Geographic earnings disclosure and trading volume

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\textbf{Abstract}

Beginning with Statement of Financial Accounting Standards No. 131 (SFAS 131), \textit{Disclosures about Segments of an Enterprise and Related Information}, most US multinational firms no longer disclose geographic earnings in their annual reports. Given the recent growth in foreign operations of US firms and the varying operating environments around the world, information (or lack thereof) related to geographical performance can affect investors’ information set. Using empirical tests that closely follow the [Kim, O., Verrecchia, R., 1997. Pre-announcement and event-period private information. Journal of Accounting and Economics 24, 395–419] model, we find results consistent with their predictions. Specifically, using a sample of firms with substantial foreign operations, we find evidence of a decrease in event period private information following adoption of SFAS 131 for firms that no longer disclose geographic earnings. These results suggest that decreased public information (i.e., non-disclosure of geographic earnings) reduces the ability of investors to utilize or generate private information in conjunction with the public announcement of quarterly earnings, which dampens trading. We also find evidence of a decrease in pre-announcement private information following adoption of SFAS 131. This is consistent with an overall improvement in public disclosures that has the effect of reducing differences in the precision of private information across investors in the period prior to the earnings announcement. However, such an effect is observed for both firms which no longer disclose geographic earnings and for firms that continue to disclose geographic earnings.

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1. Introduction

Our study uses the theoretical model developed in Kim and Verrecchia (1997; henceforth KV) to understand the impact of geographic earnings disclosures on investors' information set. KV show that trading volume during an earnings announcement can arise from two sources: (1) differential precision of pre-announcement private information (i.e., trading volume associated with prices changes); and (2) both the average amount and differential precision of event-period private information (i.e., trading volume not associated with price changes).\(^1\) First, pre-announcement private information refers to information gathered by investors in anticipation of an upcoming earnings announcement. As investors gather information, they develop private beliefs with differing precision (i.e., differing quality). Then, when earnings are announced, prices update to reflect investors' average beliefs of firm value. However, because some investors possess more precise pre-announcement information than others, the demand for the firm's shares is not constant across investors, and trading occurs. KV show that differences in the precision of investors' pre-announcement private information are manifested through a positive relation between trading volume and price changes at the time of the earnings announcement.\(^2\) As differences in the precision of investors' pre-announcement private information increase, so does the positive relation between price changes and trading volume.

The second type of trading volume modeled by KV reflects both the average amount of and differences in the precision of private information that occurs because of (or that can only be used in conjunction with) the earnings announcement itself. In other words, KV allow for the possibility that investors interpret information differently in the earnings announcement. Differential interpretation can lead to both the existence of private information on average and differential precision of private information across investors (i.e., some investors become more informed than others as to the error with which announced earnings reflect true firm value). Private information related to the differential processing of information in the earnings announcement leads to trading volume that is not associated with price movements.

Since volume related to both pre-announcement private information and event-period private information are observed in empirical settings, KV recommend that research attempting to infer the impact of firms' disclosures on investors' information set must consider both, and we do.\(^3\) We provide evidence of whether disclosure quality (i.e., disclosure/non-disclosure of geographic earnings) prior to quarterly earnings announcement affects investors' differential ability (1) to gather private information in predicting the information in the upcoming announcement (pre-announcement private information), and (2) to interpret quarterly earnings (event-period private information). In other words, we do not want to test the quality of the earnings announcement itself, but instead, whether the quality of disclosure prior to the announcement affects private information generation leading up to the announcement and at the time of the announcement. We view this as an interesting research issue that has received relatively little attention in the literature. KV's model offers us a theoretical framework for addressing this.

Our research also attempts to answer disclosure questions related to the international operations of US firms, where relatively little research currently exists. Because of the growing importance of the multinational operations of US firms, our results should be of increased interest to regulators and investors. Geographic earnings disclosures further provide an interesting setting in which to examine KV's model. Statement of Financial Accounting Standards No. 131 (SFAS 131), Disclosures about Segments of an Enterprise and Related Information, eliminates the requirement that firms must disclose

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\(^2\) The positive relation between volume reaction and price changes has been well documented (e.g., Karpoff, 1987; Atiase and Bamber, 1994).

\(^3\) Although our primary motivation for using volume-based tests comes from KV's model, Cready and Hurtt (2002) provide us with additional motivation. They show that volume-based tests, compared with alternative test metrics (e.g., price reactions), provide powerful indicators of the impact of accounting information on investors. Volume represents a summary measure of changes in expectations across all individual investors. For additional discussion of this issue, see also Beaver (1968) and Bamber (1986). Verrecchia (2001) provides an overall discussion of the relation between trading volume and disclosure.
geographic earnings (FASB, 1997). Since the implementation of SFAS 131, US multinational companies are required to report geographic earnings only when operating segments are defined along geographic lines. Since most firms define operating segments by products and services, geographic earnings are not required to be disclosed by most firms. Herrmann and Thomas (2000) report that only 16% of the firms in their sample continue to disclose geographic earnings after implementation of SFAS 131.

There are clear reasons to believe that non-disclosure of geographic earnings in the annual report will affect investors. Risk and growth opportunities vary considerably around the world, and information related to these factors will be incorporated into investors' forecasts and valuation models (Kormendi and Lipe, 1987; Thomas, 2000; Callen et al., 2005; Herrmann et al., 2008). In addition, as the proportion of foreign operations of US companies continues to expand, information related to these operations becomes increasingly important. Foreign earnings of US companies totaled $315 billion in 2004, an increase of 78% over the past decade, and the growth of foreign earnings has far outpaced the growth of domestic earnings (Hilsenrath, 2005). For the ten largest US companies listed on the NYSE, nearly one-half of their revenues are generated from foreign operations. Therefore, because of the increasing globalization of US firms, non-disclosure of geographic earnings may result in investors losing an important piece of public information for valuing the firm (Thomas, 1999; Hope et al., 2008a). These findings should be of interest not only to US standard setters, but to international standard setters as well. The International Accounting Standards Board (IASB, 2006) recently adopted SFAS 131 almost verbatim (IFRS 8 Operating Segments).

To understand the research setting better, consider Diamond Offshore Drilling (DO). From 1997 to 1998, DO reported growth in domestic sales of 14% and growth in foreign sales nearly 50%. By the end of 1998, foreign sales totaled about 43% of the company’s total operations. What effect did implementation of SFAS 131 in 1998 have on DO’s geographic segment reporting? In 1997, DO reported sales and earnings for three foreign geographic segments: Europe/Africa, Australia/Southeast Asia, and South America/Other. Sales for each segment were (in millions) $201.9, $94.0, and $50.8, respectively. Operating income for each segment was $38.2, ($3.8), and $18.4, respectively. Notice the difference in profit margins across the three segments: $0.19 versus ($0.04) versus $0.36. In 1998 (after implementation of SFAS 131), DO no longer disclosed geographic earnings but continued to report the same geographic segments with sales of $292.6, $139.1, and $84.5, respectively. Was DO’s decision to continue to grow its Australia/Southeast Asia segment a good one or did growth in this segment contribute greater losses to overall operations? Was DO able to maintain its high profit margin in South America/Other? When analysts are preparing their quarterly earnings forecasts for 1999, to what extent should they expect the foreign portion of total earnings to grow? Non-disclosure of geographic earnings makes answers to these questions more difficult.

We devise “difference-in-differences” tests in which we can compare changes in volume reaction for disclosers versus non-disclosers in the pre- and post-SFAS 131 period, thus providing more powerful conclusions that our results are less likely to be attributable to correlated omitted variables (Francis et al., 2006; Hail and Leuz, 2006; Hope and Thomas, 2008; Barth et al., 2007). A research setting in which all sample firms implement an accounting change at the same point in time, and in the same manner, is more problematic in terms of controlling for other temporal effects.

Using a sample of firms with substantial foreign operations, we find that volume related to price changes (i.e., differential pre-announcement private information) decreases following adoption of SFAS 131 for firms that continue to disclose geographic earnings. The decrease in the differential precision of pre-announcement private information provides the expected result that improved overall public disclosures under SFAS 131 (relative to SFAS 14) better align the precision of investors’ private information prior to the announcements of subsequent quarterly earnings. However, we also detect a

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4 Geographic earnings disclosures were first required under SFAS 14, Financial Reporting for Segments of a Business Enterprise (FASB, 1976).

5 We provide direct evidence of the overall increase in segment information by showing that around the adoption of SFAS 131, these firms increase the reported number of geographic segments and industry segments. Prior research also provides the conclusion that overall disclosures improved following adoption of SFAS 131. Improvements include greater disaggregation of operating segments, more items disclosed per operating segment, consistency of MD&A and segment definitions, and ability of segment definitions to better reflect the internal organization of the company (Herrmann and Thomas, 2000; Street et al., 2000; Berger and Hann, 2003; Botosan and Stanford, 2005).

significant decline in pre-announcement private information for firms that no longer disclose geographic earnings. Thus, we cannot conclude that non-disclosure of geographic earnings differentially affects investors’ pre-announcement private information. During the extended period of time leading up the earnings announcement, it appears that investors are able to gather information related to geographic earnings from alternative sources which aligns the precision of their private beliefs.

For event-period private information, we find a significant decrease for firms that no longer disclose geographic earnings. The decrease in event-period private information is consistent with reduced public disclosure (i.e., non-disclosure of geographic earnings) decreasing the ability of investors to generate additional private information from the earnings announcement itself. This positive relation between public disclosure quality and the generation of event-period private information is less appreciated in prior literature but consistent with a growing body of research which suggests that public announcements create differences in investors’ private information (Harris and Raviv, 1993; Kim and Verrecchia, 1994; Krinsky and Lee, 1996; Bamber et al., 1997, 1999; Kim et al., 1997; Kim and Verrecchia, 1997; Barron et al., 2002, 2005).6 In other words, public disclosures complement (rather than substitute for) the generation of private information during the event period (Verrecchia, 2001, p. 172). The ability of public announcements (e.g., quarterly earnings) to spur event-period private information is positively related to the quality of firms’ disclosures prior to the public announcement (Bailey et al. 2003, 2007; Byard and Shaw, 2003; Lim and Kwok, 2003).7 Higher-quality disclosures prior to the announcement allow investors to generate private information (or create the opportunity for some investors to better process the information in announced earnings) to ascertain firm value. When disclosure levels decrease, sophisticated investors lose some of their informational processing advantage and ability to distinguish their beliefs at the time earnings are announced, which decreases trading.

