) obtained from the market model. Industry model idiosyncratic risk = the log of variance of residuals from a model that regresses the firm's excess return on the value-weighted market excess return and SIC 2-digit industry excess return. FFC 4-factor idiosyncratic risk = the log of variance of residuals from a model that regresses the firm's excess return on the Fama-French-Carhart 4 factors. Size = the log of one plus market capitalization. Leverage = total debt to total assets. Market-to-book = the log of one plus market-to-book equity ratio. Profitability = income before extraordinary items divided by total assets. Industrial diversification = a dummy that takes a value of 1 if the firm reports more than one industrial business segment. Dividend payer = an indicator of dividend paying firm. Firm age = the log of one plus the number of years since the stock inclusion in the CRSP database. Scaled Amihud's illiquidity = the average over the year of the daily ratio of stock's absolute return to its trading volume scaled by the number of outstanding shares. Scaled trading volume = the average over the year of the daily trading volume scaled by the number of outstanding shares.

Variables	Mean	Std. Dev.	Minimum	Median	Maximum
Geographical diversification					
Foreign sales ratio	0.2450	0.2638	0.0000	0.1659	1.0000
Foreign sales dummy	0.3487	0.4766	0.0000	0.0000	1.0000
Opacity measures					
Future earnings incremental explanatory power	0.1136	0.1244	0.0124	0.0662	0.6965
Future earnings response coefficient	-0.0755	1.3670	-5.4294	-0.2173	7.6223
Analyst forecast error	0.3058	0.4522	0.0009	0.1423	2.6053
Analyst forecast dispersion	0.1278	0.2264	0.0000	0.0515	1.5252
R-square	0.1738	0.1688	0.0000	0.1212	0.9929
Idiosyncratic risk	-5.9233	0.9477	-7.9893	-5.9497	-3.3095
Industry model idiosyncratic risk	-5.9088	0.9587	-8.0234	-5.9117	-3.1383
FFC 4-factor idiosyncratic risk	-5.9531	0.9679	-8.0723	-5.9570	-3.1319
Firm characteristics					
Size	19.8770	1.8453	16.8932	19.6483	24.5570
Leverage	0.1973	0.1719	0.0000	0.1757	0.7632
Market-to-book	1.2110	0.5188	0.3264	1.1141	3.1955
Profitability	0.0768	0.2544	-1.1380	0.1111	0.7866
Industrial diversification	0.4362	0.4959	0.0000	0.0000	1.0000
Capital expenditures/total assets	0.0766	0.0812	0.0017	0.0518	0.4992
R&D expenditures/total assets	0.0514	0.0859	0.0000	0.0121	0.5535
Advertising expenditures/ total assets	0.0137	0.0350	0.0000	0.0000	0.2243
Dividend payer	0.4973	0.5000	0.0000	0.0000	1.0000
Firm age	2.5237	0.8525	1.0986	2.5649	4.2767
Scaled Amihud's illiquidity	32.7209	80.5929	0.8184	7.6712	590.2178
Scaled trading volume	0.0063	0.0065	0.0002	0.0041	0.0365

Table 2

Univariate analysis.

Reported are mean values of all variables for the sub-samples that are classified by foreign sales ratio. The first sub-sample only includes firms with no foreign sales. The other sub-samples are the quartile groups filled by the firms whose foreign sales ratio is greater than zero. Foreign sales ratio = foreign sales divided by total sales. Future earnings incremental explanatory power = the increase in R-square of the complete regression on future earning changes and future stock returns relative to the base regression on current earning change. Future earnings response coefficient = the sum of the coefficients on future earning changes in the regression of annual stock return. Analyst forecast error = the log of one plus absolute value of difference between median forecast and actual EPS divided by the absolute value of median forecast. Analyst forecast dispersion = the log of one plus standard deviation of difference between median forecast and actual EPS divided by the absolute value of median forecast. R-square = R-square from the market model of weekly returns. Idiosyncratic risk = the log of variance of residuals ($\sigma_{ie,t}^2$) obtained from the market model. Industry model idiosyncratic risk = the log of variance of residuals from a model that regresses the firm's excess return on the value-weighted market excess return and SIC 2-digit industry excess return. FFC 4-factor idiosyncratic risk = the log of variance of residuals from a model that regresses the firm's excess return on the Fama-French-Carhart 4 factors. Size = the log of one plus market capitalization. Leverage = total debt to total assets. Market-to-book = the log of one plus market-to-book equity ratio. Profitability = income before extraordinary items divided by total assets. Industrial diversification = a dummy that takes a value of 1 if the firm reports more than one industrial business segment. Dividend payer = an indicator of dividend paying firm. Firm age = the log of one plus the number of years since the stock inclusion in the CRSP database. Scaled Amihud's illiquidity = the average over the year of the daily ratio of stock's absolute return to its trading volume scaled by the number of outstanding shares. Scaled trading volume = the average over the year of the daily trading volume scaled by the number of outstanding shares. Refer to Table 1 for detailed variable descriptions. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Classified by foreign sales ratio			Mean diff. [III] – [I]	t-statistics
	[I]	[II]	[III]		
	FS = 0 N = 10,495	0 < FS ≤ 0.30 N = 13,641	FS > 0.30 N = 14,653		
Geographical diversification					
Foreign sales ratio	0.0000	0.1503	0.5506	0.5506***	307
Opacity measures					
Future earnings incremental explanatory power	0.1382	0.1148	0.0879	-0.0502***	-32.42
Future earnings response coefficient	-0.0327	-0.0326	-0.1643	-0.1316***	-7.83
Analyst forecast error	0.3299	0.3038	0.2944	-0.0355***	-3.42
Analyst forecast dispersion	0.1274	0.1297	0.1264	-0.0010	-0.16
R-square	0.1069	0.1840	0.2208	0.1139***	57.97
Idiosyncratic risk	-5.7433	-5.9890	-6.0113	-0.2679***	-22.96
Industry model idiosyncratic risk	-5.7290	-5.9749	-5.9963	-0.2672***	-22.61
FFC 4-factor idiosyncratic risk	-5.7654	-6.0209	-6.0456	-0.2802***	-23.48
Firm characteristics					
Size	18.8672	19.9996	20.6187	1.7514***	83.51
Leverage	0.2148	0.1963	0.1834	-0.0313***	-14.56
Market-to-book	1.2025	1.1866	1.2429	0.0404***	6.17
Profitability	0.0641	0.0835	0.0808	0.0167***	5.10
Industrial diversification	0.2577	0.5310	0.4934	0.2357***	40.30
Capital expenditures/total assets	0.1021	0.0678	0.0637	-0.0384***	-35.96
R&D expenditures/total assets	0.0418	0.0460	0.0650	0.0232***	21.08
Advertising expenditures/ total assets	0.0151	0.0142	0.0120	-0.0031***	-7.37
Dividend payer	0.4579	0.5285	0.4994	0.0415***	6.71
Firm age	2.2277	2.6636	2.6362	0.4085***	39.86
Scaled Amihud's illiquidity	47.1014	28.6561	24.4991	-22.6023***	-22.23
Scaled trading volume	0.0047	0.0062	0.0077	0.0030***	37.78

Table 3

Foreign involvement and stock price informativeness.

