# The Informational Role of Earnings Smoothing in Diversification

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**Abstract:** This paper examines whether managers smooth earnings to affect information asymmetry upon diversification. Using a sample of firms listed in Taiwan Stock Exchange, the results show that earnings smoothing increases the positive association between industrial diversification and bid-ask spread but reduces the negative association between global diversification and bid-ask spread. Our results are robust with respect to alternative research methodology (3SLS), alternative proxy for information asymmetry (analyst following), refined measure of earnings smoothing (i.e., discretionary earnings smoothing) after controlling for leverage, negative earnings, and return on equity. Collectively, the evidence suggests that discretionary earnings smoothing conveys managers' favorable information for firms with global diversification, but garbles managers' unfavorable information for firms with industrial diversification.

**Keywords:** Global Diversification; Income Smoothing; Industrial Diversification; Organization Complexity.
JEL: G14, L25, M41

## 1. INTRODUCTION

Prior literature finds mixed evidence for the relation between corporate diversification and information asymmetry. Some researchers argue that diversification reduces firm value, whereas others reveal the opposite views (Berger and Ofek, 1995; Comment and Jarrell, 1995; Denis et al., 1997; Denis et al., 2002; Thomas, 2002). Income smoothing is a widespread business practice that managers have taken for long (Graham et al., 2005).[1] It reduces the fluctuations of earnings stream and changes the information contained in earnings. The purpose of this paper is to explore the effect of income smoothing on the relation between information asymmetry and corporate diversification. We examine whether managers smooth earnings to adjust the degree of information asymmetry when firms adopt diversification strategy.

Survey evidence by Graham et al. (2005) reveals that 96.9 percent of CFOs prefer a smooth stream of earnings, whereas 78 percent of respondents part with economic value in exchange for smooth earnings. This suggests that, upon implementing corporate diversification strategy, managers have an incentive to smooth earnings.[2] Depending on managers' reporting strategy, earnings smoothing may make reported earnings informative or a noisy signal for the firm's future earnings and stock return (Tucker and Zarowin, 2006). We examine whether managers of diversified firms smooth earnings to affect the degree of information asymmetry associated with two types of diversification, i.e., industrial diversification and global diversification, and whether diversification is value-increasing or value-decreasing.

If diversification makes information more asymmetric, the bid-ask spread between informed traders and uniformed traders will be wider and the information disadvantages will induce investors to demand a risk premium that increases the cost of equity capital (Berger and Ofek, 1995; Comment and Jarrell, 1995; Lang and Stulz, 1994). Though earnings can provide information about firm value and are used for contract design and performance evaluation (Frankel and Li, 2004), diversification makes the mapping of divisional earnings into consolidated earnings less straightforward and transparent to investors (Thomas, 2002). Thus, the informed managers could smooth earnings to signal their private information to market participants, which would reduce the degree of information asymmetry associated with favorable diversification. Contrarily, the informed managers could smooth earnings to garble their private information to market participants, which would increase the degree of information asymmetry associated with unfavorable diversification. As a result, earnings smoothing is the tool for managers of diversified firms to manage and adjust the degree of information asymmetry.

Using a sample of firms listed in Taiwan Stock Exchange, we find that industrial diversification is positively related to bid-ask spread, while earnings smoothing deteriorates this association. This evidence suggests that the information asymmetry is more severe for industrially diversified firms and that these firms smooth reported earnings that further increases information asymmetry related to industrial diver-

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[1] Following prior literature, the two terms, earnings smoothing and income smoothing, are used interchangeably.
[2] Prior literature has documented a positive association between accounting information and information asymmetry. See, for example, Frankel and Li (2004) and Bhattacharya et al. (2013).

sification. On the contrary, we find some evidence that global diversification is negatively related to bid-ask spread, while earnings smoothing further reduces this association. In addition, global diversification is positively related to Tobin's q proxy for firm value. This evidence suggests that earnings smoothing is informative for favorable news about global diversification, but a noisy signal for unfavorable news about industrial diversification. Our results are robust with respect to alternative research methodology (3SLS), alternative proxy for information asymmetry (analyst following), refined measure of earnings smoothing (i.e., discretionary earnings smoothing), and controlling for confounding factors such as leverage, negative earnings, and return on equity. Collectively, the evidence suggests that global diversification is value-increasing and thus information is more symmetric for globally diversified firms. In contrast, information is more asymmetric for industrially diversified firms. Moreover, the incremental effect of earnings smoothing on the relation between spread and diversification is mainly driven by discretionary earnings smoothing. As a result, earnings smoothing is a tool for managers that affects the relation between information asymmetry and diversification.

This paper complements research relating to diversification and the informativeness of earnings smoothing. Finance literature examining the causes and consequences of diversification generally focuses on firm value. For example, Gyan, Brahmana, and Bakri (2017) find that performance improvement is positively related to industrial diversification, but not international diversification. Contrarily, Jouida, Bouzgarrou, Hellara (2017) find a negative relationship between diversification and performance in financial institutions. In contrast, few studies examine the role of accounting in corporate diversification. For example, Thomas (2002) finds no evidence of increased asymmetric information as measured by analysts' earnings forecast arising from greater diversification. Duru and Reeb (2002a) find that international diversification is related to the less accurate and more optimistic earnings forecasts by analysts. Jiraporn et al. (2008) find industrial diversification is negatively related to accrual earnings management. Kang, Khurana, and Wang (2017) find that mandatory disclosures about segments of an enterprise and related information are helpful for analysts' earnings forecasts and reduce mispricing of internationally diversified firms. However, little attention is paid to the impact of diversification on the informational role of accounting information. As corporate diversification strategy affects earnings reporting strategy, which in turn affects the informativeness of earnings, we further link diversification to the informational role of earnings driven by manager's discretion over accounting, as characterized by earnings smoothing, and document their association. Built on Fan et al. (2018) that finds that earnings are more persistent and informative for Taiwanese firms with only global diversification, this paper further documents that managers smooth earnings to signal their favorable information for firms with global diversification, which is value-increasing.

The reminder of this paper is organized as follows. Section 2 reviews related literature and develops hypotheses. Section 3 describes empirical design including empirical models and description of data and sample. Section 4 provides empirical analysis and additional analyses. Section 5 concludes the paper.

## 2. LITERATURE AND HYPOTHESES

Prior literature produces mixed results on whether diversification increases information asymmetry and whether diversification impairs firm value. Some argue that diversification makes information less transparent and more asymmetric, which leads to greater agency cost, lower market liquidity in stocks, higher cost of capital, and reduces firm value (Denis et al., 1997; Thomas, 2002).[3] However, others argue that aggregated cash flows of the basket securities can lessen the information asymmetry more than that of individual security (Subrahmanyam, 1991; Gorton and Pennacchi, 1993).[4] This suggests information being more symmetric for stocks of diversified firms than for stocks of focused firms (Thomas, 2002). Therefore, it appears that the relation between diversification and information asymmetry remains inconclusive.

Income smoothing represents "an attempt on the part of the firm's management to reduce abnormal variations in earnings to the extent allowed under accounting and management principles" (Beidleman, 1973).[5] Survey evidence by Graham et al. (2005) finds that 96.9 percent of the respondents prefer a smooth trend of earnings. In addition, 88.7 percent of respondents believe that smoother earnings can reduce investors' perceived risk, while 57.1 percent of respondents believe that investors and creditors will demand a small risk premium and hence lead to a lower cost of equity and debt capital (Graham et al., 2005). To smooth earnings, managers can use the flexibility allowed in the generally accepted accounting principles to change reported earnings but not the underlying cash flows; alternatively, change operations to smooth the underlying cash flows (Fudenberg and Tirole, 1995).[6] Managers who possess private information about firms' prospects smooth reported earnings to reduce abnormal and intertemporal variations in earnings (Beidleman, 1973; Tucker and Zarowin, 2006; Francis et al., 2004), to benefit shareholders for raising funds from capital market (Ronen and Sadan, 1981; Trueman and Titman, 1988), or to provide themselves with insurance for their private gains or job security (Lambert, 1984; Dye, 1988; Ahmed et al., 2006).