For firms that continue to disclose geographic earnings, we do not find a corresponding decrease in event-period private information with the adoption of SFAS 131. The decrease in event-period private information appears to be isolated to firms that no longer disclose geographic earnings. Since geographic earnings relate directly to consolidated earnings, it seems reasonable to find that non-disclosure reduces the ability of superior investors to process and react immediately to the announcement of quarterly consolidated earnings when geographic earnings are not disclosed in the previous year’s annual report. Also consistent with KV, the average amount of event-period private information (holding differential processing constant) may decrease with reduced public disclosure quality prior to the announcement. When investors have a sufficiently lengthy period of time to gather information from alternative sources (i.e., the full pre-announcement period), non-disclosure of geographic earnings does not affect event-period private information.

While our results align with the predictions of the KV model and with recent research, we increase the reliability of our conclusions by also considering that the impact of non-disclosure on event-period information should be more apparent for firms whose geographic earnings disclosures are more likely to be an important source of information. This includes firms that (1) do not increase their number of reported geographic segments following adoption of SFAS 131; (2) have a large absolute percentage change in foreign sales from the pre- to post-SFAS 131 period; (3) have a large difference between foreign and domestic profit margins in the post-SFAS 131 period; or (4) have a large percentage of foreign sales in the post-SFAS 131 period. We find evidence consistent with this conjecture. Being able to detect a significant effect only for firms with certain characteristics provides a powerful robustness test for our main results.

The results are also robust to controls for a number of variables shown in prior research to relate to volume and to controls for changes in industry segment reporting which may coincide with adoption

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6 Barron et al. (2005) provide a recent empirical study documenting the existence of both pre-announcement private information and event-period private information. They conclude (p. 404) that “public announcements spur investors to develop event-period private information that leads investors to act (i.e., trade).”

7 As one empirical example of this line of thought, consider Bailey et al. (2003). They investigate the relation between the change in corporate voluntary disclosures around implementation of Regulation Fair Disclosure and volume related to event-period information. They conclude, “With more corporate voluntary disclosure and more effort devoted to financial analysis in place of privileged communication, a greater variety of information and opinions manifests itself in increased trading volume” (Bailey et al., 2003, p. 2512).
of SFAS 131. We control for changes in industry segment reporting in two ways. First, we control explicitly for the number of reported industry segments before and after adoption of SFAS 131. Second, we control implicitly for the effects of industry segment reporting by comparing changes in trading volume for firms no longer disclosing geographic earnings to those that continue to disclose geographic earnings. If changes in industry segment reporting affect trading volume, then the average effect should be approximately equal across the two samples and any difference in trading volume cannot be attributed to changes in industry segment reporting. Finally, results are also consistent in matched sample and cross-sectional tests (in which we implement the Heckman (1979) procedure to control for possible sample selection bias associated with the decision to disclose geographic earnings).

The paper proceeds as follows. Section 2 discusses prior research and the research design. Section 3 details the data and our sample selection. Section 4 presents the results, and Section 5 provides conclusions.

2. Prior research and research design

Prior research contends that the implementation of SFAS 131 has made substantial improvements to the overall disclosure environment of US firms. SFAS 131 results in less aggregation of segments (Street et al., 2000; Herrmann and Thomas, 2000; Botosan and Stanford, 2005) and more information per operating segment being disclosed (Herrmann and Thomas, 2000). Extant research also suggests that these segment disclosure improvements are responsible for a greater precision in analysts’ forecasts (Berger and Hann, 2003) and greater information to the market about future earnings (Ettredge et al., 2005). However, these studies focus primarily on business segment disclosure. We focus on changes in geographic segment disclosures following adoption of SFAS 131. The focus on geographic segments is motivated in part by the increasingly global nature of US firms, as discussed previously. Research related to the informativeness of geographic segment data is relatively limited compared to that of business segment disclosures, and as discussed earlier, the importance of understanding information related to firms’ foreign operations is becoming increasingly apparent.

Under SFAS 131, firms which choose to define their operating segments on any basis other than geographic area (e.g., products and services) are no longer required to disclose geographic earnings information. Since most firms define operating segments along products and services, a considerable number of firms no longer disclose geographic earnings information after the implementation of SFAS 131 (Herrmann and Thomas, 2000). If geographic earnings are useful in assessing firm value, then the absence of such disclosures could significantly impact the information set used by investors to value the firm. To determine the impact of non-disclosure of geographic earnings on investors, we provide an “event” study by comparing trading volume during quarterly announcements before and after adoption of SFAS 131.

Our volume-based test is discussed in detail below. First, however, we want to be clear that we are not testing the market’s reaction to the act of disclosing geographic earnings. Geographic earnings, if disclosed, are included in the annual report and typically are not reported during quarterly earnings announcements. These disclosures are first made publicly available when the firm files its Form 10-K. We measure volume reaction to quarterly earnings announcements subsequent to the filing of the Form 10-K (i.e., after geographic earnings of the prior year become publicly available and can be incorporated in investors’ full information set). For example, under SFAS 131 a December year-end firm may choose not to disclose geographic earnings beginning with its 1998 financial statements. We measure volume reaction to quarterly earnings announcements beginning with the first quarter of

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These firms must continue to report sales and long-lived assets for each geographic segment disclosed.

Hope et al. (2008b) document that the extent of geographic segment disclosure is positively associated with long-window foreign earnings response coefficients. As further evidence of the importance of geographic earnings disclosures, Hope and Thomas (2008) find that managers of firms that no longer disclose geographic earnings following SFAS 131 are more likely to engage in foreign empire building. Specifically, they find that non-disclosing firms, relative to firms that continue to disclose geographic earnings, experience greater expansion of foreign sales and long-lived assets, produce lower foreign profit margins, and have lower firm value.

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1999 (i.e., after the release of the 1998 Form 10-K). This fact, however, does not affect inferences from our tests. Annual disclosures of geographic earnings create part of the firm’s overall disclosure environment and should enhance the differential generation or utilization of private information during subsequent quarterly earnings announcements (e.g., Byard and Shaw, 2003).

Now, we explain our volume-based test. KV shows that trading volume during an earnings announcement can arise from two sources: (1) differential precision of pre-announcement private information (i.e., trading volume associated with prices changes) and (2) both the average amount and differential precision of event-period private information (i.e., trading volume not associated with price changes). First, pre-announcement private information refers to private information related to firm value gathered by investors in anticipation of the forthcoming earnings announcement. Some investors possess more precise private information than others. This could occur as a result of variation in individual preferences, skills, resources, education, risk attitudes, information sets, etc. An investor that possesses more precise private information will have greater demand to trade shares for a given price change at the earnings announcement. Thus, the extent to which the precision of pre-announcement private information differs across investors can be inferred from the magnitude of the positive relation between volume reaction and price changes during earnings announcements (e.g., Karpoff, 1987; Atiase and Bamber, 1994).

Kandel and Pearson (1995), however, find that trading volume occurs during earnings announcements even when there is no price change. This type of trading volume is not consistent with differential precision of pre-announcement private information across investors. KV explains that this source of trading volume arises from event-period private information and will not relate to price changes. Event-period private information reflects investors’ private beliefs regarding the extent to which announced earnings reveal true firm value and therefore can be employed only in conjunction with the earnings announcement. In other words, KV allows for the possibility that investors interpret and process information in the earnings announcement differently. However, trading volume related to event-period private information is not related to changes in investors’ average expectations (i.e., price changes) and therefore satisfies the empirical observations in Kandel and Pearson (1995). Event-period private information is interesting because it allows for the possibility that public disclosures increase private information gathering. In other words, public disclosures may complement private information (Verrecchia, 2001, p. 172). In contrast, pre-announcement private information relates to the more traditional notion that public disclosures decrease (or substitute for) the incentives to gather private information.

KV suggests that both types of volume are observed in real market settings and that research which seeks to document the relation between trading volume and cross-sectional differences in firms’ disclosure quality must consider both. They state, “In addition to being less rich as a description of real markets, models based exclusively on one type of information yield incomplete implications involving price change and volume relations” (KV, 396). Our measures of pre-announcement private information (i.e., trading volume associated with prices changes) and event-period private information (i.e., trading volume not associated with price changes) come directly from their model:

\[
\text{VOL}_{i,q} = \alpha_0 + \beta_0 \text{ABSRET}_{i,q} + \epsilon_{i,q} \tag{1}
\]

10 The intuition for differential precision leading to a positive relation between volume reaction and price changes comes from the notion that price changes reflect changes in investors’ average expectations. An investor who is more informed (i.e., possesses above average precision) will demand less of the firm’s shares as price increases. Likewise, a more informed investor will demand more of a firm’s shares as price decreases. As differences in the precision of private information increase, so does the change in investors’ demand for the stock, enhancing the relation between volume reaction and price changes (Kim and Verrecchia, 1997).

11 KV allows for the possibility that differences in investors’ private information regarding the error in the public signal can be gathered either prior to or in conjunction with the announcement, but the private information can be used only at the time of the announcement for it to be unrelated to price changes.

