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Evaluating Earnings Management in Financial Institutions

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Abstract

Most companies listed on the Standard & Poor's 500 (S&P 500) index have smoothed reported earnings since the 1990s inspiring questions from regulators about the accuracy of financial statements. In 2002, the Sarbanes-Oxley Act (SOX) was issued to eradicate earnings management activities and improve transparency in financial reporting. Although many studies have been conducted to evaluate changes in reporting requirements, much less is known about the effectiveness of these regulations on earning smoothing with discretionary accruals (DA). Accordingly, this study was an investigation of DA from 2002 to 2011. In addition, this study included an evaluation of DA before and after the financial crisis of 2008. This study is a quasi-experimental research design where 330 observations from the U.S. financial industry segment were used for the analysis. The Modified Jones model was used to separate DA and repeated measures analyses of variance were used to assess differences in levels before and after the financial crisis of 2008. The findings suggest DA activities are decreasing but represent over 50% of total net accruals (TNA) for all years. Improved financial regulation is needed. The study contributes to positive social change by providing regulators and investors with new information about accruals for income conservative firms by segmenting DA within the financial industry segment.

Keywords: Discretionary accruals; Earning smoothing; Earnings management; Modified Jones model.

1. INTRODUCTION

Empirical research on earnings management and the valuation of earnings is heavily researched in accounting journals; however, the approach to evaluate earnings management in the banking industry through the use of a Modified Jones model that relies on loan loss provisions as a proxy for gross plant property and equipment (PPE) is still in the development phase. In 1995 (and revised in 1998), Dechow *et al.*, developed a model of non-discretionary accruals (NDA) that builds on related models in Jones (1991) and Guay *et al.* (1996). In 2008, Da Silva Rosa and Durand conducted a study to evaluate whether bidding firms that offer shares as consideration engage in earnings management prior to takeover announcements. The findings of their study show no evidence of upward managing earnings.

The financial crisis of 2008 has given rise to the question of whether bank managers manipulate earnings to meet market expectations about profitability. The majority of prior studies of the banking industry find evidence of earning smoothing by using the provision of loan loss reserves (LLR) and recognizing security gains and losses (Kanagaretnam *et al.*, 2004). Within financial institutions, bank managers have a single expense item, the loan loss provision that is extremely large relative to other income statement items and is highly discretionary in nature (Robb, 1998). This study addresses the valuation of earning smoothing in the banking industry by utilizing a cross-sectional approach to the Modified Jones model and incorporating LLR as a proxy for gross PPE. In addition, the proportion of the utilization of LLR before and after the financial crisis of 2008 is evaluated.

Accruals are defined as the difference between cash flow from operations and net income (Höglund, 2013). A fundamental property of accruals is that they reverse over time, the self-reversing property of accruals diminish the effectiveness of earnings management strategies when viewed in the aggregate over a long period of time (Höglund, 2013). The characteristics of the reversing properties

of accounting accruals suggests that managers who utilize accruals through manipulation cannot depend on them exclusively to report solid earnings and when the build-up accrual items consistently begin to unwind over time—they suppress future earnings and stock prices (Skinner and Sloan, 2002).

Manipulation of accruals comes in many forms, from estimating earnings based on a rolling average of a previous period such as a quarter to booking several prior months of accruals in one period to reflect the number of months outstanding (Hribar and Collins, 2002). Either approach introduces uncertainty and skews the financial history of earnings for a firm, even if reversals of these entries follow (Das and Shroff, 2002). As a result of over time, managers may be forced to make up earnings short-falls with real cash earnings (Brown, 2001). Much of the research focused on earnings management has investigated earnings management decisions during particular events such as takeover announcements (Da Silva Rosa and Durand, 2008), a shift in tax laws (Mills and Newberry, 2001) or debt covenants (Dechow and Skinner, 2000; Dechow *et al.*, 2003). Some managers may use these extraneous occurrences as justification for an increase in accruals (Mills and Newberry, 2001).