[3] Franco et al. (2016) find a negative relation between the quality of segment disclosures and yields of bonds for industrially diversified firms. While Bens and Monahan (2004) find that security analyst ratings of voluntary disclosure are positively related to the excess of diversification, they also find mixed results for the relation between disclosure quality and excess value for single-segment firms. This evidence suggests that the value of disclosure for firms is related to diversification.

[4] Baik et al. (2019) find that managerial ability is related to income smoothing, which enhances stock price informativeness about future cash flows.

[5] Beidleman (1973) defines income smoothing as "intentional dampening of fluctuations about some level of earnings that is currently considered to be normal for a firm."

[6] Concerning the first method, for example, managers can change the timing of recognizing sales and expenses (bad debt expense) or amount of capitalized expenditures. Concerning the second method, for example, managers can use operating decisions to smooth income and underlying cash flows (Fudenberg and Tirole, 1995), i.e., real activities earnings management.

One stream of theoretical literature documents that earnings smoothing is an efficient tool for managers to communicate their private information with capital market participants (Kirschenheiter and Melumad, 2002; Ronen and Sadan, 1981). [7] Contrarily, the other stream of theoretical literature documents that earnings smoothing garbles the communication and makes information less informative for future earnings and cash flows (Lambert, 1984). These two arguments produce opposite predictions about the information role of earnings smoothing (Tucker and Zarowin, 2006). Empirical studies find mixed results. Tucker and Zarowin (2006) find that more information about future earnings is contained in the change in current stock price of firms with higher smoothing than of firms with lower smoothing, suggesting that income smoothing enhances the informativeness of past and current earnings about future earnings and cash flows. However, Rountree et al. (2008) find that the accrual component of earnings smoothing, which represents managers' estimates of future cash flows, is subject to measurement error and potential manipulation and thus does not add value. Relatedly, McInnis (2010) finds no evidence that earnings smoothness can result in a lower cost of equity capital.[8]

We assert that managers' strategic earnings smoothing is associated with managers' assessment on the prospects of diversification. As noted, if diversification causes information to be more asymmetric, the bid-ask spread between informed traders and uniformed traders would be wider. In this situation, managers of diversified firms have a stronger incentive to manage information by smoothing earnings for various reasons such as contract design and performance evaluation as noted above. Moreover, it is easier for managers to defer bad news using earnings smoothing when diversification makes the mapping of divisional income into consolidated earnings less straightforward and transparent to investors (Thomas, 2002). Information is likely to be more asymmetric when the diversification is unfavorable for shareholders and will impair firm value. Thus, in this case, managers would garble information through earnings smoothing, which is expected to increase the positive relation between information asymmetry and diversification.

On the contrary, information related to diversification could be less asymmetric if the information asymmetries related to individual security can be partially diversified away through grouping of securities into a basket (Subrahmanyam, 1991; Gorton and Pennacchi, 1993). That is, the consolidated forecast of cash flows would be more accurate for diversified firms than the forecast for focused firms, when the forecast errors of segment cash flows by outsiders are not perfectly and positively correlated, which suggests that the aggregate nature of reported earnings for multi-segments of diversified firms can alleviate information asymmetry (Thomas, 2002). Information is likely to be less asymmetric when the diversification is favorable for shareholders and will add firm value. Managers of these firms have an incentive to signal their favorable private information to market participants through earnings smoothing. Thus, earnings smoothing is expected to decrease the negative relation between information asymmetry and diversification. To summarize, managers of firms with favorable diversification smooth earnings to makes reported earnings more informative, which reduces the degree of information asymmetry associated with diversification. Conversely, managers of firms with unfavorable diversification smooth earnings to garble earnings information, which dampens the degree of information asymmetry associated with diversification. This yields the hypotheses in alternative form as follows:

H1a: *Ceteris paribus*, given a positive relation between information asymmetry and diversification, the incremental effect of earnings smoothing on this relation is positive.

H1b: *Ceteris paribus*, given a negative relation between information asymmetry and diversification, the incremental effect of earnings smoothing on this relation is negative.

## 3. METHODOLOGY

### 3.1. Data and Sample Description

The data for stock price and accounting variables is taken from Taiwan Economic Journal (TEJ), while the data for measuring diversification is taken from the "database of operating results for affiliated enterprises". As no database provides detailed information concerning industry diversification and global diversification, we compile our data needed for the estimation of diversification in the following ways. We first collect the data regarding the industries that each company and its subsidiary operate, the sales revenues of individual segments, and the location where each segment operates, for each firm and its subsidiaries. This data is based on the database about the operating results of affiliated enterprises from TEJ, where the standard of industry classification is made by TEJ. We then follow prior literature (Anderson et al., 2000; Jiraporn et al., 2006) and use a dummy variable for diversification equal to one for a diversified firm and zero otherwise. That is, a firm operating in multi-industries (international markets) is denoted as one for industrial diversification (global diversification), relative to a single-segment firm with assigned value of zero.

Our sample period begins with 2000 and cover firms with calendar year, as the data for measuring diversification is taken from the Database of operating results for affiliated enterprises beginning from 1999. Our sample comprises 15,032 observations of public companies with common stocks listed in either Taiwan Securities and Exchange mar-

[7] Fudenberg and Tirole (1995) consider optimal contracts for managers with private incentives to smooth income. Lambert (1984) uses the agency theory to analytically examine the phenomenon of "real" income smoothing. Ahmed et al. (2006) find that income smoothing is positively related to managers' concerns over job security (measured as the degree of competition in firms' product markets, product durability, and capital intensity). Demirkan et al. (2012) documents that discretionary accruals quality is lower and the cost of capital is higher for diversified firms than for single-segment firms, suggesting more severe agency problems in diversified firms.

[8] Further, Rountree et al. (2008) find that firms with more volatile earnings have smaller Tobin's q, suggesting a negative relation between earnings smoothing and firm value. Demerjian et al. (2019) find a positive relation between private debt contracts and use of earnings-based covenants for firms with greater income smoothing, which increases the ability of earnings to reflect credit risk. They document that income smoothing enhances the monitoring role of earnings-based information in debt contracting. Erickson et al. (2017) document that earnings smoothness reduces investors' risk judgments independent of the volatility of operating cash flows.

ket or Taiwan Over-the-Counter market, with available data in financial statements and stock price from 2000 to 2010. We remove 365 observations of firms in the financial-related industries, 4,207 observations of firms due to lack of data on market value, 1,172 observations due to lack of data for calculating earning smoothness, 2,600 observations due to lack of data for the measuring of diversification, and 905 observations due to lack of data on any of the control variables used in the models. As a result, the final sample after removing observations consists of 5,783 firm-year observations over the sample period from 2000 to 2010.