12 Several empirical studies demonstrate this hypothesized effect by showing that quarterly earnings announcements induce event-period private information (e.g. Kandel and Pearson, 1995; Krinsky and Lee, 1996; Bamber et al., 1997, 1999; Kim et al., 1997; Barron et al., 2002, 2005). Please cite this article in press as: Hope, O.-K., et al. Geographic earnings disclosure and trading volume. J. Account. Public Policy (2009), doi:10.1016/j.jaccpubpol.2009.04.001
VOL represents trading volume in a short window around an earnings announcement. $\beta_0$ measures volume related to absolute price changes (ABSRET) (i.e., pre-announcement private information), and $x_0$ measures volume unrelated to absolute price changes (i.e., event-period private information).

The impact of SFAS 131 on trading volume can be tested by including an indicator variable in Eq. (1) for the post-SFAS 131 period (POST131):

$$\text{VOL}_{i,q} = x_1 + x_2 \text{POST131}_{i,q} + \beta_1 \text{LABSRET}_{i,q} + \beta_2 \text{ABSRET}_{i,q} + \text{POST131}_{i,q} + \epsilon_{i,q}$$

$\beta_2$ measures the change in return-related volume following adoption of SFAS 131, and $x_2$ measures the change in non-price-related volume. In our sample, some firms no longer disclose geographic earnings, while others continue to disclose in the post-SFAS 131 period. We are interested in the impact of this non-disclosure on investors’ private information. To determine this, we estimate Eq. (2) for the sample of non-disclosers and the sample of disclosers. We determine the impact of non-disclosure of geographic earnings by comparing changes in pre-announcement private information ($\beta_2$) and event-period private information ($x_2$) for disclosers versus non-disclosers. In the results section, we further discuss the implications of this difference-in-differences research design.

As discussed, the above model follows directly from the KV model. As other firm-level variables have been found to affect trading volume, in our empirical tests we add a number of control variables. Note, however, that inferences are unaffected if we do not include any control variables. The full model, including control variables, is as follows:

$$\text{LAVOL}_{i,q} = x_1 + x_2 \text{POST131}_{i,q} + \beta_1 \text{LABSRET}_{i,q} + \beta_2 \text{ABSRET}_{i,q} + \beta_3 \text{LGMV}_{i,q} + \beta_4 \text{LPRC}_{i,q} + \beta_5 \text{INDSEGS}_{i,q} + \beta_6 \text{LOSS}_{i,q} + \beta_7 \text{EXCHANGE}_{i,q} + \beta_8 \text{QTRA4}_{i,q} + \beta_9 \text{RGROW}_{i,q} + \beta_{10} \text{RMB1}_{i,q} + \beta_{11} \text{TECH}_{i,q} + \beta_{12} \text{LAMVOL}_{i,q} + \epsilon_{i,q}$$

Empirically, we modify equation (2) by including log-transformations of abnormal volume (LAVOL) and absolute return (LABSRET) in equation (3). Abnormal volume (as opposed to actual volume) controls for a number of firm-specific factors related to volume not captured by our control variables, and for cross-sectional differences in liquidity traders. In addition, log values help to control for the undue influence of extreme observations. LAVOL is measured as the log of mean daily volume (as a percentage of shares outstanding) for the three-day period around quarter q’s earnings announcement (day – 1 to 1) scaled by the mean daily volume (as a percentage of shares outstanding) for the 60 trading days preceding the announcement interval. LABSRET is the log of the absolute value of one plus the three-day market adjusted return around quarter q’s earnings announcement (day – 1 to 1).

We are interested in the impact of SFAS 131 on trading volume incremental to changes in other firm characteristics over this same time period. We include an extensive set of control variables that may affect trading volume:

LGMV is the log of market value two days before the earnings announcement and controls for the amount of prior information disclosure (Bamber, 1987; Atiase and Bamber, 1994).

LPRC is the log of price two days before the earnings announcement and controls for the effect of transaction costs on trading volume (Bamber et al., 1994; Utama and Cready, 1997).

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13 $\beta_1$ measures the return-related volume before adoption of SFAS 131, and $x_1$ measures non-price-related volume before adoption of SFAS 131.

14 We follow the majority of prior research by log-transforming the variables. While KV do not impose log-transformations in their model, empirical measures of abnormal trading volume tend to be highly skewed. If we instead include abnormal trading volume without log-transformation and truncate extreme observations, we obtain results very similar to those reported.

15 Landsman and Maydew (2002) show that abnormal volume reaction is increasing over time during their sample period 1972–1998. If our scalar (daily average pre-announcement trading volume) increases during our sample period (1995–2002), we could detect a decline in our abnormal volume reaction from the pre- to post-SFAS 131 period, absent any numerator effect. This does not appear to be the case. The daily average pre-announcement trading volume in the pre- (post-) SFAS 131 period is 68 (69) of shares outstanding.

16 For consistency with our measure of abnormal volume, we consider measuring abnormal returns by scaling the event-period return by the average daily absolute return during the 60 days leading up to the earnings announcement. Results are very similar to those reported.
INDSEGS is the number of reported industry segments and controls for firm complexity (Whisenant et al., 2004). By including this variable we also control for the effect that variations in the number of reported industry segments may have on volume reaction following adoption of SFAS 131.

LOSS is an indicator variable equal to one for loss firms (zero otherwise) and controls for the differential reactions that losses may induce as they are less informative about the value of the firm (Hayn, 1995).

EXCHANGE is an indicator variable equal to one if the firm is listed on NYSE or AMEX (zero otherwise) and controls for the differing average levels of volume existing between exchanges (Mittoo, 1997).

QTR4 is an indicator variable equal to one for fourth quarter observations (zero otherwise) and controls for the higher volume reaction typically found with the announcement of fourth quarter earnings (Landsman and Maydew, 2002).

We control for growth in three ways. RGROW is the decile rank of the seasonal change in quarterly sales. RMB is the decile rank of the quarter ending market-to-book ratio. TECH is an indicator variable for high technology industries. TECH equals one for firms with a two-digit SIC code equal to 35, 36, 38, 48, or 73 (Anderson and Reeb, 2003).

LAMVOL is abnormal market volume during the announcement period and controls for macroeconomic events that may coincide with quarterly earnings announcements (Atiase and Bamber, 1994). LAMVOL is computed the same way as LAVOL but at the market level.17

While Eq. (3) includes numerous control variables, we explicitly concede that conclusions are subject to the usual omitted variable bias (as the $R^2$ of our model does not equal one). In other words, the change in volume reaction around implementation of SFAS 131 may be the result of some “other” factor (e.g., implementation of Regulation FD, decimalization of stock prices, changing market sentiment, etc.) rather than non-disclosure of geographic earnings per se. Since we do not include this “other” factor in the model, we may have only the appearance of a non-disclosure effect. For this reason, we also estimate Eq. (3) for a group of firms that continue to report geographic earnings. For these firms, our model captures any change in volume reaction around SFAS 131 not attributable to non-disclosure of geographic earnings. Thus, this group serves as a benchmark with which to judge the results observed for non-disclosers. If non-disclosure of geographic earnings does, in fact, affect volume reaction, then we expect volume reaction to differ between firms that no longer disclose geographic earnings firms that continue to disclose. Thus, an important advantage of our research setting is the ability to compare results during the same time period for firms that continue to disclose geographic earnings to those that no longer disclose (i.e., difference-in-differences test). Being able to make this comparison allows for an implicit control of a number of unobservable factors.

3. Data and sample

To test the impact of non-disclosure of geographic earnings under SFAS 131, we must correctly identify the pre- and post-SFAS 131 periods. SFAS 131 became effective for periods ending after December 15, 1998. We begin the post period with the first earnings announcement date following the initial implementation of SFAS 131. This ensures that SFAS 131 disclosures are publicly available in the most recent annual report and can impact volume reactions to subsequent quarterly earnings announcements. As in Ettredge et al. (2005), the post-SFAS 131 period is defined as the three-year period subsequent to the year of initial implementation, which includes firms with year ends from December 1999 to November 2002 (i.e., each firm will have a maximum of twelve quarterly observations).18

The pre-SFAS 131 period is a three-year period prior to implementation of SFAS 131, which includes firms with year ends from December 1995 to November 1998. Quarterly observations for

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17 As an alternative specification, we compute AVOL after subtracting abnormal market volume (AMVOL). Inferences are unaffected with this alternative specification.

18 For example, a firm with a December year-end would first implement SFAS 131 in its 1998 annual report. These disclosures would be made publicly available before March 31, 1999. post-SFAS 131 period would include earnings announcements from the first quarter of 1999 (i.e., after March 31, 1999) through the fourth quarter of 2001.
the pre-SFAS 131 period include March 1995 (i.e., the first quarter for December 1995 year end firms) to November 1998. Fiscal year ends (and their quarters) between December 1998 and November 1999 are excluded from our analysis, as this is the year following possible early adoption of SFAS 131.\textsuperscript{19}

The criteria for the determination of the final sample are presented in Table 1. All segment and financial data are gathered from Compustat, while volume and return data are generated from CRSP. The initial sample of 7,844 firm-year observations includes all firms that disclose geographic sales for at least one year in both the pre-SFAS 131 period and post-SFAS 131 period. All firms disclose geographic earnings in the pre-SFAS 131 period. This enables the effects of discontinuing disclosure to be measured. Next, we eliminate 484 observations that fail to either disclose or not disclose geographic earnings in a consistent manner in the post-SFAS 131 period. Consistent disclosure of geographic earnings is achieved if they provide earnings for at least two foreign geographic segments in each of the post-SFAS 131 period years.\textsuperscript{20} This criterion is used as it is not clear whether firms that disclose geographic earnings in one year of the post-SFAS 131 period and do not in another year of the post-SFAS 131 period should be labeled as disclosers or non-disclosers.\textsuperscript{21} Finally, we require that all sample firms have significant foreign operations, defined as foreign sales greater than or equal to ten percent of total sales. This group is the most likely to be affected by non-disclosure of geographic earnings.\textsuperscript{22} This results in a maximum final sample of 6083 firm-year observations (or 24,332 firm-quarter observations). Requiring observations to have volume and return data from CRSP and financial data from Compustat reduces the sample to 20,727 quarterly observations for 1041 distinct firms.\textsuperscript{23}

Mean amounts of variables used in the tests are reported in Table 2. The post-SFAS 131 period includes 10,269 firm-quarter observations (49.5\% of the total sample). Of these, 7,847 firm-quarter observations (76.4\% of the post-SFAS 131 sample) do not disclose geographic earnings. For firms that no longer disclose geographic earnings, abnormal trading volume (LAVOL) is significantly lower in the post-SFAS 131 period than in the pre-SFAS 131 period. In contrast, those firms that continue to disclose geographic earnings do not experience a significant decline in LAVOL.\textsuperscript{24} In fact, disclosers have a slight increase in volume reaction in the post-SFAS 131 period. At this point, we do not make conclusions regarding the impact of non-disclosure of geographic earnings on trading volume, as these univariate results do not control for trading volume related to absolute price changes (pre-announcement private information) or other firm variables expected to relate to trading volume. Also, note that in the pre-SFAS 131 period eventual non-disclosers seem to have higher abnormal volume than do disclosers, even though both are disclosing geographic earnings. However, as we demonstrate with our multivariate regression model, the difference in abnormal trading volume between disclosers and non-disclosers in the pre-SFAS 131 period is not significant, controlling for other factors.