This table reports the coefficient estimates of the regressions of stock price informativeness. Future earnings incremental explanatory power = the increase in R-square of the complete regression on future earning changes and future stock returns relative to the base regression on current earning change. Future earnings response coefficient = the sum of the coefficients on future earning changes in the regression of annual stock return. Foreign sales ratio = foreign sales divided by total sales. Foreign sales dummy = a dummy that takes a value of 1 if the firm's foreign sales ratio is greater than 30% and takes zero otherwise. Size = the log of one plus market capitalization. Leverage = total debt to total assets. Market-to-book = the log of one plus market-to-book equity ratio. Profitability = income before extraordinary items divided by total assets. Industrial diversification = a dummy that takes a value of 1 if the firm reports more than one industrial business segment. Dividend payer = an indicator of dividend paying firm. Firm age = the log of one plus the number of years since the stock inclusion in the CRSP database. The *t*-statistics reported in parentheses are estimated using standard errors robust to heteroskedasticity and clustering at the firm level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

*	Dependent variable = Future earnings incremental explanatory power		Dependent variable = Future earnings response coefficient	
	[I]	[II]	[III]	[IV]
Foreign sales ratio	-0.0694*** (-12.69)		-0.2928*** (-9.06)	
Foreign sales dummy		-0.0327*** (-11.36)		-0.1357*** (-7.78)
Size	0.0024** (2.28)	0.0020* (1.95)	0.0063 (1.11)	0.0046 (0.83)
Leverage	0.0676*** (8.10)	0.0679*** (8.12)	0.2118*** (4.10)	0.2131*** (4.13)
Market-to-book	-0.0133*** (-5.02)	-0.0123*** (-4.64)	-0.0159 (-0.96)	-0.0116 (-0.70)
Profitability	-0.0031 (-0.88)	-0.0031 (-0.89)	-0.0115 (-0.40)	-0.0117 (-0.41)
Industrial diversification	0.0002 (0.07)	-0.0005 (-0.17)	-0.0105 (-0.57)	-0.0135 (-0.73)
Capital expenditures/total assets	0.0341** (2.16)	0.0344** (2.18)	0.4886*** (5.51)	0.4904*** (5.53)
R&D expenditures/total assets	-0.2663*** (-20.16)	-0.2700*** (-20.23)	-1.0030*** (-12.55)	-1.0200*** (-12.80)
Advertising expenditures/ total assets	0.1647*** (3.95)	0.1697*** (4.06)	1.3255*** (4.65)	1.3467*** (4.70)
Dividend payer	0.0154*** (4.85)	0.0152*** (4.79)	0.0368* (1.81)	0.0362* (1.77)
Firm age	-0.0042** (-2.10)	-0.0041** (-2.03)	0.0126 (1.09)	0.0132 (1.14)
Constant	0.0723*** (4.08)	0.0746*** (4.21)	-0.3811*** (-4.04)	-0.3690*** (-3.92)
Year fixed effects	Yes	Yes	Yes	Yes
N	36,683	36,683	36,683	36,683
R ²	0.1139	0.1110	0.0348	0.0343

Table 4

Foreign involvement and analyst forecast quality.

This table reports the coefficient estimates of the regressions of information asymmetry. Analyst forecast error = the log of one plus absolute value of difference between median forecast and actual EPS divided by the absolute value of median forecast. Analyst forecast dispersion = the log of one plus standard deviation of difference between median forecast and actual EPS divided by the absolute value of median forecast. Foreign sales ratio = foreign sales divided by total sales. Foreign sales dummy = a dummy that takes a value of 1 if the firm's foreign sales ratio is greater than 30% and takes zero otherwise. Size = the log of one plus market capitalization. Leverage = total debt to total assets. Market-to-book = the log of one plus market-to-book equity ratio. Profitability = income before extraordinary items divided by total assets. Industrial diversification = a dummy that takes a value of 1 if the firm reports more than one industrial business segment. Dividend payer = an indicator of dividend paying firm. Firm age = the log of one plus the number of years since the stock inclusion in the CRSP database. The *t*-statistics reported in parentheses are estimated using standard errors robust to heteroskedasticity and clustering at the firm level. *** and ** indicate significance at the 1% and 5% levels, respectively.

	Dependent variable = Analyst forecast error		Dependent variable = Analyst forecast dispersion	
	[I]	[II]	[III]	[IV]
Foreign sales ratio	0.1191*** (4.81)		0.0449*** (3.27)	
Foreign sales dummy		0.0386*** (3.39)		0.0132** (2.06)
Size	-0.0567*** (-14.46)	-0.0551*** (-14.04)	-0.0180*** (-8.07)	-0.0174*** (-7.72)
Leverage	0.1904*** (5.40)	0.1915*** (5.40)	0.0783*** (4.00)	0.0787*** (4.02)
Market-to-book	-0.0740*** (-5.58)	-0.0760*** (-5.72)	-0.0375*** (-5.23)	-0.0383*** (-5.31)
Profitability	-0.3140*** (-12.15)	-0.3124*** (-12.09)	-0.1981*** (-12.34)	-0.1976*** (-12.32)
Industrial diversification	0.0240** (2.25)	0.0249** (2.33)	0.0048 (0.79)	0.0052 (0.85)
Capital expenditures/total assets	0.1937*** (2.77)	0.1877*** (2.68)	0.0996** (2.38)	0.0970** (2.31)
R&D expenditures/total assets	0.3053*** (3.56)	0.3125*** (3.65)	0.1513*** (3.21)	0.1549*** (3.28)
Advertising expenditures/ total assets	0.7990*** (4.84)	0.8155*** (4.97)	0.1774** (2.14)	0.1836** (2.23)
Dividend payer	-0.0499*** (-3.88)	-0.0491*** (-3.80)	-0.0217*** (-3.16)	-0.0214*** (-3.12)
Firm age	-0.0084 (-1.24)	-0.0093 (-1.37)	0.0016 (0.42)	0.0013 (0.35)
Constant	1.4416*** (14.69)	1.4469*** (14.02)	0.4552*** (11.22)	0.4622*** (11.38)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
N	13,850	13,850	10,684	10,684
R ²	0.1720	0.1702	0.1777	0.1767

Table 5

Foreign involvement and idiosyncratic risk.