### 3.2. Empirical Test Specification

We follow prior research (Venkatesh and Chiang, 1986; Brown and Hillegeist, 2007) and additionally incorporate two variables of diversification and their interaction with earnings smoothing into the following model, which controls for a number of factors influencing information asymmetry:

$$\begin{aligned} SPREAD_{it} &= \beta_0 + \beta_1 ES_{it} + \beta_2 ID_{it} + \beta_3 GB_{it} + \beta_4 ES_{it} \times ID_{it} \\ &+ \beta_5 ES_{it} \times GB_{it} + \beta_6 LNP_{it} + \beta_7 LNVOL_{it} + \beta_8 SDRET_{it} + \beta_9 SIZE_{it} \\ &+ \beta_{10} INST_{it} + \beta_{11} MB_{it} + \beta_{12} LNOWN_{it} + \beta_{13} ROA_{it} + \varepsilon_{it} \end{aligned} \quad (1)$$

where SPREAD is bid-ask spread, measured as the average daily closing bid-ask price over a fiscal year; ES is earnings smoothness measured as negative one times the ratio of a firm's standard deviation of income before extraordinary items (scaled by total assets) divided by the standard deviation of cash flows from operations (scaled by total assets), where the smoothness measure is calculated at the annual level over rolling ten-year windows ending in the current fiscal year (Francis et al., 2004; Leuz et al., 2003); ID is an indicator variable for an industrially diversified, and zero otherwise; GB is an indicator variable for a globally diversified, and zero otherwise; LNP is natural logarithm of average daily closing price over a fiscal year; LNVOL is natural logarithm of average daily shares traded over a fiscal year; SDRET is standard deviation of daily stock return over a fiscal year; SIZE is the natural logarithm of market value of equity at fiscal year-end; INST is the institutional ownership measured as the percentage of common shares held by institutions; MB is market-to-book ratio of equity at fiscal year-end; LNOWN is the natural logarithm of one plus the number of shareholders at the fiscal year-end; and ROA is return on assets equal to net income divided by total assets.

The coefficients β4 (β5) is the incremental effect of earnings smoothing on the relation between industrial diversification (global diversification) and information asymmetry. Given a positive (negative) relation between diversification and information asymmetry, H1A (H1B) predicts that earnings smoothing increases (reduces) the positive (negative) relation between diversification and information asymmetry. Thus, given a positive relation between ID (GB) and SPREAD, i.e., β2 >0 (β3> 0), H1A predict β4 >0 (β5 >0). Given a negative relation between ID (GB) and SPREAD, i.e., β2 <0 (β3< 0), H1B predict β4 < 0 (β5 < 0).

## 4. EMPIRICAL RESULTS AND ANALYSIS

### 4.1. Descriptive Statistics and Correlation

Table **1** presents the descriptive statistics of variables used the models for test of hypotheses. The industrial diversification, expressed as an indicator variable, has an average and median of 0.688 and 1, respectively. Similarly, the global diversification expressed as an indicator variable, has an average of 0.642 and median of 1. These results indicate that proportion of globally diversified firms is slightly lower than that of industrially diversified firms. The average and median of earnings smoothing (ES) is -0.932 and -0.74, respectively, with a standard deviation of 0.799. The bid-ask spread (SPREAD) has an average of 0.761, median of 0.555, with first quartile and third quartile of 0.380 and 0.824, respectively. Table **2** presents the Pearson correlations and shows that all coefficients are smaller than 0.8 and thus no serious collinearity for explanatory variables of Equation (1).[9]

**Table 1. Descriptive Statistics.**

| | Median | Mean | Standard deviation | First Quartile | Third Quartile |
|---|---|---|---|---|---|
| *ID* | 1 | 0.688 | 0.463 | 0 | 1 |
| *GB* | 1 | 0.642 | 0.479 | 0 | 1 |
| *ES* | -0.740 | -0.932 | 0.799 | -1.150 | -0.466 |
| *TA* | 15.391 | 15.538 | 1.324 | 14.63 | 16.23 |
| *LEV* | 0.375 | 0.38 | 0.162 | 0.26 | 0.48 |
| *LOSS* | 0.1 | 0.177 | 0.217 | 0 | 0.3 |
| *BM* | 0.850 | 1.020 | 0.713 | 0.559 | 1.281 |
| *SDSALES* | 0.13 | 0.195 | 0.218 | 0.066 | 0.237 |
| *CYCLE* | 4.919 | 4.938 | 0.742 | 4.6 | 5.232 |
| *PPE* | 0.243 | 0.339 | 0.321 | 0.098 | 0.472 |
| *GW* | 0.078 | 0.791 | 10.900 | 0.02 | 0.251 |
| *DIVIDEND* | 0.014 | 0.026 | 0.035 | 0 | 0.04 |
| *OCF* | 0.056 | 0.062 | 0.06 | 0.027 | 0.091 |
| *ADR* | 0 | 0.011 | 0.105 | 0 | 0 |
| *OUTDIR* | 0.286 | 0.3 | 0.214 | 0.143 | 0.429 |
| *BOARD* | 7 | 7.07 | 2.668 | 5 | 8 |
| *DUALITY* | 0 | 0.295 | 0.456 | 0 | 1 |
| *INDEP* | 0 | 0.575 | 0.941 | 0 | 1 |
| *SPREAD* | 0.555 | 0.761 | 0.776 | 0.380 | 0.824 |
| *LNP* | 2.51 | 2.592 | 0.819 | 2.034 | 3.043 |

[9] To preclude potential collinearity between *LNVOL* and *LNOWN*, the results of removing *LNVOL* from Equation (2) are qualitatively the same. The variance inflated factors (VIF) are also investigated to prelude the collinearity issue.

| | | | | | |
|---|---|---|---|---|---|
| *LNVOL* | 7.236 | 7.157 | 1.646 | 6.091 | 8.351 |
| *SDRET* | 2.674 | 2.698 | 0.766 | 2.164 | 3.212 |
| *SIZE* | 8.049 | 8.207 | 1.526 | 7.142 | 9.071 |
| *INST* | 33.16 | 36.12 | 22.102 | 17.725 | 51.965 |
| *MB* | 1.176 | 1.447 | 1.347 | 0.781 | 1.789 |
| *LNOWN* | 9.483 | 9.559 | 1.258 | 8.675 | 10.363 |
| *ROA* | 0.041 | 0.032 | 0.108 | 0.004 | 0.083 |

See Table **2** for variable definitions.