Table 2 also shows that announcement period absolute returns (LABSRET) increase for both groups after adoption of SFAS 131. Kim and Verrecchia (1991) suggest that the magnitude of absolute return reflects the amount or quality of public information in the earnings announcement. Our results are consistent with the principal objective of SFAS 131 – to increase the production of public information.

\textsuperscript{19} We purposely limit our sample to three-year periods before and after implementation of SFAS 131. While expanding the number of years increases the sample size and statistical power, a longer test window allows for more extraneous events to occur, potentially limiting our ability to isolate the impact of SFAS 131. We choose three years as a reasonable tradeoff between statistical power and ability to make cause-and-effect inferences. This is consistent with Ettredge et al. (2005), who also use three-year windows before and after SFAS 131.

\textsuperscript{20} The requirement of two foreign geographic segments being disclosed ensures that all foreign earnings are not included in a single “Total Foreign” segment. Firms are required by SEC Regulation §210.4-08(h) to disclose domestic and foreign pretax income and domestic and foreign tax expense. To be useful, geographic segment disclosure would need to provide a less aggregated set of information.

\textsuperscript{21} Including these observations in the discloser group or the non-discloser group has no material effect on the results.

\textsuperscript{22} The ten percent criterion is consistent with the ten percent criterion established by SFAS 14 whereby firms are not required to disclose geographic segment information unless foreign sales or foreign assets comprise at least ten percent of consolidated amounts. Results are not sensitive to this criterion. We also considered dropping this criterion and keeping all observations or requiring foreign sales to be at least 20\% of total sales. Results are similar to those reported and none of the conclusions changes.

\textsuperscript{23} As a sensitivity analysis we run tests with annual (i.e., fourth quarter) earnings announcements only. All results are consistent with those reported in the paper.

\textsuperscript{24} Similar results obtain when observing median values of abnormal volume. To control for the potential effect of outliers, we perform additional analyses after eliminating the top and bottom percentiles of abnormal trading volume or using the rank of abnormal trading volume as the dependent variable. All conclusions remain.

However, one caveat should be made when interpreting these results. Several papers document an increase in daily return volatility over time, and this is true for our sample for the pre-announcement period as well.\textsuperscript{25} Thus, the increase in return reaction noted in Table 2 could be a manifestation of changes over time rather than to SFAS 131 per se. Since our primary tests rely on the relation between volume reaction and return reaction during the earnings announcement, we leave this issue for future research. The remainder of Table 2 provides descriptive statistics for our control variables and the variables used to partition firms based on the likely informativeness of geographic earnings disclosures.

4. Results

4.1. Primary tests

Regression results of our main tests are presented in Table 3. All models employ Huber/White standard errors that adjust for clustering at the firm level. The first column provides results of equation (3) for firms that do not disclose geographic earnings following SFAS 131, while the second column provides results for firms that continue to disclose. The differences between the two groups are shown in column three.

The first result worth noting is that the intercepts for both disclosers and non-disclosers are significantly negative at the one percent level, but the difference in intercepts is not significant. Recall from the descriptive statistics reported in Table 2 that the difference in volume reaction between disclosers and non-disclosers is greater in the pre-SFAS 131 period (i.e., when both groups of firms were disclosing geographic earnings). This suggests that eventual non-disclosers were somehow different than continual disclosers. However, once we control for firm-specific variables expected to affect volume reaction to quarterly earnings announcements, the intercepts (i.e., the precision of event-period private information in the pre-SFAS 131 period) of both groups are not significantly different. Similarly, we note that the LABSRET coefficients are not significantly different for disclosers and non-disclosers. This suggests that the difference in precision of pre-announcement private information is approximately equal for the two groups in the pre-SFAS 131 period.

We now turn to our tests of changes in pre-announcement private information and event-period private information following adoption of SFAS 131. For pre-announcement private information, we examine the coefficients on LABSRET*POST131. For both non-disclosers and disclosers, the coefficient is

\textsuperscript{25} Specifically, in the 60-day pre-announcement period, the absolute value of the log of one plus the daily raw return of disclosers increases from 0.0225 to 0.0300 in the pre versus post period. Similarly, for non-disclosers the increase is from 0.0207 to 0.0282. Both increases are significant.
Table 2
Descriptive statistics and sample sizes.

<table>
<thead>
<tr>
<th>Variables and sample size</th>
<th>Firms that disclose geographic earnings in the post-SFAS 131 period</th>
<th>Firms that do not disclose geographic earnings in the post-SFAS 131 period</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All</td>
<td>Pre 131</td>
</tr>
<tr>
<td>Firm/quarters</td>
<td>20,727</td>
<td>2437</td>
</tr>
<tr>
<td>LAVOL (mean)</td>
<td>0.177</td>
<td>0.101</td>
</tr>
<tr>
<td>LABSRET</td>
<td>0.058</td>
<td>0.053</td>
</tr>
<tr>
<td>Control variables (means)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LGMV</td>
<td>20.156</td>
<td>19.816</td>
</tr>
<tr>
<td>LPRC</td>
<td>2.881</td>
<td>2.881</td>
</tr>
<tr>
<td>INDSSEGS</td>
<td>2.130</td>
<td>1.495</td>
</tr>
<tr>
<td>LOSS</td>
<td>0.211</td>
<td>0.166</td>
</tr>
<tr>
<td>EXCHANGE</td>
<td>0.550</td>
<td>0.472</td>
</tr>
<tr>
<td>QTR4</td>
<td>0.251</td>
<td>0.257</td>
</tr>
<tr>
<td>RMB</td>
<td>4.500</td>
<td>4.758</td>
</tr>
<tr>
<td>TECH</td>
<td>0.505</td>
<td>0.480</td>
</tr>
<tr>
<td>AMVOL</td>
<td>0.049</td>
<td>0.042</td>
</tr>
<tr>
<td>Partitioning variables (medians)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ΔGEOSEG</td>
<td>0.333</td>
<td></td>
</tr>
<tr>
<td>[%ΔForSALES]</td>
<td>0.458</td>
<td></td>
</tr>
<tr>
<td>[ForPM-DomPM]</td>
<td>0.083</td>
<td></td>
</tr>
<tr>
<td>POST_For%</td>
<td>0.369</td>
<td></td>
</tr>
<tr>
<td>ΔINDSEG</td>
<td>1.000</td>
<td></td>
</tr>
</tbody>
</table>

* LAVOL is abnormal trading volume, measured as the log of mean daily volume (as a percentage of shares outstanding) for the three-day period around quarter q's earnings announcement (day – 1 to 1) scaled by the mean daily volume for the 60 trading days preceding the announcement interval. LABSRET is the absolute value of the log of one plus the three-day market adjusted return around quarter q's earnings announcement (day – 1 to 1). LGMV is the log of market value two days before the earnings announcement. LPRC is the log of price two days before the earnings announcement. INDSSEGS is the number industry segments reported by the firm. LOSS is an indicator variable equal to 1 (0 otherwise) if actual quarterly earnings is less than zero. LAMVOL is abnormal market volume measured the same way as LAVOL at the market level. EXCHANGE is an indicator variable equal to 1 for firms listed on the NYSE or AMEX (0 otherwise). QTR4 is an indicator variable equal to 1 (0 otherwise) if the firm-quarter observation is the fourth quarter of the fiscal year. RGROW is the decile rank (from 0 to 9 scaled by 9) of the seasonal change in quarterly sales. RMB is the decile rank (from 0 to 9 scaled by 9) of the quarter ending market-to-book ratio. TECH = 1 for firms with a two-digit SIC code equal to 35, 36, 38, 48, or 73. LAMVOL is computed the same way as LAVOL but at the market level. ΔGEOSEG is the average number of reported geographic segments in all post years minus the average number in all pre years. [%ΔForSALES] is the absolute value of the ratio of average foreign sales in all post years to average foreign sales in all pre years, minus one. [ForPM-DomPM] is average foreign profit margin in all post years minus average domestic profit margin in all post years. POST_For% is the average ratio of foreign sales to total sales in all post years. ΔINDSEG is the average number of reported industry segments in all post years minus the average number in all pre years.

