# Diversification and Earnings Management at U.S. Bank Holding Companies

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*This study looks at the effects of diversification on bank earnings management practices using a sample of banking holding companies (BHCs) reporting in the U.S. over the 2001 to 2020 period. Loan diversification and noninterest income diversification are associated with a substantial reduction in earnings management at banking firms. Earnings management drops by an average of 1.86 % at banking firms pursuing the two diversification measures, peaks during recessionary periods and recedes in expansionary times. Our empirical evidence implies that these diversification measures are associated with lower corporate opacity in diversified BHCs. Thus, we infer that broadly diversified banking firms are likely to have stable earnings through offsetting losses and gains. Results have important implications for enhancing governance policies at banking firms.*

*Keywords: earnings management, earnings quality, diversification, bank holding companies*

## INTRODUCTION

Owing to its effects on a firm's stock value and cost of capital, earnings' quality is relevant to investors, regulators, insiders, analysts, and other stakeholders. Investors lost billions in the aftermath of WorldCom and Enron collapses. Accounting scandals associated with these corporate failures led to a new era of legislation – epitomized by the Sarbanes-Oxley (SOX) Act 2002 -- intended to dovetail diverging financial interests, mitigate agency problems, and ameliorate corporate governance practices by improving transparency in financial reporting and accounting schemes. Nonetheless, during the great recession, earnings management at U.S. bank holding companies (BHCs) has spiked to levels not seen since the introduction of the SOX.

Self-serving corporate insiders have the incentive to manage earnings to increase the value of equity-based incentives (Hu et al., 2015; Cheng, Warfield, & Ye, 2011; Bergstresser & Philippon, 2006), meet bank regulatory capital (Beatty et al., 1995), reduce the firm's cost of capital (Strobl, 2013), and smooth earnings (Allayannis & Weston, 2005; Barton, 2001). Evidence of earnings management practices emerges in financial reports preceding major corporate events such as initial public offerings (Liu et al., 2014; Teoh et al., 1998a), seasoned equity offerings (Teoh et al., 1998b), stock-for-stock mergers (Higgins, 2013; Erickson & Wang, 1999; Louis, 2004), and management buyouts (Perry & Williams, 1994). An inspection of the earnings management literature reveals that insiders have a proclivity to manage earnings either in ways that enhance their benefits or the short-term interests of some stakeholders at the expense of others.

There is evidence of earnings management among banking firms (Ozili, P.K., 2022; Hong et al.,2020; al, Mukherjee & Pana, 2019; Beatty and Liao, 2014; Bouvatier et al., 2014; Beatty et al., 2002; Cornett et al., 2009). Banks use loan loss provisions and security gains and losses to manage earnings. The motives

for managing earnings upwards/downwards may also be divergent along with different points in business cycles. There is also ample evidence of earnings management by firms' insiders to further their benefit.

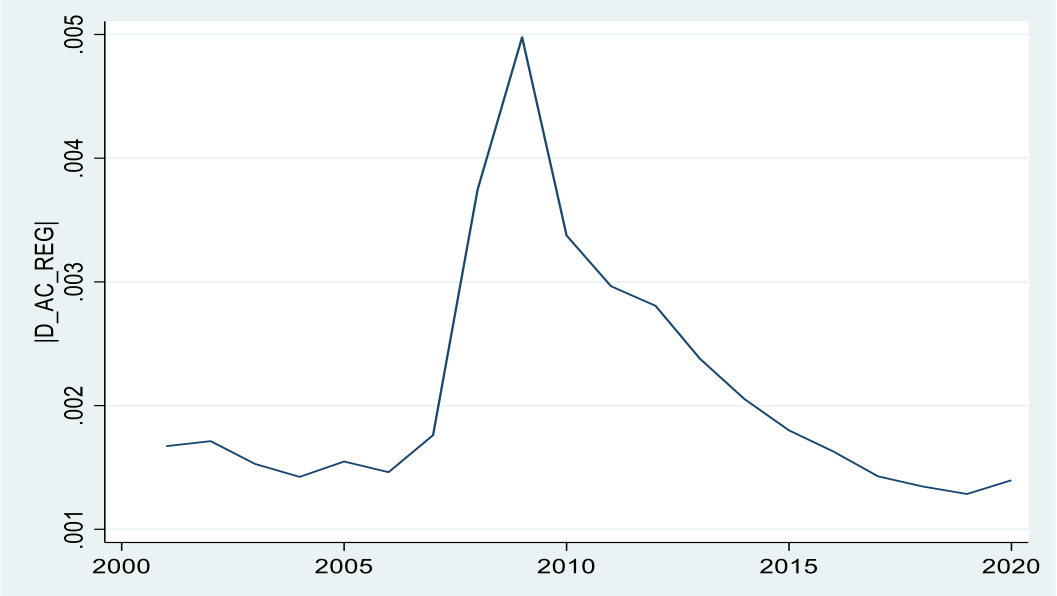
A more significant share of non-interest activities increases the risk (Maudos 2017; Williams, 2016; DeYoung & Torna, 2013; Lepetit et al., 2008; Stiroh & Rumble, 2006; DeYoung & Roland 2001), but the relationship depends on other relevant factors, including bank size, ownership structure, and the nature of non-interest income diversification. Other factors impacting the relationship for different families of risks include credit (Abedifar et al., 2018; Elyasiani & Wang, 2012; Akhigbe & Stevenson, 2010); liquidity (Carlson, 2004); and systemic (De Vries, 2005) risks.

With differing conclusions, several papers have examined the risk-return and value implication of this diversification in banking. Whether diversification has a positive or negative impact on banking risk remains undecided (Stiroh, 2015). This study attempts to fill this void by examining firms' attributes that may mitigate or aggravate earnings management practices by banks; whether diversification alleviates or exacerbates earnings management problems at the banking firm. Distinctly, it inspects four bank attributes: loan diversification, non-interest income diversification, portfolio diversification, and revenue diversification and their effects on earnings management.

General economic conditions may also influence management's appeal to earnings management. Fig. 1 shows that earnings management practice spiked in 2008, the year the National Bureau of Economic Research, NBER, had determined as the beginning of the great recession, then fell substantially in 2010, when the NBER declared the month of June 2009 as the end of the last recession and the beginning of the economic expansion. Nevertheless, Fig. 1 illustrates a pattern over the medium term – depicted within a business cycle – thus, additional investigations may be needed to confirm secular trends in earnings management around business cycles.