This table reports the coefficient estimates of the regressions of idiosyncratic risk. Models [I] and [II] report results using idiosyncratic risk, defined as the log of variance of residuals ($\sigma_{ie,t}^2$) obtained from the market model. Models [III] and [IV] report results using the industry model idiosyncratic risk, defined as the log of variance of residuals from a model that regresses the firm's excess return on the value-weighted market excess return and SIC 2-digit industry excess return. Models [V] and [VI] report results using the FFC 4-factor idiosyncratic risk, defined as the log of variance of residuals from a model that regresses the firm's excess return on the Fama-French-Carhart 4 factors. Foreign sales dummy = a dummy that takes a value of 1 if the firm's foreign sales ratio is greater than 30% and takes zero otherwise. Size = the log of one plus market capitalization. Leverage = total debt to total assets. Market-to-book = the log of one plus market-to-book equity ratio. Profitability = income before extraordinary items divided by total assets. Industrial diversification = a dummy that takes a value of 1 if the firm reports more than one industrial business segment. Dividend payer = an indicator of dividend paying firm. Firm age = the log of one plus the number of years since the stock inclusion in the CRSP database. The t -statistics reported in parentheses are estimated using standard errors robust to heteroskedasticity and clustering at the firm level. *** and ** indicate significance at the 1% and 5% levels, respectively.

	Dependent variable = Idiosyncratic risk		Dependent variable = Industry model idiosyncratic risk		Dependent variable = FFC 4-factor idiosyncratic risk	
	[I]	[II]	[III]	[IV]	[V]	[VI]
Foreign sales ratio	-0.3017*** (-12.23)		-0.2618*** (-10.70)		-0.2612*** (-10.58)	
Foreign sales dummy		-0.1452*** (-11.46)		-0.1266*** (-10.02)		-0.1285*** (-10.03)
Size	-0.1854*** (-42.42)	-0.1815*** (-42.19)	-0.1710*** (-40.20)	-0.1676*** (-40.00)	-0.1727*** (-40.36)	-0.1694*** (-40.19)
Leverage	0.1945*** (5.22)	0.1919*** (5.16)	0.1178*** (3.13)	0.1156*** (3.08)	0.1271*** (3.36)	0.1253*** (3.32)
Market-to-book	0.1632*** (13.89)	0.1621*** (13.85)	0.2206*** (18.48)	0.2196*** (18.46)	0.2228*** (18.55)	0.2219*** (18.54)
Profitability	-0.5068*** (-25.70)	-0.5156*** (-26.18)	-0.4520*** (-22.02)	-0.4595*** (-22.38)	-0.4644*** (-22.37)	-0.4715*** (-22.71)
Industrial diversification	-0.0407*** (-3.14)	-0.0451*** (-3.49)	-0.0287** (-2.21)	-0.0325** (-2.51)	-0.0339** (-2.57)	-0.0377*** (-2.86)
Capital expenditures/total assets	0.4529*** (6.46)	0.4503*** (6.45)	0.4271*** (6.16)	0.4248*** (6.14)	0.4543*** (6.50)	0.4518*** (6.48)
R&D expenditures/total assets	1.2718*** (16.82)	1.2633*** (16.67)	1.1215*** (15.01)	1.1143*** (14.91)	1.1362*** (15.07)	1.1297*** (14.98)
Advertising expenditures/ total assets	0.7061*** (4.11)	0.7013*** (4.12)	0.8114*** (4.64)	0.8074*** (4.66)	0.8088*** (4.56)	0.8055*** (4.58)
Dividend payer	-0.3330*** (-23.22)	-0.3381*** (-23.77)	-0.3158*** (-22.28)	-0.3201*** (-22.75)	-0.3185*** (-22.08)	-0.3226*** (-22.53)
Firm age	-0.1683*** (-20.92)	-0.1680*** (-20.97)	-0.1509*** (-19.04)	-0.1507*** (-19.09)	-0.1552*** (-19.29)	-0.1550*** (-19.33)
Constant	-6.0319*** (-44.54)	-6.0368*** (-44.63)	-6.1441*** (-43.05)	-6.1480*** (-43.21)	-6.1502*** (-43.40)	-6.1542*** (-43.57)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	40,486	40,486	40,231	40,231	40,260	40,260
R ²	0.5676	0.5668	0.4791	0.4786	0.4745	0.4741

Table 6

Tests using a foreign income based indicator of foreign involvement.