** The mean for the pre-SFAS 131 period is significantly different at the 5% and 1% level (two-tailed test), respectively, from the mean for the post-SFAS 131 period.
negative and significant at the one percent level. This result can be interpreted two ways. First, it could imply a decrease in the production of private information, which is consistent with investors’ reduced dependence on private information given the improvement in public disclosures with SFAS 131. Second, the negative coefficient could also indicate reduced differential precision of pre-announcement private information among investors, which is also consistent with improved public disclosures. Because the coefficients are approximately equal across the two groups, we cannot conclude that the reduction in pre-announcement private information is related to non-disclosure of geographic earnings. We can conclude that the results are consistent with improvements in overall disclosures under SFAS 131 reducing pre-announcement private information. However, because all firms adopt SFAS 131 at the same point in time, it is difficult to control for “other” factors that may be changing over this same period of time. This limits our ability to make stronger inferences regarding the overall effects of SFAS 131. Nevertheless, we note that results for LABSRET*POST131 are consistent with SFAS 131 reducing differences in investors’ private beliefs in anticipation of the earnings announcements.

For event-period private information, we do detect an effect of non-disclosure of geographic earnings. The POST131 coefficient is significantly negative for non-disclosers, but is positive and insignificant for disclosers. These results are consistent with non-disclosure of geographic earnings making it more difficult for investors to gather private information regarding the error with which announced quarterly earnings reflects true firm value. In other words, less public disclosure reduces the generation of event-period private information in the small window around the earnings announcement.

While academic research has not traditionally considered this complementary relation between the quality of public disclosures and the generation of private information, an emerging line of research is beginning to provide evidence of its existence (Bailey et al., 2003, 2007; Byard and Shaw, 2003; Lim and Kwok, 2003).26 In different contexts, these studies show that greater disclosure prior to the quarterly

### Table 3
Impact of SFAS 131 on volume reaction to quarterly earnings announcements.*

<table>
<thead>
<tr>
<th>Variables</th>
<th>Non-disclosers</th>
<th>Disclosers</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>−0.699 (−6.75)**</td>
<td>−0.857 (−4.48)**</td>
<td>0.158 (0.73)</td>
</tr>
<tr>
<td>POST131</td>
<td>−0.034 (−1.17)**</td>
<td>0.048 (1.33)</td>
<td>−0.082 (−2.01)**</td>
</tr>
<tr>
<td>LABSRET</td>
<td>6.109 (24.98)**</td>
<td>5.512 (13.17)**</td>
<td>0.597 (1.23)</td>
</tr>
<tr>
<td>LABSRET*POST131</td>
<td>−1.569 (−5.67)**</td>
<td>−1.096 (−2.43)**</td>
<td>−0.473 (−0.89)</td>
</tr>
<tr>
<td>LGMV</td>
<td>0.013 (2.08)**</td>
<td>0.015 (1.24)</td>
<td>−0.002 (−0.18)</td>
</tr>
<tr>
<td>LGPRC</td>
<td>0.060 (4.88)**</td>
<td>0.031 (1.19)</td>
<td>0.029 (1.00)</td>
</tr>
<tr>
<td>INDSEG5</td>
<td>0.001 (0.10)</td>
<td>0.007 (0.53)</td>
<td>−0.006 (−0.45)</td>
</tr>
<tr>
<td>LOSS</td>
<td>−0.133 (−7.01)**</td>
<td>−0.160 (−3.89)</td>
<td>0.027 (0.61)</td>
</tr>
<tr>
<td>EXCHANGE</td>
<td>0.077 (3.78)**</td>
<td>0.046 (1.23)</td>
<td>0.031 (0.71)</td>
</tr>
<tr>
<td>QTR4</td>
<td>0.119 (9.51)**</td>
<td>0.081 (3.56)**</td>
<td>0.038 (1.44)</td>
</tr>
<tr>
<td>RGROW</td>
<td>0.072 (3.27)**</td>
<td>0.082 (1.85)</td>
<td>−0.010 (−0.21)</td>
</tr>
<tr>
<td>RMB</td>
<td>0.118 (3.92)**</td>
<td>0.374 (5.61)**</td>
<td>−0.256 (−3.51)**</td>
</tr>
<tr>
<td>TECH</td>
<td>0.009 (0.53)</td>
<td>−0.028 (−0.82)</td>
<td>0.037 (0.97)</td>
</tr>
<tr>
<td>LAMVOL</td>
<td>0.591 (12.61)</td>
<td>0.656 (4.97)**</td>
<td>−0.065 (−0.47)</td>
</tr>
<tr>
<td>Adj. $R^2$</td>
<td>0.193</td>
<td>0.189</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>15,868</td>
<td>4859</td>
<td></td>
</tr>
</tbody>
</table>

---

* Results are provided using firm-quarter observations over the entire test period to estimate Eq. (3). Separate regressions are provided for firms that no longer disclose (non-disclosers) and those that continue to disclose (disclosers) geographic earnings in the post-SFAS 131 period. The pre-SFAS 131 period includes all quarterly observations of firms with year ends from December 1995 to November 1998. The post-SFAS 131 period includes all quarterly observations of firms with year ends from December 1999 to November 2002. The $t$-statistics are reported in parentheses and based on Huber/White standard errors that adjust for clustering at the firm level.

POST131 is an indicator variable equal to 1 (0 otherwise) for the post-SFAS 131 period. See Table 2 for definitions of the dependent (LAVOL) and independent variables.

The significance of the difference in coefficients is tested using a $t$-test of differences in coefficients.

Significance at the 5%, 1% level (one-tailed), respectively.

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26 For example, using the AIMR disclosure scores, Byard and Shaw (2003) find that the extent to which quarterly earnings announcements induce idiosyncratic beliefs among analysts relates positively to the quality of annual and quarterly accounting-related disclosures, publicly available to all investors. In other words, quarterly earnings are more informative (i.e., generate greater private information) when the firm has higher-quality public disclosures.
earnings announcement increases either the average amount or differential precision of event-period private information. This is precisely the idea put forth by KV. Investors do not process announced earnings identically. For example, some investors become more informed than others about the extent to which announced earnings reflect firm value with error. The extent of differential processing of announced earnings relates directly to the quality of the firm’s disclosures prior to the announcement. Our finding that non-disclosure of geographic earnings in the annual report reduces the event-period private information in subsequent quarterly earnings announcement is consistent with this line of research.

4.2. Subsample tests

While tests for the full sample of disclosers and non-disclosers provide initial results, we expect that if our conclusions are correct, then results should be more apparent for certain types of firms. In particular, for firms whose geographic earnings are expected to be more informative to investors’ decisions to transact, we should observe more of an impact on investors’ information set from non-disclosure. Finding a more pronounced effect when the effect is more likely to occur provides additional comfort about our overall conclusions. Alternatively, if we find equal effects across subsamples, then it is likely that any conclusions related to non-disclosure of geographic earnings merely represent some other correlated construct. Therefore, we make cross-sectional predictions as to which firms will be most affected by non-disclosure.

We use four variables expected to relate to the informativeness of geographic earnings disclosures. First, we use the change in number of geographic segments disclosed following SFAS 131. SFAS 131 not only impacts the disclosure of geographic earnings, but also the number of reportable segments. Now, firms are required to disclose geographic segments based on material countries. For countries that are not material, their operations can be aggregated in an “Other Foreign” segment. Therefore, some firms that previously defined geographic segments based on broad regions may have only a single foreign segment, as no individual country is considered material. For other companies, the number of geographic segments may have increased because of the reporting of several material countries. In addition, as a practical matter, many firms continue to report similar broad geographic regions under SFAS 131 as they did under SFAS 14. Therefore, while SFAS 131 reduces the amount of information by allowing for non-disclosure of geographic earnings, the total amount of information may have actually increased because of the greater disaggregation for geographic sales and assets. Thus, non-disclosure of geographic earnings is more likely to represent a loss of public information for firms that did not increase their number of reported geographic segments. For firms that increase their number of reported geographic segments, it is less clear whether reporting sales and assets for more geographic segments offsets the loss of public information from non-disclosure of geographic earnings.

Our next three measures of the likely informativeness of geographic earnings disclosures relate directly to the foreign operations of the firm. The first is the variability of foreign sales. For firms that have large absolute changes in foreign sales from the pre- to post-SFAS 131 period, disclosure of geographic earnings is likely to be more important in understanding announced earnings and firm value. The greater uncertainty surrounding volatile foreign operations necessitates the use of additional information, such as geographic earnings.

Our next measure is the absolute difference between the foreign and domestic profit margins in the post-SFAS 131 period. Disclosure of geographic earnings is informative only to the extent that profit margins vary by geographic area. If profit margins are relatively constant across the world, then geographic earnings can be inferred using required disclosures of geographic sales. Since

27 A key assumption of trading related to event-period private information is that (some) investors believe that quarterly earnings measure firm value with error. Given the low $R^2$ in returns/earnings regression, this assumption is not difficult to accept.

28 For example, in the year prior to implementation of SFAS 131, Proctor & Gamble disclosed four foreign geographic segments: (1) Africa/Middle East/Europe, (2) Asia, (3) South America/Mexico, and (4) International. Subsequent to adoption, Proctor & Gamble now reports only a single foreign segment (International), even though approximately 50% of its sales are from foreign sources.

29 For example, in the year prior to implementation of SFAS 131, Corning Inc. disclosed three foreign geographic segments: (1) Asia/Japan/Pacific, (2) Europe/Great Britain/Canada, and (3) South America/Mexico/Other Foreign. In the year of adoption, Corning Inc. reported eleven foreign geographic segments: (1) Germany, (2) France, (3) Brazil, (4) Mexico, (5) Japan, (6) China, (7) Korea, (8) other Europe, (9) other Latin America, (10) other Asia Pacific, and (11) All other.

geographic earnings are not disclosed for most firms in the post-SFAS 131 period, we are able to compare profit margins only for domestic operations and aggregate foreign operations using earnings data required by SEC Regulation §210.4-08(h). Firms that have large differences in domestic and foreign profit margins are more likely to have greater variability in profit margins across geographic areas.  