Previous literature of earnings management is based on the assumption that accounting accruals are used as tools in financial smoothing and earnings management (Barton and Simko, 2002; Bruns and Merchant, 1990; Lynch and Williams, 2012). However, Nissim and Penman (2003) claim that after the issuance of the Sarbanes-Oxley Act (SOX) in 2002 by the Financial and Accounting Standards Board (FASB), accrual models are ineffective in detecting earnings management. Cohen *et al.* (2004) asserted firms tend to actual transactions rather than accruals in earnings smoothing. These arguments introduce questions about the accounting treatment of operational activities. These assertions stimulate questions about the impact of the accounting methodology on earnings management strategies. In addition, the assumptions of earnings smoothing research (Kawaller, 2004) grounded on the notion that derivatives are used to hedge risk and are always present in earnings smoothing strategies (Guay *et al.*, 1996).

1.1. Problem Statement

As long as there are companies to invest in, corporate earnings management (management's handling of income and expense items in an attempt to increase or decrease the appearance of earnings) is a concern for both unethical and illegal. Investors rely on share earnings report to value the firm; if earning reports have been either inflated or deflated, decisions by the investor regarding the firm become increasingly difficult. Since the present value of future expected earnings is a primary method of valuing a firm, the impact of earnings manipulation can have a significant effect on how investors value the firm. The lack of clarity in financial reporting skews tax requirements of firms and reduces government tax liabilities, which results in a government subsidy that impacts all tax paying U.S. citizens (Boynton *et al.*, 1992). Reporting smoothed earnings also distorts the financial position of companies traded on financial markets, and impacts investors and employees who are invested in these companies and are reliant on the financial solvency of these companies (Aono and Guan, 2007).

From an earnings management perspective, this study differs from prior research in two ways. First, this study's reflects a firm's ongoing operating activities whereas, prior studies references to earnings management reflects on debt covenant violations (Dechow *et al.*, 1995; 2003) and management bonus incentives (Gaver *et al.*, 1995).

The examination of total cash earnings contrasted with total net accruals (TNA) is conducted for two reasons: (i) accrual models are ineffective in the detection of earnings management activities after SOX implementation (Nissim and Penman, 2003) and (ii) tendency of firms to use real financial transactions instead of accounting accruals in smoothing earnings (Cohen *et al.*, 2004).

1.2. Nature of the Study

This is a descriptive, comparative and correlational research study that uses quantitative methods to describe phenomena, as they exist. The data used in this analysis is not manipulated or controlled. The nature of this study is to investigate earnings management (earnings smoothing) and transparency in financial reporting. Earnings smoothing is achieved through the use of accounting accruals. The degree of earnings management through the use of discretionary accruals (DA) is conducted with a correlational evaluation of the average total assets (ATA), sales, accounts receivable, LLR and TNA. The correlational examination used in this study follows a Modified Jones model and takes

the form of multiple regression evaluation. The correlational relationships between the independent variables (IV) are: (a) ATA, (b) sales, (c) accounts receivable, (d) LLR and (e) TNA are analyzed. The evaluation includes an examination of the explanatory power of the regression model. Estimated regression equations are developed to model NDA and DA are determined for all firms from 2002 to 2011.

Once the aggregate discretionary components of TNA have been determined for all firms from 2002 to 2011, the proportion of the use of DA is evaluated by comparing population proportions of DA levels in 2006 with those of 2010. This DA comparison illustrates the levels of earnings management activities defined by the use of DA before and after the financial crisis of 2008.

1.3. Research Questions

The research questions addressed in this evaluation include:

1.3.1. Research Question One

What is the relationship among the ATA, the change in sales, the change in accounts receivable, LLR and TNA among financial institutions?

The structure of research question one is:

Table 1. Research Question One: Research Approach.

