# THE EFFECT OF SARBANES-OXLEY ON THE DEBT CONTRACTING VALUE OF ACCOUNTING INFORMATION

A Dissertation

Presented to

The Faculty of the C.T. Bauer College of Business

University of Houston

In Partial Fulfillment

Of the Requirements for the Degree

Doctor of Philosophy

By

Shihong Li

August 2013

# ACKNOWLEDGEMENTS

I would like to express my deep gratitude to my dissertation committee: Drs. Janet Meade, Tong Lu, Scott Whisenant, and Vijay Yerramilli, for their guidance, encouragement, and helpful critiques of this project. I wish to particularly thank Dr. Meade, whose inspiration and good humor made my long journey more pleasant and less taxing than it might have been.

I thank all accounting faculty at the University of Houston, whose lectures and workshop discussions enriched my understanding of accounting research.

I am grateful to the financial support provided by the University of Houston. It allowed me the privilege to study with a group of brilliant doctoral students, of whose knowledge I am a beneficiary.

My deepest gratitude goes to my family. My brothers and sister take great care of our aging parents to help me stay focused on my study. Erick, my son, constantly provides me motivation. Lastly, I am fortunate to have Weihui, my husband and best friend, in my life. He has been the most durable support for this and many other of my adventures.

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## ABSTRACT

This paper investigates whether and how the Sarbanes-Oxley Act (SOX) changed the way that banks use accounting information to price corporate loans. SOX reformed corporate governance and disclosure, intending to improve reporting transparency. The targeted beneficiaries of this improved reporting transparency were investors and shareholders, but SOX also may have affected the decision usefulness of accounting information to private lenders, such as banks. I refer to accounting information's usefulness to creditors, i.e. its ability to indicate the level of credit risk, as its debt contracting value (DCV) and proxy it with loan interest spread's sensitivity to key accounting metrics, such as ROA, interest coverage, leverage, and net worth. The tests show that, on average, the DCV of key accounting metrics, most notably ROA, declined in the period following a borrower's compliance with the requirements of SOX Section 404. Investigation of this decline finds that it cannot be explained by borrowers that disclose deficiencies in internal control over financial reporting, but is instead primarily driven by changes in how borrowers manage earnings. The study also finds that a reduction in auditor-provided tax services is related to lower DCV of ROA and leverage. Conversely, a reduction in other unspecified nonaudit services is related to higher DCV of net worth. These findings suggest that SOX has mixed implications for accounting information's usefulness to private lenders.

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# Chapter 1

# INTRODUCTION

Considerable research has investigated the effects of the Sarbanes-Oxley Act (SOX) on shareholders, managers, auditors, and bond holders. Little research, however, has addressed the effect, if any, of SOX on private lenders, such as bankers. In particular, the question of whether SOX altered the way in which private lenders use accounting information to evaluate credit risk has been largely overlooked by accounting researchers. This study examines whether and how SOX has affected the weight that private lenders place on some key accounting metrics when pricing corporate loans.

Corporate executives manage earnings to hit benchmarks and to avoid adverse compensation and career consequences (e.g. Healy 1985; Burgstahler and Dichev 1997; Dichev et al. 2012). While relying primarily on accrual-based earnings management (AEM) to meet their targets prior to SOX, they appear to have shifted to using more real earnings management (REM) afterwards (Graham et al. 2005; Cohen et al. 2008; Zang 2012). Did this shift in the earnings management method used by borrowers, in combination with the onset of a more highly regulated financial reporting environment, affect lenders' use of accounting metrics? SOX mandated that firms file auditor-attested reports on the effectiveness of their internal control over financial reporting and disclose control deficiencies. It also led to a substantial reduction in nonaudit services that

companies had previously purchased from their auditors (Maydew and Shackleford 2007). Did the disclosure of internal control weaknesses (ICW) change the weight that banks place on accounting information when pricing credit risk? Did lenders, when using information from various sources to assess credit risk, believe that the borrower's separation of audit from nonaudit services improves accounting metrics' ability to inform on credit risk? By studying US firms that issued syndicated loans both before and after SOX, this paper attempts to shed light on these questions.