Whereas the extant literature has investigated several components of the risk-return relationship in banks' loan portfolios and their associations with noninterest income-generating activities, it has overlooked the impact of bank loans and noninterest income diversifications on the earnings management practices in the banking sector. A body of research suggests that as banks pursue diversification through noninterest income activities, they become increasingly opaque to outsiders. For example, using quarterly data for a sample of U.S. banks from 2001 to 2005, Elyasiani & Wang (2008) show that banks experience higher information asymmetry as they diversify noninterest income activities.

**FIGURE 1**
**AVERAGE DISCRETIONARY ACCRUALS: 2001 - 2020**



Information asymmetry consequent to diversification may shield insiders and nourish their appetite to manage earnings. The added source of income generated from non-traditional banking activities may also make bank earnings more stable. Similarly, loan portfolio diversification across different asset classes may also reduce the risk of bankruptcy and simultaneously make bank earnings more stable. Diversification resulting from increased opportunity to expand into new loan sectors or new noninterest income-generating activities may enhance the value of the bank when based on positive net present value opportunities. This favorable framework created by diversification may lower insiders' incentives to manage earnings.

Bank loan portfolio diversification and activity diversification are key factors influencing banks' risk and return tradeoffs. It is crucial to examine the interplays between various features of diversification and banks' earnings management practices and earnings quality.

Using panel regressions on a sample of more than 7,000 bank-firm years from 2001 to 2020, we find an inverse relationship between loan diversification, noninterest income diversification, portfolio diversification, revenue diversification, and bank earnings management. In particular, we find that loan diversification and noninterest income diversification substantially reduce earnings management at the banking firm; earnings management plummets by an average of 1.86 % at the average banking firm pursuing the two diversification measures. The results corroborate with Jiraporn et al. (2008), who find that diversification reduces earnings management at the industry level. They report that industrial diversification alleviates earnings management by 1.8%, and the combination of industrial and global diversification alleviates earnings management by 2.5%.

The remainder of the paper proceeds as follows: Section 2 reviews the literature; Section 3 presents the methodology while section 4 describes the data. Section 5 presents the results, and section 6 concludes.

## LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

### Literature Review

Regulations that prohibited banks from branching within state lines started to slacken in the 1970s. Intrastate branching and interstate banking deregulation garnered momentum in the 1980s and culminated with the Regal Neal Interstate Banking and Branching Efficiency Act of 1994 (Strahan, 2003). Banks were able to diversify their loan portfolio across different geographic areas. As a result, they expanded their operations to non-traditional fee-generating activities (Deyoung & Rice, 2004). Elyasiani & Wang (2008) postulate that the non-interest income of U.S. banks has been growing twice the rate of interest income since the 1980s. Coupled with deregulation in the 1980s and 1990s, advances in new information technology might have created a framework for nontraditional banking activities, catapulted competition between banks, and oriented them towards fee-generating activities.

Banks may be motivated to diversify their loan portfolio to reduce the probability of failure resulting from excessive exposure to one sector. Whether the benefits of diversification in the form of risk reduction outweigh the benefits of specializing as delegated monitors remain debatable (Winton, 1999). Many studies inspect the link between diversification and stability and find that diversification improves banking sector stability (Deng et al., 2013; Amidu & Wolfe, 2013; Nguyen et al., 2012). Others fail to find evidence of risk reduction through diversification, which exacerbates bank risk-taking through leverage acceleration or capital deceleration (Cebenoyan & Strahan, 2004).

Evidence that loan diversification and noninterest income diversification affect bank risk and return is abound in the extant literature (see, e.g., Maudos 2017; Williams, 2016; DeYoung & Torna, 2013; Elyasiani & Wang, 2008; Deng et al., 2007; Acharya et al., 2006; Stiroh & Rumble, 2006; Deyoung & Rice, 2004; Rebecca & Philip, 1997). Rebecca & Philip (1997) find that loan diversification into different sectors such as commercial and industrial, real estate, consumer, and agricultural sectors has no effect on a bank's systemic risk but does reduce the unsystematic risk. Using a sample of Italian banks between 1993 and 1999, Acharya et al. (2006) find overall deterioration of performance of high-risk banks as they increase the diversification of their asset sector loans. Conversely, bank risk-adjusted return on equity decreases as they increase the proportion of revenue generated from noninterest sources (Stiroh, 2004).

Diversification within a financial intermediary reduces its probability of bankruptcy (Diamond, 1984). Using a sample of 412 bank holding companies, Klein & Saidenberg (1998) find that multi-bank holding companies hold less capital and do more lending than their pure-play counterparties; and conclude that banks benefit from geographic diversification. Deng and Elyasiani (2008) employ bank deposits to proxy for diversification and find that geographic diversification is associated with a significant decline in BHC total, firm-specific, and systemic market risks. Deng et al. (2007) report that asset and activity diversifications, in addition to geographic diversification, lead to lower bond yield spread for the BHCs in their sample.

Several studies report the downsides associated with asset and noninterest income diversifications. Bank loan diversification reduces the risk-return tradeoff (Acharya et al., 2006). DeLong (2001) finds bank mergers that focus on activity and geography increase stockholder value by 3% at the merger announcement. Deyoung & Rice (2004) observe that a marginal increase in noninterest income is associated with a poor risk-return tradeoff. Stiroh (2004) argues that the higher bank's noninterest income, the lower its risk-adjusted return.

Amidu and Kuipo (2015) examine the impact of revenue diversification and non-interest diversification on earnings management using a sample of 330 banks in 29 African countries. They find negative relationship between revenue diversification and earnings management; however, they don't find signification relationship between earnings management and non-interest income diversification. Using a sample of U.S. BHCs., our study examines the effect of loan diversification as well as security portfolio diversification on earnings management, in addition to the two diversification measures examined in Amidu and Kuipo (2015).

Using sample of nonfinancial firms, Jiraporn et al. (2008) find diversification reduces earnings management at the industry level. After testing two competing hypotheses: the information asymmetry hypothesis and the offsetting accruals hypothesis results, the authors support the offsetting accruals hypothesis. This study seeks to fill a gap in the extant banking literature by examining the impacts of diversification on earnings management practices at U.S. BHCs.

**Hypotheses**

Banks can manage earnings by over-or under-provisioning for loan loss reserves and realizing security gains or losses (Beatty et al., 2002). The type of loans in their portfolio could affect their ability to under-provision to inflate earnings or over-provision to deflate their income. Bank management may have more flexibility to exercise any discretion on recognizing loan losses in the case of heterogeneous loans than homogeneous loans, as suggested by (Liu & Ryan, 2006). These authors also underline that banks have less ability to manipulate earnings by over-or under- provisioning loan loss reserves for homogeneous loans. In addition, diversification in a bank's loan portfolio may introduce excess complexity, allowing management to take advantage of the resulting information asymmetry to manage earnings. However, diversification of the loan portfolio may also reduce the bank's exposure to a downturn in a particular economic sector and effectively reduce its earnings volatility. The more stable earnings that result from offsetting cash flows derived from different loan categories at different states of the economy may mitigate the earnings management practices at a bank leading up to the following hypothesis.