This table reports the coefficient estimates of the regressions of information environment variables using a foreign income based measure of foreign involvement. Foreign income based indicator of foreign involvement = an indicator that takes a value of 1 if the firm reports pre-tax income or foreign income tax at least one year over the previous three years and has at least one subsidiary outside the US, as constructed in Jang (2012). Future earnings incremental explanatory power = the increase in R-square of the complete regression on future earning changes and future stock returns relative to the base regression on current earning change. Future earnings response coefficient = the sum of the coefficients on future earning changes in the regression of annual stock return. Analyst forecast error = the log of one plus absolute value of difference between median forecast and actual EPS divided by the absolute value of median forecast. Analyst forecast dispersion = the log of standard deviation of difference between median forecast and actual EPS divided by the absolute value of median forecast. Idiosyncratic risk = the log of variance of residuals ($\sigma_{ie,t}^2$) obtained from the market model. Foreign sales dummy = a dummy that takes a value of 1 if the firm's foreign sales ratio is greater than 30% and takes zero otherwise. Controlling variables are as follows: Size = the log of one plus market capitalization. Leverage = total debt to total assets. Market-to-book = the log of one plus market-to-book equity ratio. Profitability = income before extraordinary items divided by total assets. Industrial diversification = a dummy that takes a value of 1 if the firm reports more than one industrial business segment. Dividend payer = an indicator of dividend paying firm. Firm age = the log of one plus the number of years since the stock inclusion in the CRSP database. The *t*-statistics reported in parentheses are estimated using standard errors robust to heteroskedasticity and clustering at the firm level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Dependent variable =	Future earnings incremental explanatory power	Future earnings response coefficient	Analyst forecast error	Analyst forecast dispersion	Idiosyncratic risk
	[I]	[II]	[III]	[IV]	[V]
Foreign income based foreign involvement indicator	-0.0427*** (-7.00)	-0.1436*** (-3.48)	0.1543** (2.11)	0.0573** (1.99)	-0.2414*** (-6.86)
Size	0.0079*** (4.19)	0.0146 (1.31)	-0.0911*** (-4.85)	-0.0250*** (-3.18)	-0.1462*** (-13.25)
Leverage	0.0664*** (4.90)	0.3570*** (3.71)	0.3140* (1.94)	0.0734 (1.09)	0.0565 (0.72)
Market-to-book	-0.0319*** (-7.02)	-0.0580 (-1.53)	-0.1105* (-1.70)	-0.0384 (-1.41)	0.1795*** (5.87)
Profitability	0.0232*** (3.46)	0.2799*** (4.96)	-0.6847*** (-5.09)	-0.2808*** (-4.22)	-0.5278*** (-10.57)
Industrial diversification	-0.0044 (-0.84)	0.0033 (0.09)	0.1064* (1.85)	0.0255 (1.16)	-0.0125 (-0.48)
Capital expenditures/total assets	0.0159 (0.70)	0.1879 (1.39)	0.1196 (0.42)	-0.0652 (-0.62)	0.4722*** (3.91)
R&D expenditures/total assets	-0.2159*** (-11.85)	-0.9288*** (-7.77)	0.3314 (1.09)	0.1422 (1.02)	1.2968*** (8.67)
Advertising expenditures/ total assets	0.2824*** (3.81)	-0.9012** (-1.98)	1.2253 (1.60)	0.4322 (1.09)	-0.2332 (-0.73)
Dividend payer	0.0101* (1.83)	0.0910** (2.40)	0.0546 (0.93)	-0.0005 (-0.03)	-0.2777*** (-9.78)
Firm age	-0.0018 (-0.48)	-0.0122 (-0.54)	-0.0598* (-1.66)	-0.0043 (-0.33)	-0.1725*** (-9.36)
Constant	0.0105 (0.32)	-0.3777* (-1.89)	3.2900*** (5.18)	1.0745*** (3.60)	-5.7757*** (-17.41)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	No	No	Yes	Yes	Yes
N	8,051	8,051	2,768	2,082	7,874
R ²	0.1352	0.0402	0.1355	0.1520	0.5620

Table 7

Tests using foreign affiliate information based measures of MNC network structure.

This table reports the coefficient estimates of the regressions of information environment variables using the measures of MNC network structure based on data of the Dun and Bradstreet's Who Owns Whom, which provides foreign subsidiary affiliate information. Breadth of foreign subsidiary network = the log of one plus the number of foreign countries where the firm has subsidiaries. Depth of foreign subsidiary network = the Herfindahl index of foreign subsidiary concentration across foreign countries. Cultural distance = the log of one plus the averaged cultural distance index. We use the Hofstede's cultural dimensions; 1) Power distance; 2) Individualism; 3) Masculinity; 4) Uncertainty Avoidance; and 5) Long Term Orientation. For each dimension, we compute the weighted absolute differences between US and foreign countries where the firm's subsidiaries are located. The weight is computed by the ratio of the number of subsidiaries in a particular country to the total number of subsidiaries. Finally, we get an average of difference scores from all dimensions. Geographic dispersion index = an index that combines the ranks of Breadth of foreign subsidiary network, the inverse value of Depth of foreign subsidiary network and Cultural distance. Future earnings incremental explanatory power = the increase in R-square of the complete regression on future earning changes and future stock returns relative to the base regression on current earning change. Future earnings response coefficient = the sum of the coefficients on future earning changes in the regression of annual stock return. Analyst forecast error = the log of one plus absolute value of difference between median forecast and actual EPS divided by the absolute value of median forecast. Analyst forecast dispersion = the log of standard deviation of difference between median forecast and actual EPS divided by the absolute value of median forecast. Idiosyncratic risk = the log of variance of residuals ($\sigma_{ie,t}^2$) obtained from the market model. Foreign sales dummy = a dummy that takes a value of 1 if the firm's foreign sales ratio is greater than 30% and takes zero otherwise. Controlling variables are as follows: Size = the log of one plus market capitalization. Leverage = total debt to total assets. Market-to-book = the log of one plus market-to-book equity ratio. Profitability = income before extraordinary items divided by total assets. Industrial diversification = a dummy that takes a value of 1 if the firm reports more than one industrial business segment. Dividend payer = an indicator of dividend paying firm. Firm age = the log of one plus the number of years since the stock inclusion in the CRSP database. The *t*-statistics reported in parentheses are estimated using standard errors robust to heteroskedasticity and clustering at the firm level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Dependent variable =	Future earnings incremental explanatory power	Future earnings response coefficient	Analyst forecast error	Analyst forecast dispersion	Idiosyncratic risk
	[I]	[II]	[III]	[IV]	[V]
Breadth of foreign subsidiary network					
Breadth of foreign subsidiary network	-0.0234*** (-7.41)	-0.0750*** (-3.85)	0.0639** (2.22)	0.0204* (1.74)	-0.1535*** (-9.56)
Controls	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	No	No	Yes	Yes	Yes
N	8,051	8,051	2,768	2,082	7,874
R ²	0.1377	0.0403	0.1348	0.1509	0.5681
Depth of foreign subsidiary network					
Depth of foreign subsidiary network	0.0643*** (7.30)	0.1833*** (3.17)	-0.2106** (-2.43)	-0.0778** (-2.01)	0.4019*** (8.53)
Controls	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	No	No	Yes	Yes	Yes
N	8,051	8,051	2,768	2,082	7,874
R ²	0.1369	0.0399	0.1352	0.1517	0.5659
Cultural distance					
Cultural distance	-0.0159*** (-6.76)	-0.0574*** (-3.76)	0.0520** (2.30)	0.0256** (2.44)	-0.0826*** (-6.66)
Controls	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	No	No	Yes	Yes	Yes
N	7,804	7,804	2,692	2,031	7,874
R ²	0.1346	0.0410	0.1329	0.1551	0.5618
Geographic dispersion index					
Geographic dispersion index	-0.0782*** (-6.72)	-0.2755*** (-3.73)	0.2350** (2.30)	0.0930** (2.07)	-0.4903*** (-8.40)
Controls	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	No	No	Yes	Yes	Yes
N	8,051	8,051	2,768	2,082	7,874
R ²	0.1358	0.0404	0.1348	0.1515	0.5655

Table 8

Foreign subsidiary network, degree of foreign involvement, and opaqueness.