The borrower's financial reporting plays a critical role in a bank's lending decision, as well as the price and structure of the loan (Libby 1979; Smith and Warner 1979; Leftwich 1983; Taylor and Sansone 2007; Armstrong et al. 2010). For example, when discussing the material adverse change (MAC) clause in a credit agreement, Wight et al. (2007) write:

> The typical MAC provision tests whether a material adverse change has occurred since a particular date. The date specified is generally the date of the most recent audited financial statements of the borrower delivered to the lenders prior to signing the credit agreement. The audited financials are, of course, the most reliable financial information, forming the basis of the lenders' credit decision to enter into the credit agreement (p. 269).

The lender's reliance on audited financial statements is not inconsistent with their ability to request private information. First of all, while private communication can provide soft information about the borrower, such as its competitive strategy, it is the audited financial statements that provide verified information about the financial results of the strategy. Secondly, corporate executives do not keep a different earnings number for managerial

decision making. Instead, they rely on the same "one number" for both internal and external reporting (Dichev et al. 2012). Hence, when it comes to the financial results of the borrower, private communication is less likely to provide a different or more informative number than the one disclosed in public reporting.

The lenders' reliance on audited financial numbers gives rise to interactions between a firm's debt financing and its financial reporting (Watts and Zimmerman 1986). Based on the relation between the size of capital markets and financial reporting properties, Ball et al. (2008) argue that important accounting attributes, such as timely reporting and conservatism, may be shaped more by the debt market than the equity market. Private debt is an indispensable source of capital for US corporations, with its new issuance in 2011 amounting to $193 billion for the nonfinancial business sector (Federal Reserve Statistical Release 2012),[1] close to the entire corporate equity issuance of the same year (Securities Industry and Financial Markets Association).[2] Given the proportion of bank loans in corporate financing and the importance of accounting information in the lending process, an examination of SOX's effect on banks' use of accounting metrics adds a relevant perspective to the debate over the regulation's economic consequences.

SOX led to three major changes that could have implications on the usefulness of financial reporting for lenders. First, SOX required formal disclosure of ICWs, resulting in public awareness of the unreliability of some firms' accounting reports. Second, the tightened disclosure rules plus increased penalty for misreporting changed the relative costs of AEM and REM, contributing to a shift from the former to the latter (Cohen et al.

[1] The nonfinancial business sector raised $385 billion via corporate bonds during the same period.
[2] US equity issuance in 2011 was $198 billion.

2008; Zang 2012). Third, it prohibited an auditor from providing certain consulting services to public clients, leading to a decline in auditor-provided nonaudit services (Maydew and Shackelford 2007). Taken together, the effect of these changes on accounting metrics' usefulness to banks is difficult to assess a priori.

This study uses a before-and-after design to investigate whether SOX altered the weight that private lenders place on the borrower's accounting information when assessing credit risk of corporate loans. I refer to accounting information's ability to indicate the level of credit risk as its debt contracting value (DCV) for the ease of exposition. Since loan interest spread contains a borrower-specific risk premium, I use its association with some key accounting metrics, such as ROA, interest coverage, leverage, and net worth, as the primary proxy for accounting information's ability to indicate the level of credit risk or accounting DCV. As a robustness check, I also use a set of key accounting metrics' explanatory power with respect to the loan interest spread to proxy for their collective ability to inform on credit risk. The results indicate that the DCV of examined accounting metrics declined after the borrower's implementation of Section 404(b) of SOX, and that this decline was most noticeable for ROA.