***H1:*** *Loan diversification has no effect on earnings management practices of BHCs.*

Diversification of noninterest income sources could also affect bank earnings management. First, noninterest income could be an additional source of revenue above interest income from loans. Second, varying sources of noninterest income may have an offsetting relationship that increases the predictability of the noninterest income as a general category. Thus, diversification in the noninterest income category may help mitigate the tendency to manage earnings. Nevertheless, the information asymmetry that results from noninterest income (Elyasiani & Wang, 2008) could exacerbate bank earnings management practice. These considerations lead us to form the following hypotheses:

***H2:*** *Non-interest income diversification has no effect on earnings management practices of BHCs.*

***H3:*** *Revenue diversification has no effect on earnings management practices of BHCs.*

***H4:*** *Securities portfolio diversification has no effect on earnings management practices of BHCs.*

## METHODOLOGY

### Discretionary Accruals

Loan loss provisions and realized security gains and losses are two components commonly used to manage earnings (Beatty et al., 2002). Following Beatty et al. (2002) and Cornett et al. (2009), we estimate loan loss provisions, realized security gains and losses using the following two models.

$$\mathrm{LLP_{it}} = \alpha_{tr} + \beta_1 \mathrm{LNASSETS_{it}} + \beta_2 \mathrm{NPL_{it}} + \beta_3 \mathrm{LLR_{it}} + \beta_4 \mathrm{LOANR_{it}} + \beta_5 \mathrm{LOANC_{it}} + \beta_6 \mathrm{LOAND_{it}} + \beta_7 \mathrm{LOANA_{it}} + \beta_8 \mathrm{LOANI_{it}} + \beta_9 \mathrm{LOANF_{it}} + \varepsilon_{it} \quad (1)$$

where subscripts *i* and *t* represent the bank holding company's identifier and the year indicator spanning 2001 through 2020. *r* captures the U.S. Department of Commerce defined region index; the LLP variable stands for loan loss provisions; LNASSET is the natural log of total assets and serves as a proxy for BHCs' size, while NPL measures nonperforming loans and includes loans past due 90 days or more and still accruing interest, and loans in nonaccrual status. LLR is a measure of loan loss allowance; the LOANR variable represents real estate loans; the LOANC variable is a measure of commercial and industrial loans; LOAND represents loans to depository institutions; LOANA is a measure of agriculture loans; LOANI represents consumer loans; and LOANF measures loans to foreign governments. We derive all loan variables as a percentage of total loans in each BHC loan portfolio. Finally, $\varepsilon$ represents the stochastic error term. Eq. (1) is estimated using OLS regressions controlling for year and region-fixed effects.

Next, the error term from Eq. (1) is subsequently transformed into a proportion of total assets as follows: $\mathrm{DLLP_{it}} = \varepsilon_{it} * \left(\frac{\mathrm{TOTAL\ LOANS_{it}}}{\mathrm{TOTAL\ ASSETS_{it}}}\right)$. We further estimate the second component of the earnings management model as shown in Eq. (2). We estimate the model using dummy-year and firm fixed effects regressions.

$$\mathrm{RSGL_{it}} = \alpha_{it} + \beta_1 \mathrm{LNASSETS_{it}} + \beta_2 \mathrm{URSGL_{it}} + \varepsilon_{it} \quad (2)$$

In Eq. (2), $\mathrm{RSGL_{it}}$ is the realized security gains and losses as a percentage of total assets (including realized gains and losses from available-for-sale securities and held-to-maturity securities); and $\mathrm{URSGL_{it}}$ represents unrealized security gains and losses (including unrealized gains and losses from available-for-sale securities, exclusively) as a percentage of total assets. Subscripts *i* and *t* are as previously defined.

Explicitly, the total discretionary accruals resulting from discretionary loan loss provisions ($\mathrm{DLLP_{it}}$) and discretionary realized security gains and losses ($\mathrm{DRSGL_{it}}$) represent our earnings management variables. The construction of ($\mathrm{DLLP_{it}}$) is shown above, and the ($\mathrm{DRSGL_{it}}$) variable is the regression error term ($\varepsilon_{it}$) from Eq. (2). When managers overprovision for loan losses, earnings are underestimated. However, when a BHC realizes security gains, earnings get a boost. Therefore, $\mathrm{DLLP_{it}}$, subtracted from $\mathrm{DRSGL_{it}}$ yielding $\mathrm{DACREG_{it}}$, a measure of earnings management practices among BHCs, where a high level of $|\mathrm{DACREG_{it}}|$ indicates a high prevalence of earnings management.

### Diversification Variables

U.S. BHCs report total loans and the amount in each loan category in the quarterly FRY-9C reports they file with the Federal Reserve Bank, the FED. To construct our loan diversification variables, we use the following loan components, which include loans (1) secured by real estate, (2) to depository institutions and acceptances of other banks, (3) to finance agricultural production and other farming activities, (4) commercial and industrial entities, (5) to individuals for household, family, and other personal expenditures,

(6) to foreign governments and official institutions, (7) for acquiring and carrying securities, (8) to lease financing receivables, etc.

We model loan diversification, $LOANDIV_{it}$, a measure of diversification by BHCs, as (1-$HERFINDAHLINDEX_{it}$). The measure increases proportionately with the level of loan diversification. We compute the Herfindahl Index for various types of loans as the sum of the squares of each loan type divided by the square of the sum of the absolute value of the loans. To model noninterest income, we take the following components from Schedule HI (item 5) of FRY-9C: (1) income from fiduciary activities, (2) service charges on deposit accounts in domestic offices, (3) trading revenue, (4) fees and commissions from securities brokerage, (5) investment banking, advisory, and underwriting fees and commissions, (6) fees and commissions from annuity sales, (7) underwriting income from insurance and reinsurance activities, (8) income from other insurance activities, (9) venture capital revenue, (10) net servicing fees, (11) net securitization income, and (12) other noninterest income. We then construct a measure of noninterest income diversification by BHC, as HERFINDAHLINDEX. The measure increases with the level of noninterest income diversification. Using the same procedure for bank loans, we derive the Herfindahl Index for various types of noninterest income components as the sum of the squares of each noninterest income type divided by the square of the sum of the absolute value of the noninterest income sources.

In addition, we compute another variable, $REVDIV_{it}$, as HERFINDAHLINDEX measure based on net interest income and noninterest income, an alternative measure of noninterest income diversification. However, it only has two components: net interest income and total noninterest income.