**Table 2. Pearson Correlations.**

**Panel A**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **ES** | **ID** | **GB** | **TA** | **LEV** | **LOSS** | **BM** | **SD-SALES** | **CY-CLE** | **PPE** | **GW** | **DIV-ID-END** | **OCF** | **ADR** | **OUT-DIR** | **BOA** | ***DUA-LIT*** | ***INDEP*** |
| (1) | 1.00 | | | | | | | | | | | | | | | | | |
| (2) | -0.04 | 1.00 | | | | | | | | | | | | | | | | |
| | (0.00) | | | | | | | | | | | | | | | | | |
| (3) | -0.03 | 0.50 | 1.00 | | | | | | | | | | | | | | | |
| | (0.03) | (0.00) | | | | | | | | | | | | | | | | |
| (4) | -0.00 | 0.25 | 0.23 | 1.00 | | | | | | | | | | | | | | |
| | (0.95) | (0.00) | (0.00) | | | | | | | | | | | | | | | |
| (5) | 0.00 | 0.04 | -0.05 | 0.11 | 1.00 | | | | | | | | | | | | | |
| | (0.81) | (0.00) | (0.00) | (0.00 | | | | | | | | | | | | | | |
| (6) | -0.38 | -0.06 | -0.13 | -0.23 | 0.23 | 1.00 | | | | | | | | | | | | |
| | (0.00) | (0.00) | (0.00) | (0.00 | (0.00 | | | | | | | | | | | | | |
| (7) | -0.07 | -0.04 | -0.10 | -0.09 | 0.11 | 0.29 | 1.00 | | | | | | | | | | | |
| | (0.00) | (0.00) | (0.00) | (0.00 | (0.00 | (0.00) | | | | | | | | | | | | |
| (8) | 0.10 | -0.05 | 0.02 | -0.02 | 0.15 | -0.02 | -0.14 | 1.00 | | | | | | | | | | |
| | (0.00) | (0.00) | (0.08) | (0.21 | (0.00 | (0.23) | (0.00 | | | | | | | | | | | |
| (9) | 0.07 | -0.09 | -0.14 | -0.17 | 0.14 | 0.21 | 0.18 | -0.16 | 1.00 | | | | | | | | | |
| | (0.00) | (0.00) | (0.00) | (0.00 | (0.00 | (0.00) | (0.00 | (0.00) | | | | | | | | | | |
| (10) | -0.15 | -0.05 | -0.11 | 0.11 | 0.01 | 0.21 | 0.13 | -0.23 | -0.16 | 1.00 | | | | | | | | |
| | (0.00) | (0.00) | (0.00) | (0.00 | (0.64 | (0.00) | (0.00 | (0.00) | (0.00) | | | | | | | | | |
| (11) | 0.01 | -0.03 | -0.03 | 0.03 | 0.02 | 0.03 | -0.01 | 0.05 | 0.05 | -0.02 | 1.00 | | | | | | | |
| | (0.52) | (0.03) | (0.05) | (0.02 | (0.20 | (0.05) | (0.52 | (0.00) | (0.00) | (0.23 | | | | | | | | |
| (12) | 0.13 | 0.01 | 0.04 | 0.11 | -0.29 | -0.44 | -0.35 | 0.05 | -0.20 | -0.12 | 0.01 | 1.00 | | | | | | |
| | (0.00) | (0.70) | (0.00) | (0.00 | (0.00 | (0.00) | (0.00 | (0.00) | (0.00) | (0.00 | (0.26 | | | | | | | |
| (13) | 0.11 | 0.03 | 0.07 | 0.09 | -0.40 | -0.36 | -0.23 | -0.05 | -0.27 | 0.18 | 0.01 | 0.58 | 1.00 | | | | | |
| | (0.00) | (0.04) | (0.00) | (0.00 | (0.00 | (0.00) | (0.00 | (0.00) | (0.00) | (0.00 | (0.54 | (0.00) | | | | | | |
| (14) | -0.05 | 0.04 | 0.05 | 0.27 | -0.04 | -0.05 | -0.07 | 0.02 | -0.05 | 0.15 | 0.01 | 0.02 | 0.15 | 1.00 | | | | |
| | (0.00) | (0.00) | (0.00) | (0.00 | (0.00 | (0.00) | (0.00 | (0.07) | (0.00) | (0.00 | (0.66 | (0.11) | (0.00 | | | | | |
| (15) | 0.07 | -0.11 | -0.05 | -0.28 | -0.07 | -0.10 | -0.11 | 0.09 | 0.04 | -0.09 | 0.02 | 0.11 | 0.10 | -0.02 | 1.00 | | | |
| | (0.00) | (0.00) | (0.00) | (0.00 | (0.00 | (0.00) | (0.00 | (0.00) | (0.00) | (0.00 | (0.07 | (0.00) | (0.00 | (0.20 | | | | |
| (16) | -0.00 | 0.12 | 0.04 | 0.35 | -0.03 | -0.10 | -0.03 | -0.10 | -0.13 | 0.18 | 0.00 | 0.03 | 0.06 | 0.05 | 0.04 | 1. | | |
| | (0.84) | (0.00) | (0.00) | (0.00 | (0.02 | (0.00) | (0.03 | (0.00) | (0.00) | (0.00 | (0.98 | (0.01) | (0.00 | (0.00 | (0.01) | | | |
| (17) | -0.02 | -0.04 | -0.01 | -0.14 | -0.02 | 0.07 | 0.01 | 0.04 | 0.07 | -0.06 | 0.02 | -0.02 | -0.02 | -0.02 | 0.11 | - | 1.00 | |
| | (0.09) | (0.00) | (0.31) | (0.00 | (0.07 | (0.00) | (0.44 | (0.00) | (0.00) | (0.00 | (0.08 | (0.18) | (0.07 | (0.11 | (0.00) | (0. | | |
| (18) | 0.05 | -0.03 | 0.06 | -0.11 | -0.09 | -0.14 | -0.15 | 0.15 | -0.03 | -0.13 | 0.04 | 0.18 | 0.16 | 0.10 | 0.47 | 0. | 0.05 | 1.00 |
| | (0.00) | (0.01) | (0.00) | (0.00 | (0.00 | (0.00) | (0.00 | (0.00) | (0.01) | (0.00 | (0.00 | (0.00) | (0.00 | (0.00 | (0.00) | (0. | (0.0 | |

## 4.2. Hypothesis Testing

We now test our predictions in the incremental effect of earnings smoothing on the relation between diversification and information asymmetry. The results for regressions of bid-ask spread on the two diversification variables interacted with earnings smoothing variable are shown in Table **3**. In addition to the basic model, we estimate three models with inclusion of either or both of year and industry effects.

**Panel B**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **SPREAD** | **ES** | **ID** | **GB** | **LNP** | **LNVOL** | **SDRET** | **SIZE** | **INST** | **MB** | **LNOWN** | ***ROA*** |
| (1) | 1.00 | | | | | | | | | | | |
| (2) | -0.14 | 1.00 | | | | | | | | | | |
| | (0.00) | | | | | | | | | | | |
| (3) | -0.11 | -0.04 | 1.00 | | | | | | | | | |
| | (0.00) | (0.00) | | | | | | | | | | |
| (4) | -0.18 | -0.03 | 0.50 | 1.00 | | | | | | | | |
| | (0.00) | (0.03) | (0.00) | | | | | | | | | |
| (5) | -0.20 | -0.02 | 0.04 | 0.12 | 1.00 | | | | | | | |
| | (0.00) | (0.06) | (0.00) | (0.00) | | | | | | | | |
| (6) | -0.63 | -0.06 | 0.19 | 0.24 | 0.17 | 1.00 | | | | | | |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | | | | | | | |
| (7) | 0.27 | -0.21 | -0.05 | -0.06 | 0.00 | 0.19 | 1.00 | | | | | |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.77) | (0.00) | | | | | | |
| (8) | -0.50 | 0.02 | 0.23 | 0.25 | 0.41 | 0.66 | -0.22 | 1.00 | | | | |
| | (0.00) | (0.23) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | | | | | |
| (9) | -0.05 | 0.04 | 0.03 | 0.00 | 0.20 | 0.09 | -0.17 | 0.45 | 1.00 | | | |
| | (0.00) | (0.01) | (0.02) | (0.78) | (0.00) | (0.00) | (0.00) | (0.00) | | | | |
| (10) | -0.03 | 0.00 | -0.01 | 0.02 | 0.44 | 0.04 | -0.02 | 0.19 | 0.17 | 1.00 | | |
| | (0.04) | (0.73) | (0.68) | (0.13) | (0.00) | (0.00) | (0.08) | (0.00) | (0.00) | | | |
| (11) | -0.41 | -0.20 | 0.24 | 0.24 | 0.05 | 0.80 | 0.05 | 0.69 | 0.14 | -0.07 | 1.00 | |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | | |
| (12) | -0.30 | 0.27 | 0.01 | 0.04 | 0.14 | 0.10 | -0.32 | 0.30 | 0.22 | 0.20 | -0.02 | 1.00 |
| | (0.00) | (0.00) | (0.27) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.12) | |