Research Type	Alternative Hypothesis	Null Hypothesis	Objective	Analysis
Correlational	There is a relationship among ATA, sales, accounts receivable, LLR and TNA	There is a no relationship between ATA, sales, accounts receivable, LLR and TNA.	The objective is to determine if a statistically significant correlation exists among ATA, sales, accounts receivable, LLR and TNA. The intent is to estimate aggregate regression equations for NDA for the periods 2002 through 2011 using the Modified Jones model.	Multiple regression

1.3.2. Research Question Two

What is the difference, if any, between the proportions of DA used in 2006 and 2010 (before and after the financial crisis)?

The structure of research question two is:

Table 2. Research Question Two: Research Approach.

Research Type	Alternative Hypothesis	Null Hypothesis	Objective	Analysis
Descriptive, comparative	The proportion of firms with more than 50% of DA embedded in TNA in year 2006 is not equal to the proportion of firms with more than 50% of DA embedded in TNA in year 2010.	The proportion of firms with more than 50% of DA embedded in TNA in year 2006 is equal to the proportion of firms with more than 50% of DA embedded in TNA in year 2010.	The objective is to determine if the proportional differences in DA exist and are statistically significant for years 2006 and 2010.	t-test: paired two sample for means
	$H_1: p_1 \neq p_2$ Where, p_1 = number of firms who reported more than 50% of DA in 2006 p_2 = number of firms who reported more than 50% of DA in 2010	$H_0: p_1 = p_2$ Where, p_1 = number of firms who reported more than 50% of DA in 2006 p_2 = number of firms who reported more than 50% of DA in 2010		

1.4. Purpose of Study

The purpose of this quantitative study is to determine if earnings smoothing is increasing in the financial industry segment and to determine if financial institutions have shifted away from accounting accruals and towards real earnings management activities in the post-financial crisis period (following highly publicized accounting scandals).

1.5. Theoretical Framework

The Jones model was created in 1991 (Jones, 1991) and modified by Dechow *et al.* (1995) by adding the change in receivables. The Modified Jones model is an evaluation methodology used to segment DA from NDA. The model uses a multiple regression to estimate the NDA proxy and provides a more robust framework of analysis for measuring accounting accruals. The regression used in the Jones model references IV that have some relationship to NDA. Normal accruals are driven by sales, PPE, expected sales growth and current operating performance, and are used for the IV of the Jones model. The model proposes normal accrual components can be used to predict the non-discretionary component of total accruals. The difference between total accruals and NDA yields the DA. The intent is to determine how to what degree specific factors in normal accruals influence the level of NDA. The Modified Jones model is used in this evaluation to segment NDA from DA for the sample firms in periods from 2002 to 2011 and LLR is used as a proxy for PPE.

This model has been used by many researchers (Bartov *et al.*, 2000) in the area of earnings management. In 1992, Boynton *et al.* (1992) utilized the Modified Jones model and incorporated working capital accruals. In 2000, Bowman *et al.* (2000) used the Modified Jones model to evaluate accruals but used a time series rather than a cross-sectional framework of analysis. Many researchers have referenced the Modified Jones model (Hribar and Collins, 2002; Peasnell *et al.*, 2000; Subramanyam, 1996) but have altered the IV by incorporating factors that reflect cash flow accruals and working capital such as sales and accounts receivable. The Modified Jones model (Gaver *et al.*, 1995) has been used to determine if the incremental information content in DA reflects management decisions to smooth earnings.

Earnings management is extensively documented in financial literature (Subramanyam, 1996). The practice of earnings manipulation in financial reporting has existed as long as financial documents have been used as a tool for evaluation. Earnings management is defined by the practice of manipulating reported earnings so that the financial peaks and troughs are smoothed out. In essence, earnings do not accurately represent economic earnings at every point of time (McKee, 2005) suggesting earnings management practices have always existed.