We measure securities portfolio diversification based on HERFINDAHL_INDEX of securities holdings of a BHC as reported in Schedule HC-B of FRY-9C. We include the following components to deriving securities portfolio diversification metric: 1) U.S. Treasury securities, 2) U.S. government agency and sponsored agency obligations, 3) securities issued by states and political subdivisions in the U.S., 4) mortgage-backed securities (MBS), 5) asset-backed securities and structured financial products, 6) other debt securities, and 7) investments in mutual funds and other equity securities with readily determinable fair values. Many items included in Schedule HC-B of FRY-9C of different years have changed, and we follow the items reported in the Schedule by tracing the different updates of the FRY-9C form throughout the sample period.

To test our four hypotheses, we run the absolute value of discretionary accruals on variables that include loan diversification, noninterest income diversification, revenue diversification, and securities portfolio diversification.

$$|DACREG_{it}| = \alpha_t + \beta_1 LNASSETS_{it} + \beta_2 LOANDIV_{it} + \beta_3 NIIDIV_{it} + \beta_4 REVDIV_{it} + \beta_4 SECPDIV_{it_{it}} + \varepsilon_{it} \quad (3)$$

where all of the variables are as previously defined; we also include control variables similar to those used in Mukherjee & Pana (2019). Our model also includes controls for the following variables: ROA is the return on assets; LEVERAGE is total debt scaled by total assets; LIQUIDITY is total cash scaled by total deposits; total assets scale MKTSEN, measured as the difference between short-term assets and short-term liabilities; TIER1RW is the risk-based capital ratio of a BHC; COINST states coincident indexes for each of the 50 states which summarize current economic conditions.

## SAMPLE AND DESCRIPTIVE STATISTICS

Our sample starts with all U.S. BHCs filing FRY-9C reports with the Federal Reserve from 2001 to 2020. We only include BHCs with an asset size of 1 billion or more. We winsorize the variables and remove values falling below 1% or above 99%. We collect annual data from Call Reports available at the website of the FED of Chicago. Our sample period includes one mild recession that lasted for eight months, a great recession that lasted for eighteen months, two economic expansion periods, and part of the pandemic period.

We run models (1) and (2) on our data to generate discretionary accruals variables. We derive the discretionary accrual from the error terms of the two models. We provide some descriptive statistics on the variables used in the regressions in Table 1. The results of the two regressions are in Table 2. The first model is an OLS regression with year and region dummies, while the second is an OLS model with year and firm dummies. From the error terms, we constructed the dependent variable, $|DACREG_{it}|$.

**TABLE 1**
**PANEL A: DESCRIPTIVE STATISTICS FOR VARIABLES USED IN EQS. (1) AND (2)**

| | Obs. | Mean | Std. Dev. | Min | 25p | Median | 75p | Max |
|---|---|---|---|---|---|---|---|---|
| URSGL | 7655 | 0.0005 | 0.0023 | -0.0079 | -0.0006 | 0.0001 | 0.0014 | 0.0121 |
| LLP | 7929 | 0.0066 | 0.0132 | -0.0494 | 0.0012 | 0.0028 | 0.0063 | 0.2040 |
| RSGL | 7770 | 0.0002 | 0.0008 | -0.0045 | 0 | 0.0001 | 0.0004 | 0.0045 |
| LNASSETS | 7933 | 15.523 | 1.4930 | 13.821 | 14.425 | 15.036 | 16.099 | 21.943 |
| NPL | 7930 | 0.0157 | 0.0278 | -0.0144 | 0.0031 | 0.0077 | 0.0169 | 0.5004 |
| LLR | 7930 | 0.0151 | 0.0121 | 0 | 0.0101 | 0.0129 | 0.0170 | 0.2273 |
| LOANR | 7930 | 0.6787 | 0.2062 | 0 | 0.5863 | 0.7190 | 0.8226 | 1.0191 |
| LOANC | 7930 | 0.1740 | 0.1220 | 0 | 0.0938 | 0.1523 | 0.2227 | 1 |
| LOAND | 7930 | 0.0035 | 0.0297 | 0 | 0 | 0 | 0 | 0.9195 |
| LOANA | 7927 | 0.0150 | 0.0453 | 0 | 0 | 0.0009 | 0.0099 | 0.9653 |
| LOANI | 7930 | 0.0765 | 0.1269 | 0 | 0.0094 | 0.0302 | 0.0918 | 0.9999 |
| LOANF | 7919 | 0.0002 | 0.0017 | 0 | 0 | 0 | 0 | 0.0705 |

Table 1 presents the descriptive statistics for the variables used in Models (1) and (2). URSGL stands for the unrealized security gains and losses (includes only unrealized gains and losses from available-for-sale securities) as a percentage of total assets; LLP stands for loan loss provisions expressed as percent of total loans; RSGL stands for the realized security gains and losses as a percentage of total assets (includes realized gains and losses from available-for sale securities and held-to-maturity securities); LNASSET stands for log of total assets in 000's; NPL stands nonperforming loans (includes loans past due 90 days or more and still accruing interest and loans in nonaccrual status); LLR stands for loan loss allowance; LOANR stands for real estate loans; LOANC stands for commercial and industrial loans; LAOND stands for loans to depository institutions; LOANA stands for agriculture loans; LOANI stands for consumer loans, and LOANF stands for loans to foreign governments. All loans are expressed as percent of total loans.