This table reports the coefficient estimates of the regressions of information environment variables using the geographic dispersion index based on data of the Dun and Bradstreet's Who Owns Whom, which provides foreign subsidiary affiliate information. Geographic dispersion index = an index that combines the ranks of Breadth of foreign subsidiary network, the inverse value of Depth of foreign subsidiary network and Cultural distance. Breadth of foreign subsidiary network = the log of one plus the number of foreign countries where the firm has subsidiaries. Depth of foreign subsidiary network = the Herfindahl index of foreign subsidiary concentration across foreign countries. Cultural distance = the log of one plus the averaged cultural distance index. We use the Hofstede's cultural dimensions; 1) Power distance; 2) Individualism; 3) Masculinity; 4) Uncertainty Avoidance; and 5) Long Term Orientation. For each dimension, we compute the weighted absolute differences between US and foreign countries where the firm's subsidiaries are located. The weight is computed by the ratio of the number of subsidiaries in a particular country to the total number of subsidiaries. Future earnings incremental explanatory power = the increase in R-square of the complete regression on future earning changes and future stock returns relative to the base regression on current earning change. Future earnings response coefficient = the sum of the coefficients on future earning changes in the regression of annual stock return. Analyst forecast error = the log of one plus absolute value of difference between median forecast and actual EPS divided by the absolute value of median forecast. Analyst forecast dispersion = the log of standard deviation of difference between median forecast and actual EPS divided by the absolute value of median forecast. Idiosyncratic risk = the log of variance of residuals ($\sigma_{ie,t}^2$) obtained from the market model. Foreign sales dummy = a dummy that takes a value of 1 if the firm's foreign sales ratio is greater than 30% and takes zero otherwise. Controlling variables are as follows: Size = the log of one plus market capitalization. Leverage = total debt to total assets. Market-to-book = the log of one plus market-to-book equity ratio. Profitability = income before extraordinary items divided by total assets. Industrial diversification = a dummy that takes a value of 1 if the firm reports more than one industrial business segment. Dividend payer = an indicator of dividend paying firm. Firm age = the log of one plus the number of years since the stock inclusion in the CRSP database. We regress the model for two sub-samples classified by foreign sales ratio. The *t*-statistics reported in parentheses are estimated using standard errors robust to heteroskedasticity and clustering at the firm level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Regressions on geographic dispersion index

Dependent variable =	Future earnings incremental explanatory power		Future earnings response coefficient		Analyst forecast error		Analyst forecast dispersion		Idiosyncratic risk	
	If foreign sales ratio		If foreign sales ratio		If foreign sales ratio		If foreign sales ratio		If foreign sales ratio	
	> 0.30	≤ 0.30	> 0.30	≤ 0.30	> 0.30	≤ 0.30	> 0.30	≤ 0.30	> 0.30	≤ 0.30
	[I]	[II]	[III]	[IV]	[V]	[VI]	[VII]	[VIII]	[IX]	[X]
Geographic dispersion index	-0.0328 (-1.59)	-0.0607*** (-3.57)	-0.0929 (-0.66)	-0.2180* (-1.91)	0.1935 (0.61)	0.3182* (1.86)	-0.0392 (-0.31)	0.1704* (1.87)	-0.4725*** (-5.20)	-0.4798*** (-5.53)
Size	0.0047 (1.14)	0.0105*** (4.80)	0.0564** (2.09)	0.0059 (0.42)	-0.1969*** (-2.66)	-0.0851*** (-3.12)	-0.0478 (-1.55)	-0.0309** (-2.33)	-0.1215*** (-4.91)	-0.1579*** (-11.48)
Leverage	0.0113 (0.38)	0.0585*** (3.76)	0.2253 (0.89)	0.2295** (2.03)	0.4960 (1.16)	0.2593 (1.23)	0.0882 (0.47)	0.0685 (0.72)	0.3721* (1.86)	-0.0627 (-0.63)
Market-to-book	-0.0138 (-1.29)	-0.0332*** (-6.88)	-0.3007*** (-3.12)	-0.0050 (-0.12)	-0.1067 (-0.48)	-0.0712 (-0.71)	0.0426 (0.62)	-0.0748 (-1.44)	0.1478** (2.12)	0.2264*** (5.81)
Profitability	-0.0131 (-0.77)	0.0188** (2.48)	-0.0973 (-0.61)	0.3249*** (4.93)	-1.4594*** (-2.84)	-0.5297*** (-2.66)	-0.9354*** (-4.81)	-0.2380** (-2.06)	-0.7396*** (-4.96)	-0.4441*** (-7.34)
Industrial diversification	0.0034 (0.33)	0.0002 (0.03)	-0.1011 (-1.16)	0.0591 (1.23)	0.1702 (1.09)	0.0677 (0.93)	-0.0608 (-0.99)	0.0091 (0.29)	-0.1899*** (-3.25)	0.0050 (0.15)
Capital expenditures/total assets	0.1190 (1.54)	0.0266 (1.02)	1.1444** (2.25)	-0.0047 (-0.03)	1.2814 (0.81)	-0.0847 (-0.24)	1.2338 (1.64)	-0.1105 (-0.74)	1.3122*** (2.90)	0.4197*** (2.88)
R&D expenditures/total assets	-0.2856*** (-4.57)	-0.1839*** (-9.79)	-0.5127 (-1.10)	-1.1745*** (-8.39)	0.4483 (0.31)	0.5589 (1.64)	-0.5236 (-0.98)	0.2363 (1.42)	2.6330*** (4.95)	0.9658*** (5.97)
Advertising expenditures/ total assets	0.3454** (2.58)	0.1847** (2.52)	1.7241 (1.54)	-1.0084** (-2.02)	3.7468 (0.91)	0.7739 (0.95)	2.7524** (2.26)	-0.0102 (-0.04)	1.3888* (1.78)	-0.6701* (-1.70)
Dividend payer	-0.0046 (-0.35)	0.0104 (1.60)	-0.0250 (-0.24)	0.1291*** (2.84)	0.0415 (0.21)	0.1085 (1.48)	-0.0588 (-0.86)	0.0403 (1.37)	-0.3959*** (-5.74)	-0.2462*** (-7.23)
Firm age	0.0094 (1.26)	-0.0017 (-0.41)	0.1035* (1.88)	-0.0395 (-1.44)	0.0292 (0.29)	-0.1101** (-2.21)	0.0860* (1.90)	-0.0317 (-1.61)	-0.1194*** (-3.08)	-0.1710*** (-7.97)
Constant	0.0044 (0.06)	-0.0426 (-1.11)	-1.4850*** (-3.21)	-0.1741 (-0.72)	5.7379*** (4.36)	3.4197*** (2.92)	1.5866*** (3.07)	0.7905*** (3.16)	-6.3578*** (-36.61)	-5.6444*** (-38.01)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
N	1,318	4,083	1,318	4,083	417	1,397	326	1,009	1,234	3,972
R ²	0.1135	0.1251	0.0626	0.0497	0.2276	0.1621	0.2797	0.2005	0.6321	0.5550