P-values in parentheses. Variable definitions: ES is earnings smoothness measured as -1 times the ratio of a firm's standard deviation of income before extraordinary items scaled by total assets divided by the standard deviation of cash flows from operations scaled by total assets, where the smoothness measure is calculated at year level over rolling ten-year windows ending in the current fiscal year; ID equals one for an industrially diversified, and zero otherwise; GB equals one for a globally diversified, and zero otherwise; TA is the natural logarithm of total assets; LEV is total liabilities divided by total assets; LOSS is the proportion of years for a firm to report negative earnings within ten fiscal years; BM is book value of common equity divided by market value of equity; SDSALES is the standard deviation of sales revenues in past five years scaled by average total assets; CYCLE is the operating cycle equal to the natural log of sum of days' accounts receivable and days inventory and take the average during year t-9 and year t; PPE is net property, plant and equipment scaled by total assets; GW is the sales growth over the past ten years; DIVIDEND is cash dividends deflated by average total assets"; OCF is the average cash flow from operations divided by average total assets over the past five fiscal years; ADR equals one if the firm trades in the U.S. during the fiscal year, and zero otherwise; OUTDIR is the proportion of outside directors on the board of directors; BOARD is the number of members in the board; DUALITY equals 1 if the CEO is the chairman of the board of directors, and zero otherwise; INDEP is the number of independent directors on the board. SPREAD is bid-ask spread, measured as the average daily closing bid-ask price over a fiscal year; LNP is the natural logarithm of average daily closing price over a fiscal year; LNVOL is the natural logarithm of average daily shares traded over a fiscal year; SDRET is the standard deviation of daily stock return over a fiscal year; SIZE is the natural logarithm of market value of equity at fiscal year-end; INST is institutional ownership measured as the percentage of common shares held by institutions; MB is market-to-book ratio of equity at fiscal year-end; LNOWN is the natural logarithm of one plus the number of shareholders at fiscal year-end; and ROA is return on assets equal to net income divided by total assets.

All models have significant explanatory power ($p<0.001$) with adjusted $R^2$ as high as 0.617 or more. The coefficients of SDRET, MB, and LNOWN are significantly positive ($p<0.001$), suggesting that information asymmetry as measured by bid-ask spread is higher for firms with more volatile return, higher market-to-book, and more registered shareholders. Conversely, the coefficients of ES, LNP, LNVOL, and ROA are significantly negative ($p<0.001$), suggesting that bid-ask spread is lower for firms with smoother earnings, higher share price, greater trading volume, and higher return on assets.

In all four models, the coefficient of ID is significantly positive ($p<0.001$) and indicates that the bid-ask spread is higher for industrially diversified firms than for single segment firms. Consistent with hypothesis H1A, the coefficient of the interactive variable ES*ID is significantly positive ($p<0.001$) and indicates that earnings smoothing increases the positive relation between spread and industrial diversification. These results suggest that information is more asymmetric for firms with industrial diversification, and that earnings smoothing garbles information and deteriorates the information asymmetry associated with industrial diversification. Moreover, in Model (1) and Model (2), the coefficient of GB is significantly negative ($p<0.04$) and indicates that firms with global diversification have lower bid-ask spread. Consistent with hypothesis H1B, the coefficient of the interactive variable ES*GB of all four models is significantly negative ($p<0.067$) and indicates that earnings smoothing reduces the negative relation between spread and global diversification. These

findings suggest that information is less asymmetric for firms with global diversification, and that earnings smoothing conveys managers' private information and thus further reduces the information asymmetry associated with global diversification. Collectively, this evidence suggests that industrial diversification appears to be unfavorable information that managers smooth earnings to garble the information, whereas global diversification is favorable information that managers smooth earnings to reveal their private information.

**Table 3. Regressions of Spread on Diversification and Earnings Smoothing.**

$$SPREAD_{it} = \beta_0 + \beta_1 ES_{it} + \beta_2 ID_{it} + \beta_3 GB_{it} + \beta_4 ES_{it} \times ID_{it} + \beta_5 ES_{it} \times GB_{it} + \beta_6 LNP_{it} + \beta_7 LNVOL_{it} + \beta_8 SDRET_{it} + \beta_9 SIZE_{it} + \beta_{10} INST_{it} + \beta_{11} MB_{it} + \beta_{12} LNOWN_{it} + \beta_{13} ROA_{it} + \varepsilon_{it}$$

| **Model** / **Variable** | **(1)** **Coefficient** | **(2)** **Coefficient** | **(3)** **Coefficient** | **(4)** **Coefficient** |
|---|---|---|---|---|
| *Constant* | 90.34*** (0.000) | 27.83*** (0.000) | 90.32*** (0.000) | 27.84*** (0.007) |
| *ES* | -6.513*** (0.000) | -5.262*** (0.001) | -7.599*** (0.000) | -5.930*** (0.000) |
| *ID* | 11.89*** (0.000) | 11.77*** (0.000) | 8.624*** (0.001) | 8.849*** (0.000) |
| *GB* | -6.568*** (0.004) | -4.651** (0.020) | 0.068 (0.490) | 0.504 (0.416) |
| *ES ×ID* | 9.162*** (0.000) | 9.629*** (0.000) | 7.873*** (0.000) | 8.459*** (0.000) |
| *ES ×GB* | -6.289*** (0.001) | -5.352*** (0.003) | -3.105* (0.067) | -2.968* (0.063) |
| *LNP* | -9.766*** (0.000) | -11.75*** (0.000) | -7.907*** (0.000) | -9.851*** (0.000) |
| *LNVOL* | -45.98*** (0.000) | -54.73*** (0.000) | -45.90*** (0.000) | -54.39*** (0.000) |
| *SDRET* | 43.68*** (0.000) | 61.19*** (0.000) | 42.58*** (0.000) | 60.48*** (0.000) |
| *SIZE* | 2.361** (0.011) | 13.22*** (0.000) | 1.513 (0.109) | 12.55*** (0.000) |
| *INST* | 0.230*** (0.000) | 0.0764** (0.021) | 0.182*** (0.000) | 0.0346 (0.316) |
| *MB* | 4.843*** (0.000) | 2.219*** (0.000) | 5.039*** (0.000) | 2.447*** (0.000) |
| *LNOWN* | 18.97*** (0.000) | 19.57*** (0.000) | 19.72*** (0.000) | 20.18*** (0.000) |
| *ROA* | -50.60*** (0.000) | -48.89*** (0.000) | -44.37*** (0.000) | -44.42*** (0.000) |
| *Year* | No | Yes | No | Yes |
| *Industry* | No | No | Yes | Yes |
| Observations | 5783 | 5783 | 5783 | 5783 |
| Adjusted $R^2$ | 0.617 | 0.666 | 0.624 | 0.671 |
| F | 717.4 | 503.3 | 241.3 | 237.0 |

Note: P-values in parentheses are two-tailed, except those of ID, GB, and their interactions with ES that are one-tailed. *, **, and *** denotes P < 0.1, 0.05, and 0.01, respectively. For exponential purpose, the variable SPREAD is multiplied by 100 when used in estimating related models. See Table 2 for variable definitions.