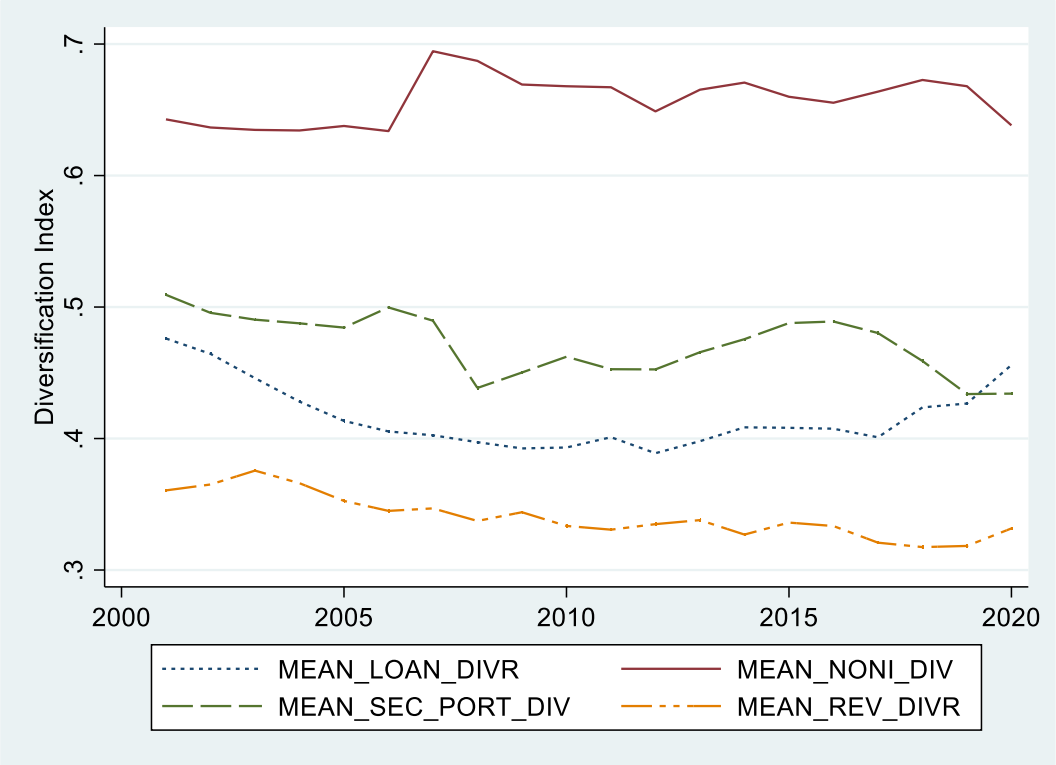
We next report the descriptive statistics of the variables used in our main regressions in Table 3. The average discretionary accrual for the period is - 0.008% of total assets, very close to zero. We anticipated this effect since the discretionary accruals are the error term. However, the mean of the absolute value of discretionary accruals -- our variable of interest -- is 0.209% of total assets, with a standard deviation of 0.242% of total assets, 116% of the mean absolute value of the discretionary accruals. From the average annual absolute value of discretionary accruals, |DACREG|, throughout the sample period, as shown in Fig. 1, emerge several patterns. First, the earning management practices tend to go up during recessionary periods and fade during economic expansion. The graph starts with some level of |DACREG| during the mild recession of 2001, and from the bottom level of |DACREG|, during the first economic expansion that lasted for 73 months, followed by very excessive |DACREG| amount during the great recession to finally wane in 2009, the official end of the recession by the Business Cycle Dating Committee of the NBER.

**TABLE 2**
**OLS REGRESSION WITH DUMMY FOR YEARS, REGIONS, AND FIRMS**

| | **(1)** | **(2)** |
|---|---|---|
| Dept. variables | $LLP_{it}$ | $RSGL_{it}$ |
| LNASSETS | 0.0004*** | 0.0000 |
| | (4.221) | (0.209) |
| URSGL | | 0.0324*** |
| | | (4.436) |
| NPL | 0.109*** | |
| | (10.73) | |
| LLR | 0.560*** | |
| | (18.73) | |
| LOANR | -0.0006 | |
| | (-0.661) | |
| LOANC | -0.0005 | |
| | (-0.330) | |
| LOAND | 0.0044** | |
| | (1.988) | |
| LOANA | -0.0033 | |
| | (-1.112) | |
| LOANI | 0.0095*** | |
| | (5.262) | |
| LOANF | -0.0142 | |
| | (-0.543) | |
| Constant | -0.0104*** | 0.0004 |
| | (-5.216) | (0.740) |
| Year controls | Yes | Yes |
| Region controls | Yes | No |
| Firm controls | No | Yes |
| Observations | 7,779 | 7,523 |
| Adjusted $R^2$ | 0.711 | 0.222 |

Table 2 presents OLS regression results with years, regions and firms dummies. t-statistics are into parentheses. ***, ** and * represent 1%, 5% and 10% level of confidence.

**FIGURE 2**
**DIVERSIFICATION MEASURES: 2001 – 2020**




A close inspection of the loan diversification reveals some banks with only one type of loan and others with well-diversified portfolios, as shown in Table 3. The same observation applies to the other three diversification measures. In addition, BHCs within the sample period have higher levels of diversification in their noninterest income activities, with a diversification index of 0.6576, compared to the extent of diversification observed in their loan portfolio with an average diversification index of 0.4155. Fig. 2 shows the average annual value of the loan diversification and the average annual value of other diversification measures throughout the sample period. Loan diversification moves in the opposite direction to noninterest diversification over the sample period.

**TABLE 3**
**DESCRIPTIVE STATISTICS FOR VARIABLES USED IN MODELS (3)**

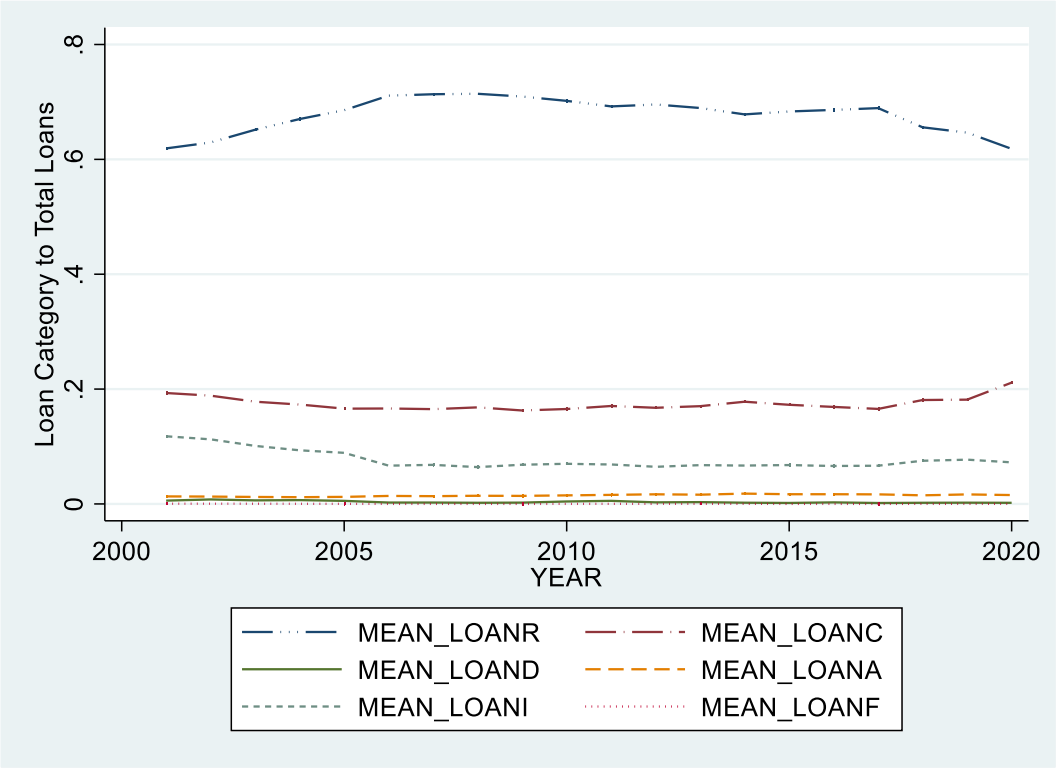
| | Obs. | Mean | Std. Dev. | Min | 25p | Median | 75p | Max |
|---|---|---|---|---|---|---|---|---|
| DACREG | 7,390 | -0.0001 | 0.0032 | -0.0255 | -0.0014 | 0.00001 | 0.0014 | 0.0188 |
| \|DACREG\| | 7,390 | 0.0021 | 0.0024 | 0 | 0.0006 | 0.0014 | 0.0027 | 0.0255 |
| LNASSETS | 7,930 | 15.523 | 1.4930 | 13.821 | 14.425 | 15.036 | 16.099 | 21.943 |
| LOANDIV | 7,930 | 0.4155 | 0.1720 | 0 | 0.2975 | 0.4297 | 0.5454 | 0.8288 |
| NIIDIV | 7,930 | 0.6576 | 0.1278 | 0 | 0.6106 | 0.6888 | 0.7432 | 0.8642 |
| REVDIV | 7,930 | 0.3405 | 0.1132 | 0 | 0.2717 | 0.3609 | 0.4277 | 0.5000 |
| SECPDIV | 7,910 | 0.4727 | 0.1871 | 0 | 0.3609 | 0.5160 | 0.6161 | 0.8167 |
| ROA | 7,560 | 0.0133 | 0.0106 | -0.0418 | 0.0093 | 0.0141 | 0.0186 | 0.0553 |
| LEVERAGE | 7,750 | 0.6555 | 0.1419 | 0.0895 | 0.5973 | 0.6832 | 0.7498 | 0.8976 |
| LIQUIDITY | 7,780 | 0.0801 | 0.0721 | 0.0091 | 0.0311 | 0.0548 | 0.1059 | 0.4621 |
| MKTSEN | 7,760 | 0.1383 | 0.1852 | -0.3772 | 0.0252 | 0.1405 | 0.2584 | 0.6410 |