Panel B: Regressions on individual subsidiary network variables

Dependent variable =	Future earnings incremental explanatory power		Future earnings response coefficient		Analyst forecast error		Analyst forecast dispersion		Idiosyncratic risk	
	If foreign sales ratio		If foreign sales ratio		If foreign sales ratio		If foreign sales ratio		If foreign sales ratio	
	> 0.30	≤ 0.30	> 0.30	≤ 0.30	> 0.30	≤ 0.30	> 0.30	≤ 0.30	> 0.30	≤ 0.30
	[I]	[II]	[III]	[IV]	[V]	[VI]	[VII]	[VIII]	[IX]	[X]
Panel B.1: Breadth of foreign subsidiary network										
Breadth of foreign subsidiary network	-0.0128**	-0.0179***	-0.0240	-0.0546*	0.1035	0.0662	-0.0253	0.0417*	-0.1892***	-0.1372***
	(-2.25)	(-4.21)	(-0.62)	(-1.79)	(1.12)	(1.53)	(-0.75)	(1.80)	(-6.64)	(-6.01)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
N	1,318	4,083	1,318	4,083	417	1,399	326	1,009	1,234	3,972
R ²	0.1167	0.1265	0.0624	0.0496	0.2294	0.1614	0.2808	0.1998	0.6422	0.5560
Panel B.2: Depth of foreign subsidiary network										
Depth of foreign subsidiary network	0.0340**	0.0489***	-0.0153	0.1355	-0.2217	-0.2231*	0.0322	-0.1265*	0.4469***	0.3526***
	(2.16)	(4.19)	(-0.14)	(1.58)	(-0.86)	(-1.75)	(0.32)	(-1.74)	(5.49)	(5.40)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
N	1,318	4,083	1,318	4,083	417	1,399	326	1,009	1,234	3,972
R ²	0.1168	0.1263	0.0622	0.0495	0.2284	0.1619	0.2797	0.2004	0.6346	0.5547
Panel B.3: Cultural distance										
Cultural distance	-0.0068	-0.0114***	-0.0322	-0.0286	0.0351	0.0459	-0.0140	0.0337*	-0.0757***	-0.0864***
	(-1.40)	(-3.71)	(-0.95)	(-1.23)	(0.48)	(1.50)	(-0.51)	(1.92)	(-3.20)	(-5.27)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
N	1,232	3,932	1,232	3,932	375	1,367	298	988	1,234	3,972
R ²	0.1164	0.1226	0.0708	0.0512	0.2237	0.1662	0.3052	0.2024	0.6232	0.5540

Table 9
Controlling for endogeneity.

Panel A reports the results of the instrumental variable (IV) model and Panel B reports the results of the Heckman's (1979) self-selection model following Campa and Kedia (2002). A probit model is used to estimate firm's foreign sales dummy in the first stage, as reported in Appendix, where foreign sales dummy = a dummy that takes a value of 1 if the firm's foreign sales ratio is greater than 30% and takes zero otherwise. Future earnings incremental explanatory power = the increase in R-square of the complete regression on future earning changes and future stock returns relative to the base regression on current earning change. Future earnings response coefficient = the sum of the coefficients on future earning changes in the regression of annual stock return. Analyst forecast error = the log of one plus absolute value of difference between median forecast and actual EPS divided by the absolute value of median forecast. Analyst forecast dispersion = the log of standard deviation of difference between median forecast and actual EPS divided by the absolute value of median forecast. Idiosyncratic risk = the log of variance of residuals ($\sigma_{ie,t}^2$) obtained from the market model. Controlling variables are as follows: Size = the log of one plus market capitalization. Leverage = total debt to total assets. Market-to-book = the log of one plus market-to-book equity ratio. Profitability = income before extraordinary items divided by total assets. Industrial diversification = a dummy that takes a value of 1 if the firm reports more than one industrial business segment. Dividend payer = an indicator of dividend paying firm. Firm age = the log of one plus the number of years since the stock inclusion in the CRSP database. In Panel B, Lambda is the inverse Mill's ratio from the first-stage estimation. The *t*-statistics reported in parentheses are estimated using standard errors robust to heteroskedasticity and clustering at the firm level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Instrumental Variable Approach					
Dependent variable =	Future earnings incremental explanatory power	Future earnings response coefficient	Analyst forecast error	Analyst forecast dispersion	Idiosyncratic risk
	[I]	[II]	[III]	[IV]	[V]
Foreign sales dummy	-0.1637*** (-5.40)	-0.8418*** (-4.31)	0.4284*** (3.79)	0.2022*** (3.12)	-0.3911*** (-3.94)
Size	0.0104*** (5.08)	0.0500*** (3.61)	-0.0805*** (-9.86)	-0.0298*** (-6.34)	-0.1536*** (-20.64)
Leverage	0.0494*** (5.50)	0.1186*** (2.10)	0.2496*** (6.58)	0.1066*** (5.07)	0.1330*** (3.42)
Market-to-book	-0.0096*** (-3.58)	0.0001 (0.003)	-0.0806*** (-6.02)	-0.0401*** (-5.55)	0.1610*** (13.66)
Profitability	-0.0158*** (-3.75)	-0.0767** (-2.34)	-0.2742*** (-9.92)	-0.1793*** (-10.47)	-0.5606*** (-26.70)
Industrial diversification	0.0037 (1.23)	0.0076 (0.41)	0.0141 (1.25)	0.0001 (0.02)	-0.0389*** (-2.95)
Capital expenditures/total assets	-0.0202 (-1.02)	0.2013* (1.74)	0.3650*** (4.25)	0.1858*** (3.78)	0.3149*** (3.95)
R&D expenditures/total assets	-0.2793*** (-20.22)	-1.0437*** (-13.04)	0.3101*** (3.61)	0.1537*** (3.25)	1.2402*** (16.30)
Advertising expenditures/ total assets	0.1576*** (3.74)	1.2825*** (4.52)	0.8434*** (5.23)	0.1912** (2.36)	0.6649*** (3.85)
Dividend payer	0.0146*** (4.52)	0.0326 (1.59)	-0.0450*** (-3.49)	-0.0195*** (-2.86)	-0.3504*** (-24.55)
Firm age	-0.0041** (-2.02)	0.0131 (1.13)	-0.0086 (-1.26)	0.0016 (0.43)	-0.1719*** (-21.37)
Constant	-0.0662* (-1.95)	-1.1282*** (-4.91)	1.8829*** (12.00)	0.6682*** (8.36)	-5.9688*** (-42.56)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	No	No	Yes	Yes	Yes
N	36,683	36,683	10,684	10,684	40,486
R ²	0.1018	0.0332	0.1703	0.1772	0.5630