### 4.3. Further Analyses

We provide the following further analyses that may influence our findings. First, our results suggest managers' strategic use of earnings smoothing that affects information asymmetry associated with different types of diversification. We conjecture these results to be related to whether diversification is favorable or not and explore the relation between diversification and firm value as characterized by the Tobin's q. Secondly, we further explore the relation between corporate diversification and managers' earnings smoothing decisions. Thirdly, considering that discretionary component of earnings smoothing is the target that managers can use their discretion over accounting to smooth earnings (LaFond et al., 2007), we further explore whether discretionary smoothing drives the relation between spread and diversification. Fourthly, our prior models take earnings smoothing as exogenous when conducting regression analysis for the information asymmetry model. As information asymmetry and earnings smoothing may be endogenously related, we use three stage least squares (3SLS) to produce unbiased coefficient estimates for our models. Finally, analysts are viewed as either information providers who compete with disclosure by firms, or information intermediaries who process the information disclosed by firms and then transmit to the market, i.e., both firms' disclosure complement for analysts' reports (Lang and Lundolm, 1996). This suggests that more analysts following reduces information asymmetry. Thus, we use the number of analysts as a proxy for information asymmetry to explore its relationship with diversification.

Firstly, to examine the relation between diversification and firm value, we follow Rountree et al. (2008) and regress firm value, as measure by Tobin's q, on two types of diversification, controlling for size (TA), leverage (LEV), profitability (ROA), and investment growth (CAPS, RDS, ADVS, and GW) as follows.

$$TQ_{it} = \gamma_0 + \gamma_1 ID_{it} + \gamma_2 GB_{it} + \gamma_3 TA_{it} + \gamma_4 DEBT_{it} + \gamma_5 ROA_{it} + \gamma_6 CAP_{it} + \gamma_7 RD_{it} + \gamma_8 ADV_{it} + \gamma_9 GW_{it} + \tau_{it}, \quad (2)$$

where TQ is the natural logarithm of Tobin's q measured as sum of the market value of equity and book value of long-term debt divided by total assets; TA is the natural logarithm of total assets; DEBT is debt divided by total assets; CAP is capital expenditures deflated by total assets; RD is research and development divided by sales revenues; ADV is advertising expenditures divided by sales revenues, and GW is sales growth over the past ten years. All other variables are as specified above. Based on the above results, we expect

that industrial diversification is value-decreasing, and thus the coefficient of ID is negative, i.e., $\gamma 1 < 0$. Conversely, global diversification is value-increasing, and thus the coefficient of GB is positive, i.e., $\gamma 2 > 0$.

The results are presented in Table **4**. The final sample after removing observations lacking variables used in Equation (2) consists of 5,383 firm-year observations over the sample period from 2000 to 2010. All models have significant and high explanatory power exceeding 0.607. In Model (1), the coefficients of ROA and RD are significantly positive, whereas the coefficients of TA, DEBT, and CAP are significantly negative. These findings suggest that that Tobin's q is higher for firms with higher return on assets and greater research and development costs, but lower for firms with larger size, more debt, and greater capital expenditures. Further, the coefficient of GB is significantly positive for all four models ($p<0.009$), although the coefficient of ID is insignificant. As shown in Models (2)-(4), inclusion of either or both of year and industry effects yields qualitatively the same results. While Lang and Stulz (1994), Berger and Ofek (1995), Servae (1996), and Jiraporn et al. (2006) document that diversification destroys firm value, Villalonga (2004) find diversification premium. finds diversification discount is more severe for firms with industrial diversification Jiraporn et al. (2006) finds more severe diversification discount for firms with more restrictive shareholder rights, which hold for firms with industrial diversification but not for firms with global diversification.[10] In contrast, our findings suggest that global diversification is favorable for shareholders and value-increasing. Overall, we find evidence consistent with higher firm value for firms with global diversification than for firms without global diversification, but no evidence that industrial diversification reduces firm value.

**Table 4. Regression Results of Tobin's Q Model.**

$$TQ_{it} = \gamma_0 + \gamma_1 ID_{it} + \gamma_2 GB_{it} + \gamma_3 TA_{it} + \gamma_4 DEBT_{it} + \gamma_5 ROA_{it} + \gamma_6 CAP_{it} + \gamma_7 RD_{it} + \gamma_8 ADV_{it} + \gamma_9 GW_{it} + \tau_{it},$$

| **Model** | **(1)** | **(2)** | **(3)** | **(4)** |
|---|---|---|---|---|
| **Variable** | **Coefficient** | **Coefficient** | **Coefficient** | **Coefficient** |
| Constant | 1.116*** | 1.178*** | 1.196*** | 1.269*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| ES | -0.004 | 0.006 | -0.001 | 0.007 |
| | (0.499) | (0.317) | (0.802) | (0.175) |
| ID | -0.002 | 0.002 | -0.003 | -0.001 |
| | (0.420) | (0.412) | (0.388) | (0.477) |
| GB | 0.044*** | 0.037*** | 0.029*** | 0.025*** |
| | (0.000) | (0.000) | (0.005) | (0.009) |
| ROA | 1.482*** | 1.341*** | 1.372*** | 1.235*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| TA | -0.014*** | -0.010*** | -0.010*** | -0.007** |
| | (0.000) | (0.003) | (0.006) | (0.043) |
| CAP | -0.059** | -0.027 | -0.091*** | -0.064** |
| | (0.030) | (0.309) | (0.001) | (0.012) |
| LEV | -1.870*** | -1.877*** | -1.843*** | -1.853*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| RD | 1.170*** | 1.080*** | 0.566*** | 0.503*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| ADV | 0.091 | 0.093* | 0.158*** | 0.148*** |
| | (0.108) | (0.078) | (0.008) | (0.008) |
| GW | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| | (0.563) | (0.541) | (0.953) | (0.906) |
| Year | No | Yes | No | Yes |
| Industry | No | No | Yes | Yes |
| Observations | 5383 | 5383 | 5383 | 5383 |
| Adjusted R2 | 0.607 | 0.653 | 0.644 | 0.688 |
| F | 833.1 | 507.0 | 264.0 | 253.3 |

Note: P-values in parentheses are two-tailed, except those of ID and GB that are one-tailed.*, **, and *** denotes P < 0.1, 0.05, and 0.01, respectively. Variable definitions: TQ is Tobin's Q measured as sum of the market value of equity and book value of long-term debt divided by total assets, CAP is capital expenditures deflated by total assets, RD is research and development divided by sales revenues, ADV is advertising expenditures divided by sales revenues. See Table **2** for the definitions of all other variables.

Secondly, we examine the relation between earnings smoothing and diversification. Following prior studies, we model earnings smoothing as a function of a firm's operating characteristics and governance attributes (Lafond et al., 2007; Dey, 2008). In addition, we incorporate two diversification variables into the model as follows:

$$\begin{aligned} ES_{it} = {} & \alpha_0 + \alpha_1 ID_{it} + \alpha_2 GB_{it} + \alpha_3 TA_{it} + \alpha_4 LEV_{it} + \alpha_5 LOSS_{it} \\ & + \alpha_6 BM_{it} + \alpha_7 SDSALES_{it} + \alpha_8 CYCLE_{it} + \alpha_9 PPE_{it} + \alpha_{10} GW_{it} \\ & + \alpha_{11} DIVIDEND_{it} + \alpha_{12} OCF_{it} + \alpha_{13} ADR_{it} + \alpha_{14} OUTDIR_{it} \\ & + \alpha_{15} BOARD_{it} + \alpha_{16} DUALITY_{it} + \alpha_{17} INDEP_{it} + \upsilon_{it}, \end{aligned} \quad (3)$$

where LEV is total liabilities divided by total assets; LOSS is the proportion of years for a firm to report negative earnings within ten fiscal years; BM is book value of common equity divided by market value of equity; SDSALES is the standard deviation of sales revenues in past five years scaled by average total assets; CYCLE is the operating cycle equal to the natural log of sum of days' accounts receivable and days inventory and take the average during year t-9 and year t; PPE is net property, plant and equipment scaled by total as-

[10] Duru and Reeb (2002b) document a positive (negative) relation between CEO compensation and geographic (industrial) diversification and that CEQs are compensated for value-enhancing geographic diversification but are penalized for value-reducing industrial diversification.

sets; DIVIDEND is cash dividends scaled by average total assets; OCF is the average cash flow from operations scaled by average total assets over the past five fiscal years; ADR equals one if the firm trades in the U.S. during the fiscal year, and zero otherwise; OUTDIR is the proportion of outside directors on the board of directors; BOARD is the number of members in the board; DUALITY equals 1 if the CEO is the chairman of the board of directors, and zero otherwise; and INDEP is the number of independent directors on the board. All other variables are as previously defined. We expect that firms engaging in diversification exhibit evidence of earnings smoothing. If industrial diversification (global diversification) is related to earnings smoothing, the coefficient α1 (α2) is different from zero.