| | Obs. | Mean | Std. Dev. | Min | 25p | Median | 75p | Max |
|---|---|---|---|---|---|---|---|---|
| TIER1RW | 5,020 | 0.1240 | 0.0388 | 0.0363 | 0.0999 | 0.1173 | 0.1386 | 0.3651 |
| COINST | 7,570 | 0.0199 | 0.0326 | -0.1921 | 0.0126 | 0.0282 | 0.0392 | 0.1502 |

Table 2 is a summary of statistics for the variables in the main regressions. DACREG is a measure of earning management practice among BHCs, where a high level of DACREG indicates high earning management practice; |DACREG | stands for the absolute value of DACREG; LOANDIV is a measure of loan diversification by BHCs; NIIDIV is a measure of non-interest income diversification by BHC; REVDIV is a measure of revenue diversification by BHC, and SECPDIV is a measure of revenue diversification by BHC. ROA is the return on assets; LEVERAGE is total debt scaled by total assets; LIQUIDITY is total cash scaled by total deposits; MKTSEN is measured as the difference between short-term assets and short-term liabilities scaled by total assets; TIER1RW is the risk-based capital ratio of a bank; COINST is the coincident state indexes for each of the 50 states which summarize current economic conditions

We depict a slump in loan diversification in Fig. 2. Among the components of the loan portfolio that make up the index, we plot six in Fig. 3. The loan components are part of the independent variable in Eq. (1), as defined above. As illustrated in the graph, real estate loans continued to increase from 2001 until 2006 and remained at that level until declining in 2017. Looking at Fig. 3 in conjunction with Fig. 2, one can observe the sharp decline in loan diversification, more pronounced from 2001 to 2006, yet the diversification variable continues to decline, albeit at a slower rate, until 2017, when it starts rebounding. The increasing dominance of real estate loans could explain the sharp decline in loan diversification from 2001 to 2006, followed by an almost flat line till 2017, and finally starting to trend up in 2017.

**FIGURE 3**
**PROPORTION OF EACH LOAN CATEGORY TO TOTAL LOANS**



## EMPIRICAL RESULTS

**TABLE 4**
**FIXED EFFECTS PANEL REGRESSION CONTROLLING FOR YEAR EFFECTS**

| Dept. variable | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| LNASSETS | -0.0000 | -0.0000 | -0.0001 | -0.0001 | -0.0001 |
| | (-0.666) | (-0.725) | (-1.011) | (-0.857) | (-1.025) |
| LOANDIV | -0.0009* | | | | -0.0009* |
| | (-1.788) | | | | (-1.720) |
| NIIDIV | | -0.0016*** | | | -0.0020*** |
| | | (-2.591) | | | (-3.106) |
| REVDIV | | | -0.0024*** | | -0.0029*** |
| | | | (-2.762) | | (-3.213) |
| SECPDIV | | | | 0.0002 | 0.0002 |
| | | | | (0.705) | (0.655) |
| Constant | 0.0033* | 0.0040** | 0.0044** | 0.0032* | 0.0061*** |
| | (1.745) | (2.050) | (2.294) | (1.655) | (3.050) |
| Year controls | Yes | Yes | Yes | Yes | Yes |
| Observations | 7,389 | 7,389 | 7,389 | 7,365 | 7,365 |
| R-squared | 0.178 | 0.179 | 0.180 | 0.178 | 0.186 |
| Adj. $R^2$ | 0.175 | 0.177 | 0.178 | 0.176 | 0.183 |
| F | 22.37 | 22.69 | 22.29 | 22.86 | 20.42 |

This table reports the estimation results of earnings management based on Fixed Effects regressions absolute value of discretionary accruals on loan diversification, noninterest income diversification, revenue diversification, portfolio diversification and control variables, which take the general form:

$$|\mathbf{DACREG_{it}}| = \boldsymbol{\alpha_t} + \boldsymbol{\beta_1}\mathbf{LNASSETS_{it}} + \boldsymbol{\beta_2}\mathbf{LOANDIV_{it}} + \boldsymbol{\beta_3}\mathbf{NIIDIV_{it}} + \boldsymbol{\beta_4}\mathbf{REVDIV_{it}} + \boldsymbol{\beta_5}\mathbf{SECPDIV_{it}} + \mathbf{e_{it}}$$

where the variables are as previously defined. t-statistics are reported into parentheses. ***, **, and * represent 1%, 5% and 10% levels of significance. Standard errors for the estimates are clustered at firms' level.