1.6. Review of Related Research

When investors, regulators and other stakeholders reference financial information of publically traded firms, they are generally confident that those reported numbers are reliable (Burgstahler and Dichev, 1997). The reliability of the reported numbers is exposed to a degree of risk as a result of the discretion allowed in performance modeling and reporting under generally accepted accounting principles (GAAP) (Ortega and Grant, 2003). Burgstahler and Dichev (1997) demonstrate the implications of risk exposure in their study that revealed some managers manage earnings to avoid reporting a loss and to meet analysts' expectations. Chaney *et al.* also illustrates this notion in a study conducted of accruals and income smoothing published in 1998. As Chaney stated, managers seeking to lower the perceived risk of the financial stability do so by reducing the variation of inter-period earnings (earnings smoothing) which in turn reduces the cost of capital for the firm (Chaney *et al.*, 1998). These practices create artificially inflated stock prices and reduce the number of price decreases, which signifies financial stability and allows the firm to sell stock at a higher price. This simulated financial position provides managers justification to collect bonuses and exercise options (Healy, 1985). Earnings smoothing strategies are also used to stabilize financial reporting required for government funding and project subsidies (Jones, 1991).

1.6.1. Discretionary Accruals

The interest of analysts, regulators and investors in general about techniques that can identify earnings manipulation by the firm's management has been the focus of existing financial literature dedicated to earnings management since the early 1970s. Most research methods focused on the evidence of earnings management rely on the calculation of accounting accruals and their separation from NDA (Bartov *et al.*, 2000). DA are considered abnormal or unexpected whereas the non-discretionary components are considered the expected accrual values stimulated by business cycles (Guay *et al.*, 2003). After the DA component is separated, statistical tests are used to determine if the DA of the firm differ from zero, the normal or expected value.

Despite all the generated interest and abundant literature in earnings management, a consensus about superiority in the estimation of DA does not exist. Guidelines or axioms about how to estimate these models in order to improve the power of the tests are in their early stages and there have been few attempts to develop recommendations for evaluation in this area of study (Dechow *et al.*, 1995; Jones 1991). An evaluation of the existing literature in DA is explored.

1.7. A New Approach to Evaluating Accruals

Some early attempts to develop standards for analyzing DA can be found in the works of Guay *et al.* (1996), Dechow and Skinner (2000) and Young (1999). These early studies concentrate on models created by Healy (1985) and Jones (1991). There have been several attempts to account for the relation between accruals and cash flows such as Hunt *et al.* (1997) which augmented the Jones model with the addition of a cash flow variable.

In 1996, Shivakumar augmented the Jones model by adding five cash flow variables. An alternative model was introduced by Gomez *et al.* (2000) that was based on cash flow from operations, which they named the Accounting Process (AP) model. The AP model uses the term $(1/A_t - 1)$ as an explanatory variable and is estimated without intercept. The DA component shows a large bias when the $(1/A_t - 1)$ is used, and concerns about the methodology of DA remains (Gomez *et al.*, 2000).

1.7.1. Evaluating Abnormal Accruals

Segmenting total accruals into a discretionary and a non-discretionary component is a difficult task. The discretion exercised by management is unobservable and there are economic events that stimulate changes in total accruals from one year to the next (Shivakumar, 1996). When a researcher estimates DA, they are forcing an expectation model of the expected behavior of accruals in relation to economic events (Kothari *et al.*, 2005). Most of the models require the estimation of one or more parameters (Guay *et al.*, 1996). Two methodologies can be found in the literature of earnings management and accrual evaluation. The time-series approach includes the estimation of parameters for each firm in the sample by referencing data from periods prior to the current period under review. In contrast, the cross-sectional approach provides estimates for each period for each firm in the event sample referencing data of firms in the same industry (Guay *et al.*, 1996).

Dechow *et al.* (1995) and Guay *et al.* (1996) utilize the time-series approach in their DA evaluations. The disadvantage of using a time-series approach is that it introduces survivorship bias as well as selection bias, since the time-series model requires the existence of at least $N + 1$ years of data (where N is the number of explanatory variables used in the model) (Dechow *et al.*, 1995). This limitation inherent in the time-series model reduces the explanatory power of short-series financial data. The time-series approach is effective only when firms in the sample possess a long-series of financial data. Guay *et al.* (1996) requires 15 years of data in their evaluation of time-series DA.