The results for regressions of earnings smoothing on the two diversification variables are presented in Table **5**. Four models differ in whether fixed effects of either or both of year and industry are included. All fours models have significant explanatory power exceeding 0.206. The coefficients of LEV, BM, SDSALES, CYCLE, and CFO are significantly positive, whereas the coefficients of TA, LOSS, DIVIDEND, ADR, and INDEP are significantly negative for all models. These findings mean earnings are smoother in firms that have more leverage, higher book-to-market ratio, more volatile sales revenue, longer operating cycle, and greater operating cash flows, whereas earnings are less smooth in firms that are larger in size, suffer loss more frequently, declare more cash dividends, trade in the U.S. stock market, and have more independent board of directors. Moreover, the coefficient of GB of all models is significant and negative (p<0.006). While the coefficient of ID in Model (1) and Model (2) is significant and negative (p<0.088), the coefficient of ID in Model (3) and Model (4) is insignificant. These findings suggest that, after controlling for firms' operating characteristics and corporate governance attributes, earnings of firms with global diversification are less smooth. In addition, whether earnings are less smooth in firms with industrial diversification is inconclusive.

**Table 5. Regression Results of Earnings Smoothing Model**

$$ES_{it} = \alpha_0 + \alpha_1 ID_{it} + \alpha_2 GB_{it} + \alpha_3 TA_{it} + \alpha_4 LEV_{it} + \alpha_5 LOSS_{it} + \alpha_6 BM_{it} + \alpha_7 SDSALES_{it} + \alpha_8 CYCLE_{it} + \alpha_9 PPE_{it} + \alpha_{10} GW_{it} + \alpha_{11} DIVIDEND_{it} + \alpha_{12} OCF_{it} + \alpha_{13} ADR_{it} + \alpha_{14} OUTDIR_{it} + \alpha_{15} BOARD_{it} + \alpha_{16} DUALITY_{it} + \alpha_{17} INDEP_{it} + \upsilon_{it},$$

| **Model** / **Variables** | **(1)** **Coefficient** | **(2)** **Coefficient** | **(3)** **Coefficient** | **(4)** **Coefficient** |
|---|---|---|---|---|
| Constant | -1.173*** (0.000) | -1.197*** (0.000) | -1.417*** (0.000) | -1.441*** (0.000) |
| ID | -0.031* (0.099) | -0.032* (0.088) | 0.001 (0.478) | -0.001 (0.489) |
| GB | -0.065*** (0.003) | -0.060*** (0.005) | -0.067*** (0.003) | -0.061*** (0.006) |
| TA | -0.040*** (0.000) | -0.041*** (0.000) | -0.028*** (0.003) | -0.029*** (0.003) |
| LEV | 0.436*** (0.000) | 0.426*** (0.000) | 0.327*** (0.000) | 0.306*** (0.000) |
| LOSS | -1.662*** (0.000) | -1.632*** (0.000) | -1.619*** (0.000) | -1.578*** (0.000) |
| BM | 0.056*** (0.000) | 0.061*** (0.000) | 0.041*** (0.005) | 0.038** (0.022) |
| SDSALES | 0.459*** (0.000) | 0.468*** (0.000) | 0.352*** (0.000) | 0.358*** (0.000) |
| CYCLE | 0.171*** (0.000) | 0.172*** (0.000) | 0.149*** (0.000) | 0.148*** (0.000) |
| PPE | -0.068* (0.053) | -0.069* (0.051) | -0.058 (0.121) | -0.056 (0.131) |
| GW | <0.0001 (0.513) | <0.0001 (0.561) | <0.0001 (0.459) | <0.0001 (0.531) |
| DIVIDEND | -1.042*** (0.004) | -0.751** (0.046) | -1.252*** (0.000) | -0.973*** (0.009) |
| OCF | 1.298*** (0.000) | 1.278*** (0.000) | 1.561*** (0.000) | 1.535*** (0.000) |
| ADR | -0.325*** (0.001) | -0.328*** (0.001) | -0.227** (0.019) | -0.236** (0.015) |
| OUTDIR | 0.032 (0.545) | 0.054 (0.309) | 0.064 (0.230) | 0.090* (0.095) |
| BOARD | 0.006 (0.148) | 0.005 (0.237) | -0.005 (0.208) | -0.007 (0.105) |
| DUALITY | -0.021 (0.331) | -0.020 (0.339) | -0.024 (0.248) | -0.024 (0.241) |
| INDEP | -0.029** (0.012) | -0.024** (0.047) | -0.027** (0.022) | -0.020* (0.089) |
| Year | No | Yes | No | Yes |
| Industry | No | No | Yes | Yes |
| Observations | 5783 | 5783 | 5783 | 5783 |
| Adjusted R2 | 0.206 | 0.206 | 0.239 | 0.240 |
| F | 89.03 | 56.67 | 42.18 | 34.77 |

Note: P-values in parentheses are two-tailed, except those of ID and GB that are one-tailed. *, **, and *** denotes P < 0.1, 0.05, and 0.01, respectively. See Table **2** for variable definitions.

Thirdly, following LaFond et al. (2007), we decompose earnings smoothing as two components: innate and discretionary, and examine their relationships with diversification. We replace ES with IES and DES in Equation (1) for regression analysis. The innate earnings smoothing (IES) is the fitted value and the discretionary earnings smoothing (DES) is the residual from regression of Equation (3). The results presented in Table **6** are qualitatively the same. In Model (1) and Model (2), the coefficients of ID*IES are significantly positive (p<0.037), whereas the coefficients of GB*IES are significant and negative (p<0.025). The coefficients of ID*DES of all models are significantly positive (p<0.001), whereas

the coefficients of GB*DES of first three (last) models are significant (p<0.096) (marginally significant) and negative. These findings and those shown in Table **5** suggest that managers of globally diversified firms (industrially diversified firms) smooth earnings mainly through using their discretion over accounting to signal (garble) their private information that reduces (increases) information asymmetry associated with global diversification (industrial diversification).