Table 4 displays the results from estimating Eq. (1) using fixed effects regression controlling for year effects. The standard errors are robust and clustered at the firm's level. The dependent variable is earnings management, measured as the absolute value of discretionary accruals. Higher values of the dependent variable indicate a high prevalence of earnings management practices. The independent variables consist of the four measures of diversification 1) loan diversification, 2) noninterest income diversification, 3) revenue diversification, and 4) security portfolio diversification. We control for bank size in all of the specifications. The results show that three out of four diversification measures have a negative and significant effect on earnings management. In our sample, size does not seem to be related to earnings management. It is noteworthy to highlight that, in column (5) of Table 4, where all the four measures of diversification enter the regression, the coefficients are qualitatively identical; and the point estimates suggest that a mix of loan diversification, noninterest income diversification, revenue diversification, and security portfolio diversification have substantial impacts in reducing earnings management. Our initial findings in Table 4 are consistent with the view that diversification increases transparency and mitigates asymmetric information problems and that broadly diversified banks have a broader revenue base and pursue income smoothing to a lesser extent.

**TABLE 5**
**FIXED EFFECTS PANEL REGRESSION WITH CONTROL VARIABLES**

| Dept. variable | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| LNASSETS | -0.0000 | -0.0000 | 0.00001 | -0.0000 | 0.0000 |
| | (-0.0001) | (-0.0286) | (0.0126) | (-0.0283) | (0.0283) |
| LOANDIV | -0.0010 | | | | -0.0011 |
| | (-1.233) | | | | (-1.333) |
| NIIDIV | | -0.0016** | | | -0.0016** |
| | | (-2.116) | | | (-2.107) |
| REVDIV | | | 0.0004 | | 0.0002 |
| | | | (0.360) | | (0.187) |
| SECPDIV | | | | -0.0000 | -0.0000 |
| | | | | (-0.0739) | (-0.174) |
| ROA | -0.0823*** | -0.0827*** | -0.0831*** | -0.0825*** | -0.0827*** |
| | (-7.923) | (-7.909) | (-7.977) | (-7.925) | (-7.931) |
| LEVERAGE | 0.0017* | 0.0019* | 0.0017* | 0.0017* | 0.0019* |
| | (1.720) | (1.847) | (1.709) | (1.700) | (1.866) |
| LIQUIDITY | -0.0016 | -0.0015 | -0.0016 | -0.0016 | -0.0014 |
| | (-1.436) | (-1.407) | (-1.490) | (-1.490) | (-1.346) |
| MKTSEN | -0.0000 | -0.0000 | -0.0000 | -0.0000 | -0.0000 |
| | (-0.0962) | (-0.151) | (-0.215) | (-0.187) | (-0.0727) |
| TIER1RW | 0.0030 | 0.0027 | 0.0030 | 0.0031 | 0.0026 |
| | (1.104) | (0.980) | (1.105) | (1.111) | (0.961) |
| COINST | 0.0007 | 0.0008 | 0.0007 | 0.0007 | 0.0008 |
| | (0.256) | (0.276) | (0.238) | (0.238) | (0.297) |
| Constant | 0.0022 | 0.0028 | 0.0016 | 0.0019 | 0.0031 |
| | (0.527) | (0.664) | (0.361) | (0.446) | (0.704) |
| Year controls | Yes | Yes | Yes | Yes | Yes |
| Observations | 4,325 | 4,325 | 4,325 | 4,325 | 4,325 |
| R-squared | 0.243 | 0.244 | 0.243 | 0.242 | 0.245 |
| Adj. $R^2$ | 0.239 | 0.240 | 0.239 | 0.239 | 0.241 |
| F | 21.57 | 21.58 | 21.51 | 21.47 | 19.00 |
| Wald – Serial Cor | 34.103*** | 34.841*** | 35.627*** | 35.572*** | 33.594*** |

This table reports the estimation results of earnings management based on Fixed Effects regressions absolute value of discretionary accruals on loan diversification, noninterest income diversification, revenue diversification, portfolio diversification and control variables, which take the general form:

$$|\mathbf{DACREG_{it}}| = \alpha_t + \beta_1 \mathbf{LNASSETS_{it}} + \beta_2 \mathbf{LOANDIV_{it}} + \beta_3 \mathbf{NIIDIV_{it}} + \beta_4 \mathbf{REVDIV_{it}} + \beta_5 \mathbf{SECPDIV_{it}} + \beta_6 \mathbf{ROA_{it}} + \beta_7 \mathbf{LEVERAGE_{it}} + \beta_8 \mathbf{LIQUIDITY_{it}} + \beta_9 \mathbf{MKTSEN_{it}} + \beta_{10} \mathbf{TIER1RW_{it}} + \beta_{11} \mathbf{COINST_{it}} + \mathbf{e_{it}}$$

where the variables are as previously defined. t-statistics are reported into parentheses. ***, **, and * represent 1%, 5% and 10% levels of significance. Standard errors for the estimates are clustered at firms' level.

In Table 5, we include control variables in our fixed-effects regression. ROA has a negative and significant effect on the dependent variables, while leverage has a positive coefficient, signification at 5%. The results of our diversification variables are qualitatively similar to those reported in Table 4. However,

loan diversification and revenue diversification lose their significance in the fixed-effects regression. Including all of the four diversification measures in column (5) has not qualitatively altered the results found in the first four models. With the possibility of a serial correlation of idiosyncratic errors, the fixed effects regression may be inappropriate for the modeling strategy. We test for serial correlation in the idiosyncratic errors of a linear panel-data model as discussed in Drukker (2003) and Wooldridge (2002). We report the results of the serial correlation tests in Table 5. Our findings show that the idiosyncratic errors of our fixed effects panel data models have a significant serial correlation. Therefore, we employ the GLS estimation technique that corrects for serial correlation. We report those results in Table 6.