In 1996, Subramanyam estimated the Jones model and the Modified Jones model proposed by Dechow *et al.* (1995), and reported a better fit for the cross-sectional version than for the time-series version of the model. Subramanyam's findings suggest the cross-sectional approach generates lower standard errors for the coefficients, fewer outliers and coefficients that better fit the predicted signs as measured against the time-series approach.

1.7.2. Discretionary Accrual Modeling

The original Jones model introduced in 1991 is a regression-based expectation model that controls for variations in NDA associated with the depreciation charge as well as changes in economic activities (Dechow *et al.*, 1995). The Jones model is expressed as:

$$\sum [TA_t/A_{t-1}] = NDA_t = \alpha_1(1/A_{t-1}) + \beta_1(\Delta REV_t/A_{t-1}) + \beta_2(PPE_t/A_{t-1}) \quad [1]$$

Where, ΔREV_t = Change in revenue from period t-1 to t

NDA_t = Non-discretionary accruals calculated:

$$NDA_t = \alpha_1(1/A_{t-1}) + \beta_1(\Delta REV_t/A_{t-1}) + \beta_2(PPE_t/A_{t-1})$$

A_t = Assets

ΔREV = Change in revenue

PPE_t = Gross plant property and equipment

In 1991, Jones argued that the change in revenue (ΔREV) and PPE terms are used as a control for the non-discretionary component of total accruals associated with changes in operating activity and level of depreciation. Dechow *et al.* (1995) argued the assumption that all revenue changes in the Jones models are non-discretionary, and the resulting measure of DA does not reflect the impact of sales based manipulation. As a result, Dechow attempted to capture revenue manipulation and altered the Jones model by subtracting the change in receivables (ΔREC) from ΔREV for each sample firm. The Modified Jones model becomes:

$$\sum [TA_t/A_{t-1}] = NDA_t = \alpha_1(1/A_{t-1}) + \beta_1(\Delta REV_t/A_{t-1} - \Delta REC_t/A_{t-1}) + \beta_2(PPE_t/A_{t-1}) \quad [2]$$

1.7.3. Calculation of Accruals

In 2002, Hribar and Collins introduced an alternative approach to DA evaluation. Under this approach, the researcher can calculate accruals directly from the statement of cash flows using the formula (Hribar and Collins, 2002):

$$TA_{cf} = EBXI - CFO_{cf} \quad [3]$$

Where, TA_{cf} = The total accrual adjustments provided on the cash flow statement under the indirect method

$EBXI$ = Earnings before extraordinary items and discontinued operations

CFO_{cf} = Operating cash flows (from continuing operations) taken directly

This method of calculating accruals by referencing the statement of cash flows is used in this evaluation of DA.

2. METHODS

The data mining process included online data retrieval from the published financial reports of financial institution firms for the years 2002–2011 from the Mergent Online database. The Mergent database was used to extract data files for each company randomly selected for the sample. Only U.S. firms were included in the study and all dollar values were converted into millions for consistency in comparison. The Modified Jones model is referenced to separate DA from NDA. The process includes the implementation of a linear regression model where the IV are identified with a proxy for NDA. The proxy is created by categorizing total accruals into NDA and DA. The non-discretionary component reflects business conditions (such as firm growth and length of the operating cycle) that create and destroy accruals, while the discretionary component highlights management choices (Jones, 1991). After the cross-sectional DA are identified for all firms for the years 2002–2011, a test of proportion means is conducted using a binomial distribution to test the proportion of DA in 2006 and 2010. The intent of this investigation is to evaluate the proportion of DA activities before and after the 2008 financial crisis.