Panel B: Self-selection Correction Approach

Dependent variable =	Future earnings incremental explanatory power	Future earnings response coefficient	Analyst forecast error	Analyst forecast dispersion	Idiosyncratic risk
	[I]	[II]	[III]	[IV]	[V]
Foreign sales dummy	-0.0319*** (-11.15)	-0.1318*** (-7.60)	0.0380*** (3.32)	0.0130** (2.03)	-0.1624*** (-11.31)
Size	0.0111*** (5.59)	0.0521*** (3.84)	-0.0823*** (-10.24)	-0.0294*** (-6.32)	-0.1981*** (-24.14)
Leverage	0.0532*** (6.03)	0.1358** (2.44)	0.2431*** (6.45)	0.1027*** (4.89)	0.2191*** (5.63)
Market-to-book	-0.0120*** (-4.53)	-0.0101 (-0.61)	-0.0774*** (-5.80)	-0.0389*** (-5.37)	0.1610*** (13.78)
Profitability	-0.0137*** (-3.33)	-0.0668** (-2.07)	-0.2773*** (-10.05)	-0.1815*** (-10.60)	-0.4965*** (-23.34)
Industrial diversification	0.0025 (0.85)	0.0025 (0.13)	0.0156 (1.38)	0.0010 (0.15)	-0.0501*** (-3.84)
Capital expenditures/total assets	-0.0177 (-0.92)	0.2174* (1.92)	0.3585*** (4.25)	0.1766*** (3.64)	0.5462*** (6.67)
R&D expenditures/total assets	-0.2579*** (-19.46)	-0.9568*** (-12.21)	0.3002*** (3.51)	0.1501*** (3.18)	1.2541*** (16.59)
Advertising expenditures/ total assets	0.1575*** (3.81)	1.2832*** (4.54)	0.8047*** (4.94)	0.1762** (2.16)	0.7020*** (4.14)
Dividend payer	0.0145*** (4.58)	0.0323 (1.59)	-0.0458*** (-3.56)	-0.0199*** (-2.92)	-0.3369*** (-23.68)
Firm age	-0.0040** (-2.00)	0.0135 (1.17)	-0.0085 (-1.24)	0.0016 (0.43)	-0.1676*** (-20.92)
Lambda	-0.1966*** (-4.80)	-1.0301*** (-3.86)	0.5730*** (3.73)	0.2519*** (2.84)	0.3650** (2.39)
Constant	0.0803*** (4.45)	-0.3392*** (-3.58)	1.4460*** (14.50)	0.4602*** (11.30)	-6.3701*** (-32.42)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	No	No	Yes	Yes	Yes
N	36,683	36,683	10,684	10,684	40,486
R ²	0.1136	0.0349	0.1716	0.1777	0.5670

Table 10

Exclusion of illiquid and small firms.

This table reports the coefficient estimates of the regressions of information environment variables after excluding most illiquid firms (i.e., the top quartile of Scaled Amihud's illiquidity or the bottom quartile of scaled trading volume) or excluding smallest firms (i.e., the bottom quartile of firm size). Scaled Amihud's illiquidity = the average over the year of the daily ratio of stock's absolute return to its trading volume scaled by the number of outstanding shares. Scaled trading volume = the average over the year of the daily trading volume scaled by the number of outstanding shares. Future earnings incremental explanatory power = the increase in R-square of the complete regression on future earning changes and future stock returns relative to the base regression on current earning change. Future earnings response coefficient = the sum of the coefficients on future earning changes in the regression of annual stock return. Analyst forecast error = the log of one plus absolute value of difference between median forecast and actual EPS divided by the absolute value of median forecast. Analyst forecast dispersion = the log of standard deviation of difference between median forecast and actual EPS divided by the absolute value of median forecast. Foreign sales ratio = foreign sales divided by total sales. Idiosyncratic risk = the log of variance of residuals ($\sigma_{ie,t}^2$) obtained from the market model. Foreign sales dummy = a dummy that takes a value of 1 if the firm's foreign sales ratio is greater than 30% and takes zero otherwise. Controlling variables are as follows: Size = the log of one plus market capitalization. Leverage = total debt to total assets. Market-to-book = the log of one plus market-to-book equity ratio. Profitability = income before extraordinary items divided by total assets. Industrial diversification = a dummy that takes a value of 1 if the firm reports more than one industrial business segment. Dividend payer = an indicator of dividend paying firm. Firm age = the log of one plus the number of years since the stock inclusion in the CRSP database. The *t*-statistics reported in parentheses are estimated using standard errors robust to heteroskedasticity and clustering at the firm level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	After excluding the top quartile of Scaled Amihud's illiquidity		After excluding the bottom quartile of scaled trading volume		After excluding the bottom quartile of firm size	
	[I]	[II]	[III]	[IV]	[V]	[VI]
Dependent variable = Future earnings incremental explanatory power						
Foreign sales ratio	-0.0737*** (-12.52)		-0.0736*** (-12.91)		-0.0736*** (-12.00)	
Foreign sales dummy		-0.0340*** (-11.00)		-0.0337*** (-10.92)		-0.0339*** (-10.60)
Controls, year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.1191	0.1156	0.1233	0.1193	0.1139	0.1103
Dependent variable = Future earnings response coefficient						
Foreign sales ratio	-0.2993*** (-8.19)		-0.3017*** (-8.45)		-0.3087*** (-8.33)	
Foreign sales dummy		-0.1339*** (-6.90)		-0.1337*** (-6.88)		-0.1380*** (-7.05)
Controls, year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.0353	0.0347	0.0361	0.0354	0.0367	0.0361