**Table 6. Regression Results of Spread on Components of Discretionary Earnings Smoothing.**

| Model | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **Variable** | **Coefficient** | **Coefficient** | **Coefficient** | **Coefficient** |
| Constant | 90.68*** | 30.31*** | 89.92*** | 30.52*** |
| | (0.000) | (0.000) | (0.000) | (0.003) |
| ID | 10.79** | 9.229*** | 5.856* | 5.062 |
| | (0.006) | (0.010) | (0.084) | (0.102) |
| GB | -8.713** | -6.917** | -0.00839 | -0.682 |
| | (0.018) | (0.037) | (0.499) | (0.432) |
| IES | -15.57*** | -9.344*** | -17.99*** | -10.66*** |
| | (0.000) | (0.001) | (0.000) | (0.001) |
| DES | -4.652*** | -4.797*** | -5.957*** | -5.769*** |
| | (0.006) | (0.003) | (0.001) | (0.001) |
| ID×IES | 8.446** | 7.200** | 5.344 | 4.662 |
| | (0.025) | (0.037) | (0.106) | (0.123) |
| ID×DES | 8.890*** | 10.12*** | 7.975*** | 9.281*** |
| | (0.000) | (0.000) | (0.001) | (0.000) |
| GB×IES | -8.261** | -7.619** | -2.807 | -4.074 |
| | (0.024) | (0.025) | (0.253) | (0.151) |
| GB×DES | -6.024*** | -4.967** | -3.016* | -2.612 |
| | (0.005) | (0.011) | (0.096) | (0.114) |
| LNP | -10.14*** | -11.67*** | -8.392*** | -9.770*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| LNVOL | -45.88*** | -54.50*** | -45.79*** | -54.13*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| SDRET | 43.11*** | 60.32*** | 41.90*** | 59.40*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| SIZE | 3.535*** | 13.75*** | 2.763*** | 13.09*** |
| | (0.000) | (0.000) | (0.004) | (0.000) |
| INST | 0.206*** | 0.061* | 0.162*** | 0.022 |
| | (0.000) | (0.065) | (0.000) | (0.523) |
| MB | 4.812*** | 2.235*** | 4.964*** | 2.441*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| LNOWN | 17.36*** | 18.47*** | 18.16*** | 19.09*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| ROA | -46.80*** | -46.50*** | -40.09*** | -41.64*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| Year | No | Yes | No | Yes |
| Industry | No | No | Yes | Yes |
| Observations | 5783 | 5783 | 5783 | 5783 |
| Adjusted R2 | 0.619 | 0.667 | 0.627 | 0.672 |
| F | 588.3 | 446.9 | 226.8 | 224.6 |

Note: P-values in parentheses. *, **, and *** denotes P < 0.1, 0.05, and 0.01, respectively. See Table 2 for variable definitions.

Fourthly, to take into account the endogeneity issue of earnings smoothing and information asymmetry, we use 3SLS to estimate Equation (1) and Equation (3). In the first stage, we estimate earnings smoothing model to obtain the fitted values of earnings smoothing (ES). In the second stage, these fitted values of ES and the interactions with ID and GB are included in Equation (1) as explanatory variables. The results in Table **7** are qualitatively the same. That is, both industrially diversified firms and globally diversified firms engage in earnings smoothing. Earnings smoothing increases the positive relation between industrial diversification and spread but reduces the negative relation between global diversification and spread.

**Table 7. 3SLS Estimations for the Spread Model and Earnings Smoothing Model.**

| Spread Model | | Earnings Smoothing Model | |
|---|---|---|---|
| **Variable** | **Coefficient** | **Variable** | **Coefficient** |
| Constant | 28.44*** | Constant | -1.153*** |
| | (0.000) | | (0.000) |
| ES | -4.094 | ID | -0.033* |
| | (0.552) | | (0.084) |
| ID | 9.900** | GB | -0.060*** |
| | (0.024) | | (0.005) |
| GB | -5.285** | TA | -0.041*** |
| | (0.025) | | (0.000) |
| ID×ES | 7.605* | LEV | 0.406*** |
| | (0.080) | | (0.000) |
| GB×ES | -6.035*** | LOSS | -1.634*** |
| | (0.008) | | (0.000) |
| LNP | -11.71*** | BM | 0.030** |
| | (0.000) | | (0.018) |
| LNVOL | -54.84*** | SDSALES | 0.452*** |
| | (0.000) | | (0.000) |
| SDRET | 61.24*** | CYCLE | 0.172*** |
| | (0.000) | | (0.000) |
| SIZE | 13.24*** | PPE | -0.064* |
| | (0.000) | | (0.066) |
| INST | 0.075** | GW | 0.0005 |
| | (0.024) | | (0.586) |
| MB | 2.286*** | DIVIDEND | -0.834** |
| | (0.000) | | (0.026) |

| | | | |
|---|---|---|---|
| LNOWN | 19.65***<br>(0.000) | OCF | 1.217***<br>(0.000) |
| ROA | -49.08***<br>(0.000) | ADR | -0.354***<br>(0.000) |
| | | OUTDIR | 0.049<br>(0.353) |
| | | BOARD | 0.004<br>(0.280) |
| | | DUALITY | -0.022<br>(0.289) |
| | | INDEP | -0.022*<br>(0.060) |
| No. of Observations | 5783 | No. of Observations | 5783 |
| R2 | 0.668 | R2 | 0.209 |
| $\chi 2$ | 11661 | $\chi 2$ | 1534 |
| P | 0.000 | P | 0.000 |

Note: *P*-values in parentheses are two-tailed, except those of *ID, GB,* and their interactions with *ES* that are one-tailed. *, **, and *** denotes $P < 0.1$, 0.05, and 0.01, respectively. See Table 2 for variable definitions.

Finally, we adapt Lang and Lundolm (1996) and use analyst following to proxy for information asymmetry, controlling for potentially influencing factors including firm size, correlation between return and earnings, and volatility of return on equity. The untabulated results show that the relation between the number of analyst and global diversification is significantly positive ($p<0.003$), suggesting more analyst following for firms with global diversification. In addition, as expected, the incremental effect of earnings smoothing on the relation between the number of analyst and global diversification is significantly positive ($p<0.085$). If we include year effects in the model, the incremental effect of earnings smoothing on the relation between analyst following and industrial diversification is significantly negative ($p<0.057$). Thus, we find some evidence in consistent with our main findings. To summarize, the above findings suggest that global diversification is value-increasing and thus information is less asymmetric for globally diversified firms. In addition, the relation between spread and diversification is driven mainly by discretionary earnings smoothing. As such, earnings smoothing is a tool for managers to adjust their private information when firms adopt diversification strategy. Further, we use 3SLS to consider the endogeneity issue of spread and earnings smoothing and find our results still hold. Lastly, using analyst following as a proxy for information asymmetry yields similar results.

## 5. CONCLUDING REMARKS

Diversification impacts information asymmetry and firm value, while discretion over accounting provides managers with the opportunity to reveal or garble information. Prior studies investigate the relation between diversification and earnings management, disclosure quality, or firm value. We extend to examine the role of earnings smoothing in the relation between two types of diversification and information asymmetry.

The major results show that while bid-ask spread is greater for firms with industrial diversification, earnings smoothing deteriorates this relation and further increases the spread. Conversely, bid-ask spread is smaller for firms with global diversification, while earnings smoothing further reduces the spread associated with diversification. Moreover, the Tobin's q is greater for firms with global diversification. These results are robust with respect to alternative research methodology (3SLS), alternative proxy for information asymmetry, refined measure of earnings smoothing, and controlling for confounding factors such as leverage, negative earnings, and return on equity. Collectively, the evidence suggests that global diversification is favorable news and increases firm value, and that managers smooth earnings to further release their private information. Further, the incremental effect of earnings smoothing on the relation between spread and diversification is mainly driven by discretionary earnings smoothing. Thus, managers strategically smooth earnings through their discretion over accounting to inform or garble information, depending on whether diversification is favorable or unfavorable for shareholders. As such, earnings smoothing is a tool for managers that affects the relation between information asymmetry and diversification.

This paper contributes to our further understanding of the association between diversification and the relation between earnings smoothing and information asymmetry. Our evidence is subjected to the measure of diversification, due to lack of detailed disclosure on segment information. Using other information to measure the degree of diversification awaits future research.

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## CONFLICT OF INTEREST STATEMENT

The authors declare that they have no conflict of interest.

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