2.1. Pooled Ordinary Least Squares

A pooled ordinary least squares approach is used in this evaluation which requires a two-stage process for calculations. To accomplish this, the results from the first part of the analysis are used in the next stage of analysis to reach the needed estimate (Peasnell *et al.*, 2000). To estimate the NDA amounts, firm-specific amounts for each IV are used for a particular period across several different firms. In essence, each data item [(TNA), (ATA), (Δ Sales – Δ REC) and (LLR)] is coming from the same period with the next data set originating from a different firm. For example, the data set of 330 different firms with accounting data for the year ending 2007 yields one estimated regression equation. Since the period range in this study is from 2002 to 2011, ten regression equations are estimated for the 330 firms—one for each fiscal year. Finally, one aggregate estimated regression equation is determined for all observations in all periods.

2.2. Setting and Sample

The financial industry segment is the target of this study. The financial industry segment drawn for the sample is defined by Standard Industrial Classification (SIC) codes which refer to a four-digit number assigned to U.S. industries and their products. The SIC codes used in this analysis include: National commercial banks (SIC 6021), Commercial Banking (NAICS 522110) and State Commercial Banks (SIC 6022). All firms classified by these SIC codes are drawn from Mergent Online database and 330 observations are used to form the sample. Annually reported data is used for all calculations and dollar values of all firms are translated into millions. The significance level for all tests in this study is set to 0.05.

2.3. Research Question One

Research question one is investigated by determining the DA amount of each firm using the Modified Jones model (McKee, 2005). Under the Modified Jones model, the IV are used as a proxy for activities that reflect a relationship to NDA. The IV reflect normal accruals driven by sales, LLR, expected sales growth and current operating performance. The TNA calculation is used for a linear regression analysis and is set as the dependent variable (DV). The IV are (a) net income, (b) change in cash, (c) cash dividends, (d) stock repurchases and (e) equity issuance. Once β_0 , β_1 , β_2 and β_3 are estimated for the cross-section of firms for all the periods (calculated by running a linear regression equation), the coefficients along with the firm specific data for each of the identified IV are used to estimate the individual firm's NDA for the period using a pooled ordinary least squares approach. The DA are estimated by:

$$DA = \beta_0 + \beta_1(ATA) + \beta_2(\Delta\text{Sales} - \Delta\text{REC}) + \beta_3(\text{LLR}) + \varepsilon$$

Where, DA = Discretionary accruals

ATA = Average total assets

Δ Sales = Change in sales

Δ REC = Change in accounts receivable

LLR = Loan loss reserves

The ATA calculated for each firm in the sample and derived from the balance sheets of all firms. The ATA calculated as, $ATA = (\text{prior year's total assets}) + (\text{current year's total assets}/\text{number of periods})$. The NDA is calculated by:

$$NDA_t = \alpha_1(1/ATA - 1) + \beta_1(\Delta\text{REV}_t/ATA - 1 - \Delta\text{REC}_t/A_t - 1) + \beta_2(\text{LLR}_t/ATA - 1)$$

Where, NDA = Non-discretionary accruals

ATA = Average total assets

Δ REV = Change in revenue

Δ REC = Change in accounts receivable

LLR = Loan loss reserves

The total discretionary accruals (TDA) are the difference between the individual firm's TNA and its estimated total NDA amount, calculated as $TDA = TNA - NDA$.

2.4. Research Question Two

A test of population proportions is conducted to investigate the proportional differences of DA usage in 2006 with DA usage in 2010 (before and after the financial crisis of 2008). The hypothesis is that the proportion of DA in 2006 is equal to the proportion of DA in 2010. The hypothesis is stated as:

$$H_0: p_1 = p_2$$

$$H_1: p_1 \neq p_2$$

Where, p_1 = Number of firms who reported DA that represented over 50% of TNA in 2006

p_2 = Number of firms who reported DA that represented over 50% or more of TNA 2011

3. RESULTS AND DISCUSSION

The economic crisis that began during the late 20th century resulted in dramatic losses in equity values within international financial markets. Between June 2007 and November 2008, Americans lost more than one quarter of their net worth. By early November 2008, the S&P 500 was down 45% from its 2007 high. Housing prices had dropped 20% from their 2006 peak, with futures markets signaling a 30–35% potential drop. Total retirement assets, Americans' second-largest household asset, dropped by 22%, from \$10.3 trillion in 2006 to \$8 trillion in mid-2008. During the same period, savings and investment assets (apart from retirement savings) lost \$1.2 trillion and pension assets lost \$1.3 trillion. Taken together, these losses total \$8.3 trillion (Minton *et al.*, 2009). The crisis of the financial system has resulted in a crisis in the entire economical system. It has been argued by Crutchley *et al.* (2007) that this financial anomaly is a full market correction directly attributable to the lack of international regulation and consistency in domestic regulation standards within financial markets.