Dependent variable = Analyst forecast error						
Foreign sales ratio	0.1219*** (4.76)		0.1151*** (4.38)		0.1141*** (4.51)	
Foreign sales dummy		0.0393*** (3.36)		0.0379*** (3.09)		0.0313*** (2.75)
Controls, year fixed effects, industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.1707	0.1688	0.1679	0.1663	0.1693	0.1672
Dependent variable = Analyst forecast dispersion						
Foreign sales ratio	0.0403*** (2.92)		0.0425*** (2.96)		0.0426*** (3.07)	
Foreign sales dummy		0.0116* (1.80)		0.0121* (1.79)		0.0113* (1.75)
Controls, year fixed effects, industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.1789	0.1780	0.1744	0.1734	0.1776	0.1765
Dependent variable = Idiosyncratic risk						
Foreign sales ratio	-0.3471*** (-12.95)		-0.4046*** (-15.84)		-0.3144*** (-11.60)	
Foreign sales dummy		-0.1584*** (-11.63)		-0.1871*** (-14.31)		-0.1450*** (-10.54)
Controls, year fixed effects, industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.6060	0.6046	0.6199	0.6181	0.5701	0.5691

Table 11
Sub-period analysis.

This table reports the coefficient estimates of the regressions of information environment variables for sub-periods. Future earnings incremental explanatory power = the increase in R-square of the complete regression on future earning changes and future stock returns relative to the base regression on current earning change. Future earnings response coefficient = the sum of the coefficients on future earning changes in the regression of annual stock return. Analyst forecast error = the log of one plus absolute value of difference between median forecast and actual EPS divided by the absolute value of median forecast. Analyst forecast dispersion = the log of standard deviation of difference between median forecast and actual EPS divided by the absolute value of median forecast. Idiosyncratic risk = the log of variance of residuals ($\sigma_{ie,t}^2$) obtained from the market model. Foreign sales ratio = foreign sales divided by total sales. Foreign sales dummy = a dummy that takes a value of 1 if the firm's foreign sales ratio is greater than 30% and takes zero otherwise. Controlling variables are as follows: Size = the log of one plus market capitalization. Leverage = total debt to total assets. Market-to-book = the log of one plus market-to-book equity ratio. Profitability = income before extraordinary items divided by total assets. Industrial diversification = a dummy that takes a value of 1 if the firm reports more than one industrial business segment. Dividend payer = an indicator of dividend paying firm. Firm age = the log of one plus the number of years since the stock inclusion in the CRSP database. The *t*-statistics reported in parentheses are estimated using standard errors robust to heteroskedasticity and clustering at the firm level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	1985 - 1999		2000 - 2012	
	[I]	[II]	[III]	[IV]
Dependent variable = Future earnings incremental explanatory power				
Foreign sales ratio	-0.0767*** (-11.21)		-0.0578*** (-7.67)	
Foreign sales dummy		-0.0334*** (-9.73)		-0.0305*** (-7.74)
Controls, year fixed effects	Yes	Yes	Yes	Yes
R ²	0.0955	0.0904	0.1490	0.1493
Dependent variable = Future earnings response coefficient				
Foreign sales ratio	-0.2563*** (-6.89)		-0.3138*** (-5.93)	
Foreign sales dummy		-0.1188*** (-6.19)		-0.1445*** (-4.88)
Controls, year fixed effects	Yes	Yes	Yes	Yes
R ²	0.0308	0.0304	0.0461	0.0454
Dependent variable = Analyst forecast error				
Foreign sales ratio	0.1381*** (3.44)		0.1069*** (3.45)	
Foreign sales dummy		0.0394** (2.38)		0.0389*** (2.59)
Controls, year fixed effects, industry fixed effects	Yes	Yes	Yes	Yes
R ²	0.2083	0.2067	0.1574	0.1558
Dependent variable = Analyst forecast dispersion				
Foreign sales ratio	0.0614*** (2.59)		0.0297* (1.75)	
Foreign sales dummy		0.0159* (1.69)		0.0110 (1.34)
Controls, year fixed effects, industry fixed effects	Yes	Yes	Yes	Yes
R ²	0.2355	0.2342	0.1576	0.1571
Dependent variable = Idiosyncratic risk				
Foreign sales ratio	-0.2250*** (-6.57)		-0.3840*** (-11.75)	
Foreign sales dummy		-0.1113*** (-6.68)		-0.1746*** (-10.13)
Controls, year fixed effects, industry fixed effects	Yes	Yes	Yes	Yes
R ²	0.5613	0.5611	0.5876	0.5853

Appendix

Determinants of foreign sales dummy.

This table reports the estimated coefficients of the first-stage probit model, which is used for the instrumental variable (IV) model and Heckman's (1979) self-selection model in Table 9. Foreign sales dummy = a dummy that takes a value of 1 if the firm's foreign sales ratio is greater than 30% and takes zero otherwise. Controlling variables are as follows: Size = the log of one plus market capitalization. Leverage = total debt to total assets. Market-to-book = the log of one plus market-to-book equity ratio. Profitability = income before extraordinary items divided by total assets. Liquidity = the log of scaled trading volume, which is computed by the average over the year of the daily trading volume scaled by the number of outstanding shares. Value of announced acquisitions = the log of one plus the total value of announced acquisitions. GDP is the growth rate in real GDP. Contraction is the number of months in the year when the economy was in a recession. Major exchange is a dummy that takes 1 if the firm is listed in NYSE, NASDAQ, or AMEX, and 0 otherwise. The *t*-statistics reported in parentheses are estimated using standard errors robust to heteroskedasticity and clustering at the firm level. *** indicates significance at the 1% level.

Dependent variable =	Foreign sales dummy
Size	0.1820*** (15.36)
Leverage	-0.3943*** (-4.39)
Profitability	-0.2371*** (-5.44)
Capital expenditures/total assets	-1.3242*** (-7.25)
Liquidity	0.0505*** (3.22)
Ratio of sales by conglomerates in the industry	0.4717*** (7.71)
Value of announced acquisitions	0.2218*** (14.31)
GDP	-7.9909*** (-12.33)
Contraction	-0.0040 (-1.52)
Major exchange	-0.0480 (-0.90)
Constant	-9.6099*** (-20.19)
N	40,486
Pseudo R ²	0.1204