Our final measure is the percentage of foreign sales in the post-SFAS 131 period. The more multinational the firm, the more material is information related to geographic earnings. For firms that have a small percentage of their operations outside the US, non-disclosure of geographic earnings is unlikely to impact total volume reaction of the firm.

In summary, we predict that the loss of useful public information from non-disclosure of geographic will be greater for firms that: (1) do not increase their number of reported geographic segments following adoption of SFAS 131, (2) have a large absolute percentage change in foreign sales from the pre- to post-SFAS 131 period, (3) have a large difference between foreign and domestic profit margins in the post-SFAS 131 period, or (4) have a large percentage of foreign sales in the post-SFAS 131 period.

Results for subsamples are reported in Table 4. We first provide results for the subset of firms that do (do not) increase their number of reported geographic segments after implementation of SFAS 131 (Panel A). For firms that do not increase the number of reported geographic segments, the difference in the POST131 coefficients between disclosers and non-disclosers is significantly negative, while the difference in the LABSRET*POST131 coefficients is not significantly different. These results are consistent with what we find for the full sample; non-disclosure of geographic earnings reduces event-period private information but has no effect on pre-announcement private information.

For firms that increase the number of reported geographic segments, the difference in the POST131 coefficients and the difference in the LABSRET*POST131 coefficients between disclosers and non-disclosers are not significant. As such, it is possible that the offsetting effect of increased geographic segment disaggregation of sales and long-lived assets negates the effects of non-disclosure of geographic earnings. Taken together, the results in Panel A demonstrate that non-disclosure of geographic earnings is more likely to affect investors when geographic earnings are likely to be more important in understanding the error with which announced quarterly earnings reflect true firm value (i.e., event-period private information).

Results in Panels B–D of Table 4 provide similar conclusions. Firms with a large absolute percentage change in foreign sales from the pre- to post-SFAS 131 period (Panel B), firms with a large difference in domestic and foreign profit margins in the post-SFAS 131 period (Panel C), and firms with a large percentage of foreign sales in the post-SFAS 131 period (Panel D) provide evidence that non-disclosure of geographic earnings significantly reduces event-period private information. For the other firms, we find no evidence that non-disclosure of geographic earnings affects event-period private information. Finding significant results for the expected subsamples further reduces concerns that differences in the change in event-period private information between disclosers and non-disclosers are simply driven by omitted variables.

4.3. Sensitivity analyses

4.3.1. Samples matched on time period, market capitalization, and industry membership

In this section, we employ a matched-sample design. We match disclosers and non-disclosers based on time period, market capitalization, and industry membership. Thus, we attempt to include firms that may have similar incentives for disclosing or not disclosing geographic earnings.  

First, it is possible that the frequency of disclosers versus non-disclosers is not...
Table 4
Impact of SFAS 131 on volume reaction to quarterly earnings announcements for firms split on variables related to the likely importance of geographic earnings disclosures.*

\[
\text{LAVOL}_{it} = \alpha_t + \beta_1 \text{POST131}_{it} + \beta_2 \text{LABSRET}_{it} + \beta_3 \text{LABSRET}_{it} \times \text{POST131}_{it} + \beta_4 \text{LGMV}_{it} + \beta_5 \text{LGPRC}_{it} + \beta_6 \text{INDSEGS}_{it} \\
+ \beta_7 \text{LOSS}_{it} + \beta_8 \text{EXCHANGE}_{it} + \beta_9 \text{QTR4}_{it} + \beta_9 \text{RGROW}_{it} + \beta_{10} \text{RMB}_{it} + \beta_{11} \text{TECH}_{it} + \beta_{12} \text{LAMVOL}_{it} + \epsilon_{it}.
\]

Panel A: change in the number of reported geographic segments

<table>
<thead>
<tr>
<th></th>
<th>AGEOSEGS ≤ 0</th>
<th></th>
<th>AGEOSEGS &gt; 0</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non-disclosers</td>
<td>Disclosers</td>
<td>Difference</td>
<td>Non-disclosers</td>
</tr>
<tr>
<td>Intercept</td>
<td>−0.763</td>
<td>−1.146</td>
<td>0.383</td>
<td>−0.601</td>
</tr>
<tr>
<td>POST131**</td>
<td>(−5.71)**</td>
<td>(−3.80)**</td>
<td>(1.17)</td>
<td>(−3.67)**</td>
</tr>
<tr>
<td>LABSRET</td>
<td>6.123</td>
<td>4.683</td>
<td>1.440</td>
<td>6.110</td>
</tr>
<tr>
<td>POST131</td>
<td>−1.214</td>
<td>−0.925</td>
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<td>−1.907</td>
</tr>
<tr>
<td>CONTRS</td>
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<td></td>
<td>Yes</td>
</tr>
<tr>
<td>N</td>
<td>8440</td>
<td>2317</td>
<td></td>
<td>7428</td>
</tr>
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</table>

Panel B: absolute percentage change in foreign sales

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non-disclosers</td>
<td>Disclosers</td>
<td>Difference</td>
<td>Non-disclosers</td>
</tr>
<tr>
<td>Intercept</td>
<td>−0.705</td>
<td>−0.616</td>
<td>−0.089</td>
<td>−0.705</td>
</tr>
<tr>
<td>POST131</td>
<td>(−4.97)**</td>
<td>(−1.78)**</td>
<td>(−0.24)</td>
<td>(−4.69)**</td>
</tr>
<tr>
<td>LABSRET</td>
<td>(−0.06)</td>
<td>0.179</td>
<td>−0.185</td>
<td>(−0.064)</td>
</tr>
<tr>
<td>POST131</td>
<td>(−0.22)</td>
<td>(2.91)**</td>
<td>(−2.74)**</td>
<td>(−2.47)**</td>
</tr>
<tr>
<td>LABSRET*POST131</td>
<td>5.907</td>
<td>5.058</td>
<td>0.849</td>
<td>6.395</td>
</tr>
<tr>
<td>CONTRS</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>N</td>
<td>8228</td>
<td>2119</td>
<td></td>
<td>7640</td>
</tr>
</tbody>
</table>

Panel C: average absolute difference between foreign profit margin and domestic profit margin in the post-SFAS 131 period

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non-disclosers</td>
<td>Disclosers</td>
<td>Difference</td>
<td>Non-disclosers</td>
</tr>
<tr>
<td>Intercept</td>
<td>−0.680</td>
<td>−0.699</td>
<td>0.019</td>
<td>−0.654</td>
</tr>
<tr>
<td>POST131</td>
<td>(−4.65)**</td>
<td>(−2.53)**</td>
<td>(0.06)</td>
<td>(−3.80)**</td>
</tr>
<tr>
<td>LABSRET</td>
<td>(−0.042)</td>
<td>0.081</td>
<td>−0.123</td>
<td>(−0.038)</td>
</tr>
<tr>
<td>POST131</td>
<td>(−1.44)</td>
<td>(1.69)**</td>
<td>(−2.20)**</td>
<td>(−1.30)</td>
</tr>
<tr>
<td>LABSRET*POST131</td>
<td>5.755</td>
<td>5.249</td>
<td>0.506</td>
<td>7.279</td>
</tr>
<tr>
<td>CONTRS</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>N</td>
<td>6250</td>
<td>2056</td>
<td></td>
<td>6617</td>
</tr>
</tbody>
</table>

Panel D: percentage of foreign sales in the post-SFAS 131 period

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non-disclosers</td>
<td>Disclosers</td>
<td>Difference</td>
<td>Non-disclosers</td>
</tr>
<tr>
<td>Intercept</td>
<td>−0.639</td>
<td>−0.731</td>
<td>0.092</td>
<td>−0.763</td>
</tr>
<tr>
<td>POST131</td>
<td>(−4.28)**</td>
<td>(−2.48)**</td>
<td>(0.28)</td>
<td>(−5.16)**</td>
</tr>
<tr>
<td>LABSRET</td>
<td>(−0.034)</td>
<td>0.086</td>
<td>−0.120</td>
<td>(−0.032)</td>
</tr>
<tr>
<td>POST131</td>
<td>(−1.21)</td>
<td>(1.72)**</td>
<td>(−2.09)**</td>
<td>(−1.19)</td>
</tr>
<tr>
<td>LABSRET*POST131</td>
<td>5.826</td>
<td>5.408</td>
<td>0.418</td>
<td>6.464</td>
</tr>
<tr>
<td>CONTRS</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>N</td>
<td>7843</td>
<td>2518</td>
<td></td>
<td>8025</td>
</tr>
</tbody>
</table>

consistent across quarters. This would affect conclusions if abnormal trading volume varies across quarters (Landsman and Maydew, 2002). Second, the descriptive statistics reported in Table 2 show that average firm size is slightly smaller for disclosers than for non-disclosers. Although we include market capitalization as a control variable, we consider that a matched-sample design may better capture the impact of size-related factors. Third, Eq. (3) only partially controls for industry affiliation. Disclosers versus non-disclosers may cluster into certain industries, and these industries may have factors related to higher or lower abnormal trading volume around earnings announcements. Fourth, beyond the variables used to match samples, the matching procedure itself introduces an additional and potentially important control. That is, a one-to-one matching of disclosers and non-disclosers ensures that any differences in significance between the two samples are not attributable to statistical power. The number of non-disclosers equals the number of disclosers after matching.

Our matching procedure entails the following. In each three-month interval during our test period, we rank all sample firms (disclosers and non-disclosers) into market capitalization quartiles within each two-digit SIC code. We then match each discloser to a non-discloser in the same three-month interval, size quartile, and industry.

Results are reported in Table 5. The number of disclosers decreases from 4859 to 4004, as a matching non-discloser could not be identified for all disclosers. The sample size for non-disclosers reduces from 15,868 to 4004. The results are similar to those reported for the full sample in Table 3. The difference in POST131 coefficients between disclosers and non-disclosers is significantly negative, indicating that non-disclosure reduces event-period private information. Thus, differences in time period, market capitalization, and industry affiliation (and other control variables) cannot explain the differential decline in volume reaction following implementation of SFAS 131. Furthermore, the LABS-RET POST131 coefficients continue to be insignificantly different between disclosers and non-disclosers.