Research question one is a correlational test conducted to address the impact of DA on the accounting treatment on reported earnings. The Modified Jones model is used to create the dichotomy between DA and NDA. The analysis includes the use of a multiple linear regression model that regresses the TNA to estimate the coefficients for DA. This study uses a cross-sectional research approach. TNA are calculated from the TNA equation while NDA is determined with the regression of TNA. A regression correlational analysis is used to determine the discretionary component of total accruals. Once the discretionary components are determined for each firm in the sample from 2002 to 2011, a *t*-test is conducted to investigate discretionary usage of firms before and after the financial crisis of 2008.

3.1. Analysis of Discretionary Accruals

The resulting coefficients for DA identified in Table 1, are used to construct the estimated regression equations for NDA.

In a multiple linear regression model, the adjusted R^2 measures the proportion of the variation in the DV accounted for by the explanatory variables. Unlike R^2 , the adjusted R^2 allows for the degrees of freedom associated with the sum of the squares. Therefore, even though the residual sum of squares decreases or remains the same as new explanatory variables are added, the residual variance does not. The adjusted R^2 is generally considered a more accurate goodness-of-fit measure than R^2 ; nevertheless, both the R^2 and the adjusted R^2 are reported in this table (Aono and Guan, 2007).

The adjusted R^2 allows for the degrees of freedom associated with the sum of the squares. Therefore, even though the residual sum of squares decrease or remain the same as new explanatory variables are added, the residual variance does not. For this reason, the adjusted R^2 is considered an accurate goodness-of-fit measure and this linear regression was used on the assumption that the IV possess strong explanatory power. The expectation of this evaluation is that the explained variation of the estimated regression equations is above 50% for each year. These equations were

Table 3. Estimated Regression Coefficients.

Years	Intercept	(1/ATA)	(Δ Net Interest Income – Δ Loan REC/ATA)	Allowance for LLR/ATA)	p-value
2002	0.0000659	-0.0547845	0.0019915	0.0006687	2.80347E-08
2003	-0.0000160	-0.0570124	0.0012045	0.0099754	4.49149E-11
2004	-0.0001813	-0.0395298	0.0013016	0.0286287	1.39212E-08
2005	0.0000737	-0.0305375	0.0006781	-0.0045628	2.06805E-4
2006	0.0001487	-0.0220654	0.0014698	-0.0092602	2.28912E-05
2007	0.0000608	0.0124243	0.0000503	0.0054577	7.38342E-07
2008	0.0000632	-0.0549173	0.0010357	0.0005214	6.71713E-07
2009	-0.0000213	0.0218471	0.0005800	0.0010309	5.89892E-05
2010	-0.0000355	0.0299794	0.0007092	0.0015092	4.72466E-06
2011	-0.0000779	0.0419199	0.0006271	0.0043632	1.61046E-05

Note: The table shows the estimated regression coefficients for the aggregate NDA for each year from 2002 to 2011.

Table 4. Estimated Regression Equations.