**TABLE 6**
**FIXED EFFECTS REGRESSIONS WITH AR(1) DISTURBANCES**

| Dept. variable | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** |
|---|---|---|---|---|---|
| LNASSETS | -0.0000 | -0.0001 | -0.0001 | -0.0001 | 0.0003*** |
| | (-0.370) | (-0.511) | (-0.450) | (-0.463) | (4.071) |
| LOANDIV | -0.0014 | | | | -0.0018** |
| | (-1.483) | | | | (-1.971) |
| NIIDIV | | -0.0021*** | | | -0.0021*** |
| | | (-2.985) | | | (-3.169) |
| REVDIV | | | 6.93e-06 | | -0.0002 |
| | | | (0.0078) | | (-0.199) |
| SECPDIV | | | | 0.0002 | -0.0001 |
| | | | | (0.539) | (-0.313) |
| ROA | -0.0929*** | -0.0938*** | -0.0930*** | -0.0929*** | -0.1020*** |
| | (-16.73) | (-16.89) | (-16.35) | (-16.72) | (-19.46) |
| LEVERAGE | 0.0020** | 0.0021** | 0.0020** | 0.0019** | 0.0012 |
| | (2.132) | (2.263) | (2.131) | (2.121) | (1.399) |
| LIQUIDITY | -0.0011 | -0.0011 | -0.0012 | -0.0012 | -0.0007 |
| | (-0.960) | (-0.961) | (-0.980) | (-0.983) | (-0.617) |
| MKTSEN | -0.0000 | -0.0000 | -0.0000 | -0.0000 | 0.0000 |
| | (-0.0371) | (-0.136) | (-0.120) | (-0.106) | (0.158) |
| TIER1RW | 0.00116 | 0.0008 | 0.0011 | 0.0011 | 0.0056** |
| | (0.482) | (0.342) | (0.460) | (0.457) | (2.556) |
| COINST | -0.0017 | -0.0016 | -0.0017 | -0.0017 | -0.0016 |
| | (-0.664) | (-0.632) | (-0.689) | (-0.690) | (-0.714) |
| Constant | -0.0004 | -0.0005 | -0.0005 | -0.0005 | -0.0006 |
| | (-0.515) | (-0.606) | (-0.639) | (-0.675) | (-1.086) |
| Observations | 3,685 | 3,685 | 3,685 | 3,685 | 3,685 |
| R-squared | 0.203 | 0.206 | 0.206 | 0.205 | 0.200 |
| Adj. $R^2$ | 0.0825 | 0.0846 | 0.0819 | 0.0820 | 0.0686 |
| F | 43.07 | 43.50 | 42.94 | 42.95 | 64.32 |

This table reports the estimation results of earnings management based on Fixed Effects regressions, with AR(1) disturbances of absolute value of discretionary accruals on loan diversification, noninterest income diversification, revenue diversification, portfolio diversification and control variables, which take the general form:

$$|\mathbf{DACREG_{it}}| = \alpha_t + \beta_1 \mathbf{LNASSETS_{it}} + \beta_2 \mathbf{LOANDIV_{it}} + \beta_3 \mathbf{NIIDIV_{it}} + \beta_4 \mathbf{REVDIV_{it}} + \beta_5 \mathbf{SECPDIV_{it}} + \beta_6 \mathbf{ROA_{it}} + \beta_7 \mathbf{LEVERAGE_{it}} + \beta_8 \mathbf{LIQUIDITY_{it}} + \beta_9 \mathbf{MKTSEN_{it}} + \beta_{10} \mathbf{TIER1RW_{it}} + \beta_{11} \mathbf{COINST_{it}} + \mathbf{e_{it}}$$

where the variables are as previously defined. t-statistics are reported into parentheses. ***, **, and * represent 1%, 5% and 10% levels of significance. Standard errors for the estimates are clustered at firms' level.

As shown in Column (2) of Table 6, the coefficient for NIIDIV is -0.0021, significant at the 1% level, and the coefficient for LOANDIV is -0.0018, significant at the 5% level. Column (5) of Table 6 indicates that, on average, a combination of our measures of diversification reduces earnings management by 1.86%. Our results in Specification (5) of Table 6 reject two out of the four hypotheses, and all diversification-related coefficients in Specification (5) have a negative sign. These findings reject the null hypotheses that loan diversification and non-interest income diversification have no effects on BHC's earnings management practices.

The estimates are statistically significant and economically compelling, but they also have substantial implications for corporate governance policies. Consider a bank at the 25th percentile of loan diversification and noninterest income diversification across our sample. Should that bank move from the 25th percentile of the loan diversification or noninterest income diversification, measures to the sample median, and subsequently to the 75th percentiles of these diversification measures, the effects of such policies on earnings management at that bank would have been either 39.65% or 27.39% decline in discretionary accruals at the median; a 14.88% or 8.15% decline in discretionary accruals at the 75th percentile for each measure, respectively. In addition, the sample standard deviation for loan diversification and noninterest income are 17.2% and 12.78%, respectively. For a BHC with discretionary accruals of the sample mean, increasing either loan diversification or noninterest income by one standard deviation will result in a decline of discretionary accruals variable by 14.74% or 12.78%, respectively. If both variables increase by one standard deviation, the combined effect will be reduction of discretionary accruals by 27.52%. Virtually, the results imply that diversification in its various forms significantly negates earnings management and asymmetric information problems. Overall, the results in Table 5 feed the earnings management literature by proposing alternative but supporting views to the information asymmetry hypothesis and offsetting accruals hypothesis, leaving us to infer that broadly diversified banking firms are likely to have stable earnings through offsetting losses and gains.

Our results corroborate those of Jiraporn et al. (2008) and align to Hadlock et al. (2001), who report that equity offerings by diversified firms are viewed less negatively by the market than those by focused firms and contradict Lim et al. (2008). They find that current discretionary accruals positively associate with the firm's diversification in seasoned equity offering (SEO) settings. The empirical evidence from Table 6 implies that our diversification measures imply lower corporate opacity in diversified BHCs. Our results suggest that although diversified banks' operations may depend on a chain of complex interrelations, unlike those of focused banks, a great deal of prestige and revenue stability may be associated with broadly diversified operations lessening thus the necessity of revenue manipulations.

The four diversification measures are qualitatively similar to the previous tables, and the results resemble those previously reported. The coefficients remain insensitive to the inclusion of all of the diversification measures in the last regression. It is, however, possible that omitted variables influence discretionary accruals. Should larger banks exploit the breadth of their activities to manage earnings and manipulate expectations, further investigations may be needed.

## CONCLUSION

Is there a relationship between BHC's loan diversification, non-interest income diversification, revenue diversification, security portfolio diversification, and earnings management? Using a sample of BHCs from 2001 through 2020 and different estimation techniques, this study shows that loan diversification and non-interest income diversification help lessen earnings management problems and explain BHC's earnings quality.

For completeness, we report robust estimates of competing models for the effects of our measures of diversification on earnings management and earnings quality. Overall, the results corroborate those of Jiraporn et al. (2008), who find that diversification reduces earnings management at the industry level. They

report that industrial diversification alleviates earnings management by 1.8%, and the combination of industrial and global diversification alleviates earnings management by 2.5%. We report that, on average, a combination of our diversification measures reduces earnings management by 1.86%.

Importantly, our diversification measures have solid economic implications since they may reduce the exposure of banking firms to a downturn in one particular sector of the economy; therefore, reducing the volatility of earnings. More stable earnings resulting from offsetting cash flows of the different loan categories at different states of the economy may mitigate the earnings management practice at BHC.

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