4.4. Changes in firm-specific averages

We also test for information effects using a model that includes changes in firm-specific averages.

\[
\Delta \text{LAVOL}_i = \beta_0 + \beta_1 \Delta \text{LABSRET}_i + \beta_2 \Delta \text{LGMOV}_i + \beta_3 \Delta \text{LGPRC}_i + \beta_4 \Delta \text{GEOSEGS}_i + \beta_5 \Delta \text{LOSS}_i \\
+ \beta_6 \Delta \text{RGROW}_i + \beta_7 \Delta \text{ARMB}_i + \beta_8 \Delta \text{LGPRC}_i + \varepsilon_i
\]  

(4)

Approximately 4.2% of our sample observations come from two-digit industries where either all firms disclose or all firms do not disclose geographic earnings. Other than that, the proportion of disclosers to non-disclosers across industries shows some variation. For example, for all two-digit industries with at least 500 observations (a total of eight, making up approximately 68% of the overall sample), the ratio of disclosers to non-disclosers ranges from a low of 17.4% (Chemicals) to a high of 68.6% (Oil and Gas Extraction), with a standard deviation of 16.8%.

The intercept (\(b\)) is defined as firm \(i\)'s average abnormal volume reaction in the post-SFAS 131 period minus firm \(i\)'s average abnormal volume reaction in the pre-SFAS 131 period. The independent variables are also defined as firm \(i\)'s average in the post-SFAS 131 period minus firm \(i\)'s average in the pre-SFAS 131 period. The intercept (\(b_0\)) can be interpreted as the average change in abnormal volume reaction surrounding adoption of SFAS 131 that cannot be explained by other variables. Note that POST, EXCHANGE, and TECH are excluded from the model as these variables have a value of zero for all firms with year ends from December 1995 to November 1998. The post-SFAS 131 period includes all quarterly observations of firms with year ends from December 1999 to November 2002. For each two-digit SIC code, all sample firms are ranked into size quartiles for each quarter of the sample period. Disclosing firms are matched with non-disclosing firms in the same quarter, size quartile, and industry membership. The t-statistics are reported in parentheses and based on Huber/White standard errors that adjust for clustering at the firm level.

The advantage of using changes in firm-specific means is that each firm contributes only one observation to the model. This eliminates any dependence in the residuals that may occur when including multiple quarters for each firm, as in Eq. (3). The disadvantage of using firm-specific means is the reduced sample size. The number of observations declines by about 95% compared to the number of firm-quarter observations used in Eq. (1). The reduced sample size may reduce the power of our tests, making Eq. (4)'s results quite conservative. However, the loss in power may be partially offset by the reduced measurement error of averaging values over time.

In Table 6 the intercept for non-disclosures is negative (−0.091) and significant at the one percent level. This suggests that the average volume reaction to quarterly earnings has declined substantially after adoption of SFAS 131 for firms that no longer disclose geographic earnings. For disclosers, the change is positive (0.049) and not significant. The difference between disclosers and non-disclosers is significant at the five percent level. Thus, results using changes in firm-specific averages provide similar conclusions to those of Eq. (3) in Table 3.33

### Table 5
Impact of SFAS 131 on volume reaction to quarterly earnings announcements for samples matched on time period, market capitalization, and two-digit SIC code\(^a,b\).

<table>
<thead>
<tr>
<th></th>
<th>Non-disclosers</th>
<th>Disclosers</th>
<th>Difference(^c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>−0.550 (−3.05)(^**)</td>
<td>−0.929 (−3.92)(^**)</td>
<td>0.379 (1.27)</td>
</tr>
<tr>
<td>POST</td>
<td>−0.054 (−1.53)</td>
<td>0.053 (1.25)</td>
<td>−0.107 (−1.94)(^*)</td>
</tr>
<tr>
<td>LABSRET</td>
<td>5.678 (15.24)(^**)</td>
<td>5.426 (11.89)(^**)</td>
<td>0.252 (0.43)</td>
</tr>
<tr>
<td>LABSRET(^POST)</td>
<td>−1.147 (−2.60)(^**)</td>
<td>−1.128 (−2.27)</td>
<td>−0.019 (−0.03)</td>
</tr>
<tr>
<td>LGMV</td>
<td>0.003 (0.27)</td>
<td>0.016 (1.02)</td>
<td>−0.013 (−0.68)</td>
</tr>
<tr>
<td>LGPRC</td>
<td>0.056 (2.65)(^**)</td>
<td>0.042 (1.43)</td>
<td>0.013 (0.37)</td>
</tr>
<tr>
<td>INDEGES</td>
<td>0.013 (1.07)</td>
<td>0.023 (1.59)</td>
<td>−0.010 (−0.57)</td>
</tr>
<tr>
<td>LOSS</td>
<td>−0.137 (−4.15)(^**)</td>
<td>−0.154 (−3.47)(^**)</td>
<td>0.017 (0.29)</td>
</tr>
<tr>
<td>EXCHANGE</td>
<td>0.126 (3.60)(^**)</td>
<td>0.035 (0.81)</td>
<td>0.091 (1.64)</td>
</tr>
<tr>
<td>QTR4</td>
<td>0.115 (4.27)(^**)</td>
<td>0.100 (3.77)</td>
<td>0.015 (0.39)</td>
</tr>
<tr>
<td>RGROW</td>
<td>0.083 (2.10)(^*)</td>
<td>0.052 (1.06)</td>
<td>0.031 (0.48)</td>
</tr>
<tr>
<td>RMB</td>
<td>0.145 (2.62)(^**)</td>
<td>0.392 (5.22)</td>
<td>−0.247 (−2.65)(^**)</td>
</tr>
<tr>
<td>TECH</td>
<td>0.006 (0.19)</td>
<td>−0.013 (−0.34)</td>
<td>0.019 (0.38)</td>
</tr>
<tr>
<td>LAMVOL</td>
<td>0.558 (6.61)(^**)</td>
<td>0.694 (4.51)</td>
<td>−0.136 (−0.78)</td>
</tr>
<tr>
<td>Adj. R(^2)</td>
<td>0.184</td>
<td>0.190</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>4004</td>
<td>4004</td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) Separate regressions are provided for firms that no longer disclose (non-disclosers) and those that continue to disclose (disclosers) geographic earnings in the post-SFAS 131 period. The pre-SFAS 131 period includes all quarterly observations of firms with year ends from December 1995 to November 1998. The post-SFAS 131 period includes all quarterly observations of firms with year ends from December 1999 to November 2002. For each two-digit SIC code, all sample firms are ranked into size quartiles for each quarter of the sample period. Disclosing firms are matched with non-disclosing firms in the same quarter, size quartile, and industry membership. The t-statistics are reported in parentheses and based on Huber/White standard errors that adjust for clustering at the firm level.

\(^b\) POST131 is an indicator variable equal to 1 (0 otherwise) for the post-SFAS 131 period. See Table 2 for definitions of the dependent (AVOL) and independent variables. Control variables are included in all regressions but not reported for brevity.

\(^c\) The significance of the difference in coefficients is tested using a t-test of differences in coefficients.

\(^*\) indicates significance at the 5%, 1% level (one-tailed), respectively.

33 We also compare results from using changes in firm-specific averages to our subsample tests reported in Table 4. Untabulated results show that for three of the four measures, non-disclosers show a significantly greater decline in volume reaction compared to disclosers for the predicted subsample. The only exception is the difference between disclosers and non-disclosers that have a large absolute difference in foreign and domestic profit margin.
Table 6
Impact of SFAS 131 on volume reaction to quarterly earnings announcements using changes in firm-specific averages (H1)*.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pred.</th>
<th>Non-disclosers</th>
<th>Disclosers</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td></td>
<td>0.049 (0.94)</td>
<td>-0.140 (2.43)</td>
<td></td>
</tr>
<tr>
<td>ΔLABSRET</td>
<td>+</td>
<td>5.086 (6.76)**</td>
<td>6.088 (5.20)**</td>
<td>-1.002 (0.73)</td>
</tr>
<tr>
<td>ΔLGMV</td>
<td>-</td>
<td>-0.074 (0.98)</td>
<td>0.149 (1.89)</td>
<td></td>
</tr>
<tr>
<td>ΔLGRP</td>
<td>+</td>
<td>0.247 (3.06)**</td>
<td>-0.260 (3.10)**</td>
<td></td>
</tr>
<tr>
<td>ΔINDSEGS</td>
<td>-</td>
<td>0.027 (0.98)</td>
<td>-0.051 (1.70)</td>
<td></td>
</tr>
<tr>
<td>ΔLOSS</td>
<td>-</td>
<td>-0.227 (1.58)</td>
<td>-0.280 (1.72)</td>
<td></td>
</tr>
<tr>
<td>ΔQT4</td>
<td>+</td>
<td>-0.708 (2.40)**</td>
<td>0.131 (0.33)</td>
<td></td>
</tr>
<tr>
<td>ΔRGROW</td>
<td>?</td>
<td>0.022 (0.14)</td>
<td>-0.055 (0.30)</td>
<td></td>
</tr>
<tr>
<td>ΔRMB</td>
<td>?</td>
<td>0.620 (4.04)**</td>
<td>-0.210 (1.17)</td>
<td></td>
</tr>
<tr>
<td>ΔLAMVOL</td>
<td>+</td>
<td>0.841 (1.24)</td>
<td>-0.006 (0.01)</td>
<td></td>
</tr>
<tr>
<td>Adj. R²</td>
<td></td>
<td>0.453</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td></td>
<td>743</td>
<td>235</td>
<td></td>
</tr>
</tbody>
</table>

* The change in firm-specific average is calculated as the firm’s average of the variable in the post-SFAS 131 period minus the firm’s average of the variable in the pre-SFAS 131 period. Separate regressions are provided for firms that no longer disclose (non-disclosers) and those that continue to disclose (disclosers) geographic earnings in the post-SFAS 131 period. The pre-SFAS 131 period includes all quarterly observations of firms with year ends from December 1995 to November 1998. The post-SFAS 131 period includes all quarterly observations of firms with year ends from December 1999 to November 2002. The t-statistics are reported in parentheses and based on Huber/White standard errors that adjust for clustering at the firm level.