Years	Estimated Regression Equations	R ²	Adjusted R ²
2002	$\hat{y} = 0.0000659 - 0.0547x + 0.0019x + 0.0006x$	0.76	0.73
2003	$\hat{y} = -0.0001603 - 0.0570x + 0.00120x + 0.00997x$	0.86	0.84
2004	$\hat{y} = -0.000181 - 0.0395x + 0.00130x + 0.0286x$	0.78	0.75
2005	$\hat{y} = 0.0000737 - 0.0305x + 0.00067x - 0.0045x$	0.52	0.47
2006	$\hat{y} = 0.0001487 - 0.02206x + 0.001469x - 0.00092x$	0.60	0.55
2007	$\hat{y} = 0.0000608 + 0.0124x + 0.00005x + 0.0054x$	0.69	0.66
2008	$\hat{y} = 0.0000632 - 0.05491x + 0.001035x + 0.0005214x$	0.70	0.66
2009	$\hat{y} = -0.0000213 + 0.0218471x + 0.0005800x + 0.00010309x$	0.57	0.52
2010	$\hat{y} = -0.0000355 + 0.0299794x + 0.0007092x + 0.0015092x$	0.65	0.60
2011	$\hat{y} = -0.0000779 + 0.0419199x + 0.0006271x + 0.0043632x$	0.61	0.57

used to predict the NDA of all firms for periods 2002–2011 for individual years. The coefficients along with specific firm’s data are then used to estimate the aggregate regression equation for the NDA from 2002 to 2011. The aggregate estimated regression equation is

$$\hat{y} = 0.00022199 - 0.003421659x + 0.001067138x + 0.001241384x \text{ with a } p\text{-value of } 0.01.$$

3.2. Impact of the Financial Crisis on Discretionary Accruals

Research question two is a comparative investigation conducted to evaluate the population proportion of DA used before and after the financial crisis of 2008. The average percentage of DA as a

percentage of total accruals for all years 2006 through 2010 is 67%. The intent of this test is to investigate the proportion of firms who reported financials with DA representing more than the average DA as expressed as a percentage of TNA from 2006 to 2010 (67%). A paired two-sample *t*-test for means is used due to the dependent nature of the data from 2006 to 2010. The test statistic is -3.36 and the null hypothesis is rejected at $p = 0.002$. The results are statistically significant and the findings suggest the DA activity in 2006 is not equal to the DA activity in 2010 [two-sample $t(29) = -3.36$, $p = 0.002$].

4. CONCLUSION

Research question one is a correlational investigation of the discretionary component of TNA. The Modified Jones model is used to stratify NDA from TNA and the difference is calculated to yield the TDA activity. The analysis includes the use of a multiple regression model that is used to regress the TNA to estimate the coefficients for DA. A cross-sectional approach is used to analyze the data. The R^2 and adjusted R^2 are provided to evaluate the effectiveness of the regression model.

The adjusted R^2 for each year are above 0.50 with the exception of year 2005 (0.47). The adjusted R^2 allows for the degrees of freedom associated with the sum of the squares. Therefore, even though the residual sum of squares decreases or remains the same as new explanatory variables are added, the residual variance does not. For this reason, the adjusted R^2 is considered an accurate goodness-of-fit measure and this linear regression was used on the assumption that the IV possess strong explanatory power. These equations are used to predict the aggregate DA of all firms from 2002 to 2011. The cross-sectional coefficients along with a specific firm's data are used to estimate the firm specific DA from 2002 to 2011.

Research question two is a comparative investigation of the difference in means of DA before and after the financial crisis of 2008 (from 2006 to 2010). The intent of this test is to investigate the difference in means of DA reported in financial statements. The findings indicate the means of DA before the financial crisis is not equal to the DA embedded in financial statements of financial institutions after the financial crisis of 2008.

The average rate of change in DA with respect to time (*t*) from 2006 to 2010 is 7% in the financial sector which suggests earning smoothing activities through the use of DA is increasing at a rate of 7% per year. A Modified Jones model was used to predict the level of earning smoothing activities through the use of accounting accruals in the financial sector and can be used to estimate the degree of risk exposure of financial institutions. However, it is clear there is an increasing need for financial regulation within the financial sector, specifically within the area of earnings management.

Competing Interests

None declared.

Author Contributions

Margot Geagon conducted the data analyses and wrote the methods, results and preliminary draft of the manuscript. John Hayes conducted the literature review, wrote the discussion and edited the final draft of the manuscript.

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