** Indicates significance at the 5%, 1% level (one-tailed), respectively.

The significance of the difference in coefficients is tested using a t-test of differences in coefficients.

4.5. Operating segments

SFAS 131 requires that sales and long-lived assets be disclosed for both operating and secondary segments, while earnings and capital expenditures are disclosed for operating segments only. If firms define operating segments by geographic area, then disclosure of earnings is mandatory rather than voluntary. To control for this, we remove firms that disclose earnings and capital expenditures by geographic area, as these firms are more likely to report geographic earnings as part of operating segments rather than secondary segments. This reduces the sample of disclosers from 4859 to 3780 observations. Results are very similar to those reported in the paper and no conclusions change.

4.6. Changes in industry segments

As discussed earlier, results in Table 3 show that the POST131 coefficients is significantly negative for firms that no longer disclose geographic earnings, consistent with decreasing event-period private information following SFAS 131. However, firms that continue to disclose geographic earnings have an insignificant POST131 coefficient, indicating no change. These results suggest that any increase in overall disclosure quality associated with SFAS 131 may be negated by non-disclosure of geographic earnings. While we do not test all alternative aspects of SFAS 131 (e.g., greater disaggregation of operating segments, more items disclosed per operating segment, consistency of MD&A and segment definitions, ability of segment definitions to better reflect the internal organization of the company), we can test one alternative aspect of SFAS 131 – the change in the number of reported industry segments. Reporting a greater number of industry segments could improve overall public disclosures and offset the effects of non-disclosure of geographic earnings. When there has not been a large increase in the number of reported industry segments, then non-disclosure of geographic earnings is more likely to reflect an overall decrease in public information.

We split firms into those with a change in reported industry segments greater than (less than or equal to) one following implementation of SFAS 131. The median change in reported industry segments for our sample of firms is one (see Table 2). Relative to firms that continue to disclose

---

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We split firms into those with a change in reported industry segments greater than (less than or equal to) one following implementation of SFAS 131. The median change in reported industry segments for our sample of firms is one (see Table 2). Relative to firms that continue to disclose

---

geographic earnings, non-disclosure appears to be significantly related to a decrease in event-period private information only for firms that have little or no increase in reported industry segments. That is, the difference in POST131 coefficient between disclosers and non-disclosers is negative and significant \((-0.114, t = -2.78\), while the difference in LABSRET POST131 coefficient is not significant \((0.016, t = 0.03)\). For firms that increase the number of reported industry segments and possibly negate the effects of non-disclosure of geographic earnings, we find no evidence of a change for non-disclosers relative to disclosers. The difference in POST131 coefficients is insignificant \((0.071, t = 0.83)\) and the difference in LABSRET POST131 is insignificant \((-1.639, t = -1.67)\).

4.7. Cross-sectional tests

We also consider cross-sectional tests of our hypotheses. Results reported in Tables 3 and 4 control for changes over time within the sample of disclosers or non-disclosers. These tests have the advantage of controlling for changes in firm characteristics that may coincide with the adoption of SFAS 131. However, cross-sectional tests have the advantage of controlling for differences in characteristics between disclosers and non-disclosers. Differences in firm characteristics may correlate with non-disclosure, leading us to incorrectly conclude that non-disclosure matters. To test this possibility, we estimate the following model in the pre-SFAS 131 period and then compare estimates to those in the post-SFAS 131 period.

\[
LAVOL_{i,q} = \beta_1 + \beta_2 \text{NODISC}_{i,q} + \beta_3 \text{LABSRET}_{i,q} + \beta_4 \text{LABSRET}_{i,q} \times \text{NODISC}_{i,q} + \beta_5 \text{LGMV}_{i,q} \\
+ \beta_6 \text{LPRC}_{i,q} + \beta_7 \text{INDSEGS}_{i,q} + \beta_8 \text{LOSS}_{i,q} + \beta_9 \text{EXCHANGE}_{i,q} + \beta_{10} \text{QTR4}_{i,q} \\
+ \beta_{11} \text{RGROW}_{i,q} + \beta_{12} \text{RMB}_{i,q} + \beta_{13} \text{TECH}_{i,q} + \beta_{14} \text{LAMVOL}_{i,q} + \epsilon_{i,q} \tag{5}
\]

where NODISC is an indicator variable for non-disclosure of geographic earnings in the post-SFAS 131 period.

We find results consistent with those reported previously. The difference in event-period private information \((\beta_2)\) between disclosers and non-disclosers in the pre-SFAS 131 period versus the post-SFAS 131 period is significantly negative \((-0.091, t = -2.59)\). The difference in pre-announcement private information \((\beta_3)\) between disclosers and non-disclosers in the pre-SFAS 131 period versus the post-SFAS 131 period is not significant \((-0.474, t = -0.99)\). We also conduct our cross-sectional tests for subsamples, similar to the analyses in Table 4. For all four subsamples, we obtain identical conclusions. Non-disclosure of geographic earnings is associated with a reduction in event-period private information but has no effect on pre-announcement private information.

As an additional sensitivity analysis for the cross-sectional tests, we employ the Heckman (1979) procedure to control for sample selection bias. The Heckman procedure involves using a Probit model in the first stage to model the decision to disclose or not disclose geographic earnings. To model the disclosure decision, we include the log of market capitalization, the log of price, the number of industry segments, an indicator variable for loss firms, an indicator variable for exchange listing, the decile rank of leverage, the decile rank of liquidity, the decile rank of capital intensity, the decile rank of the market-to-book ratio, and the decile rank of return on equity. In the second stage, we estimate the cross-sectional models after including the inverse Mills ratio from the first stage. Finally, we compare the cross-sectional differences between disclosers and non-disclosers in the pre-SFAS 131 period to the cross-sectional differences in the post-SFAS 131 period. Results are very similar to cross-sectional tests without controlling for the inverse Mills ratio and no conclusions are changed.

Collectively, the evidence presented in Tables 3 and 4 and the additional sensitivity analyses described above suggest that non-disclosure of geographic earnings has a significant negative effect on event-period private information, consistent with non-disclosure reducing the ability of investors to utilize or generate private information in conjunction with the public announcement of quarterly earnings. We detect no effect on pre-announcement private information.

5. Conclusion

SFAS 131 fundamentally changes the way in which firms report segment results compared to guidelines under SFAS 14. Firms that define operating segments on any basis other than geographic area (e.g.,
products or services) are no longer required to disclose geographic earnings in the annual report. Since geographic earnings vary in risk and expected growth, investors will no longer have access to an important piece of public information useful for understanding the relation between reported earnings and firm value. Non-disclosure of geographic earnings may be especially detrimental to the firm’s information environment as foreign operations continue to represent a growing portion of overall operations of US firms. Guided by the theoretical model proposed in Kim and Verrecchia (1997), we provide a test of the effect that non-disclosure of geographic earnings has on investors’ private information.

Kim and Verrecchia (1997) show that trading volume during an earnings announcement results from two sources: (1) differential precision of investors’ pre-announcement private information and (2) both the average amount and differential precision of investors’ event-period private information. Empirically, differences across investors in pre-announcement (event-period) private information can be measured as trading volume that is (is not) associated with price changes. Kim and Verrecchia (1997) advise that research attempting to infer the impact of firms’ public disclosures on investors’ private information must consider both types of trading volume.

Using a sample of firms with substantial foreign operations and employing differences-in-differences tests, we find that non-disclosure of geographic earnings affects event-period private information. The change in the average amount or differential precision of event-period private information following adoption of SFAS 131 is significantly less for firms that no longer disclose geographic earnings. Additional results show that the decline is attributable to firms hypothesized to be most affected by non-disclosure of geographic earnings. The results are consistent with the notion that investors do not interpret earnings announcement information in a similar manner, and the generation of private information is directly affected by public disclosure quality prior to the announcement.

Our results are consistent with an emerging line of research which suggests that public announcements (e.g., quarterly earnings) trigger the development of event-period private information. Furthermore, the ability of public announcements to spur event-period private information is positively related to the quality of firms’ disclosures prior to the public announcement. This suggests that the quality of public information complements (as opposed to substitutes for) the development of private information around quarterly earnings announcements. While the relation between public disclosure and private information is not without controversy, our paper adds to a developing body of literature “that forges a link between disclosure and its economic consequences” (Verrecchia, 2001, p. 174).

In addition, we find that non-disclosure of geographic earnings in the annual report does not affect pre-announcement private information. Firms that no longer disclose geographic earnings have a significant decline in pre-announcement private information following adoption of SFAS 131, but so do firms that continue to disclose geographic earnings. Thus, we cannot conclude that the reduction in differential precision of pre-announcement private information is caused by non-disclosure of geographic earnings. We can conclude that these results are consistent with improved overall public disclosures under SFAS 131 aligning investors’ beliefs in anticipation of the subsequent quarterly earnings announcements.

Our research attempts to answer questions related to the disclosures of international operations of US firms, where relatively little research currently exists. Because of the growing importance of the multinational operations of US firms, our results should be of increased interest to regulators and investors. In addition, as the International Accounting Standards Board has recently issued a new segment standard (IFRS 8), which is based on SFAS 131, our findings should also be of interest outside the US if firms choose not to disclose geographic earnings because they are not mandated for secondary segments, then this potentially reduces the quality of the IASB’s segment reporting standard.

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