One potential explanation for the post-SOX 404 decline in the DCV of accounting information is the mandated disclosure of internal control weaknesses (ICW). Empirical studies of ICW disclosures have shown these to increase the cost of bank debt, suggesting that the disclosures provide banks with new information (Costello and Wittenberg-Moerman 2011; Kim et al. 2011). If ICW disclosures reveal previously unknown internal control problems and these problems weaken the lender's reliance on accounting information when assessing credit risk, the decline in the accounting DCV of a subset of

borrowers with internal control deficiencies could result in a lower average accounting DCV. To test this possibility, I examine whether the average post-SOX 404 decline in the DCV of accounting information is concentrated among the ICW firms. If such is the case, it supports the argument that SOX improves the information environment by differentiating firms on the basis of their reporting systems. However, the empirical results suggest that the ICW firms do not experience a larger decline in the DCV of ROA than non-ICW firms.

Another explanation, given firms' post-SOX shift from AEM to REM (Cohen et al. 2008; Zang 2012), is that banks view REM as impairing accounting information's ability to predict credit risk. AEM temporarily alters the appearance of firm performance with no direct impact on the stream of cash flows; REM, however, has negative consequences on the firm's ability to generate future earnings by changing the timing or structure of business transactions. If banks perceive REM, more than AEM, to impair accounting measures' ability to inform on credit risk, they may reduce their reliance on accounting information in response to borrowers' shift from AEM to REM. Consistent with this prediction, I find that REM borrowers have lower post-SOX DCV of ROA than non-REM borrowers.

Last, because SOX prohibits several auditor-provided consulting services and requires tax services to be preapproved by the audit committee, I also investigate how the borrower's separation of audit from nonaudit services affects their accounting DCV. Nonaudit services affect financial reporting quality, and hence accounting DCV, in two different ways. They can increase financial reporting quality via knowledge spillover effect; they can reduce financial reporting quality via impairment of auditor

independence. One type of nonaudit services, tax services, have been found to improve accounting quality (Seetharaman et al. 2011; Krishnan and Visvanathan 2011; Gleason and Mills 2011), whereas unspecified other services, appear to be associated with lower accounting quality (Kinney et al. 2004; Schmidt 2012). These observations raise two questions: how do banks assess nonaudit services' influence on accounting metrics' usefulness, and, in particular, do they differentiate the effects of tax services from that of unspecified other services? The empirical tests show that (1) a larger reduction in tax services is related to lower DCV of ROA and leverage, while (2) a larger reduction in unspecified other services is associated with higher DCV of net worth. These findings provide some evidence that banks perceive tax and other consulting services to have divergent effects on accounting metrics' ability to inform on credit risk.

By focusing directly on how SOX affects banks' use of accounting information to price corporate loans, this study augments the literature on SOX's economic consequences, which to date has concentrated on its effect on particular accounting attributes, firms' operational and listing decisions, and stock or bond market responses. In particular, the finding that the decline in accounting DCV is concentrated among borrowers suspected of REM highlights yet another unintended consequence of SOX. This investigation also extends the research on the use of accounting information in debt contracting, which until now has focused on the relation between accounting quality and the cost of debt or various non-price features of the debt contract. Here, on the premise that interest spread reflects the lender's best estimate of credit risk, I focus on banks' use of accounting information to price credit risk. Doing so not only broadens the concept of DCV to include accounting's usefulness for assessing credit risk at loan inception but

also provides a simple way to measure the DCV of accounting information. The findings add to the research on the relation between nonaudit services and perceived accounting quality by showing that the reductions in tax service and unspecified other services have different effects on accounting DCV. They provide some evidence that banks perceive tax services' benefit from knowledge spillover to dominate their cost of impairing auditor independence. To my knowledge, this is the first empirical evidence on how nonaudit services affect banks' use of accounting information in their loan pricing decisions.

Admittedly, because of the lack of a comparable control sample, there is a possibility that the results could merely reflect a temporal trend. To address this concern, I include a time trend variable as well as two time-sensitive macroeconomic variables in all the models. An additional falsification test does not detect a similar downward trend in accounting DCV in a period before SOX 404 became effective. Assuming that the partitioning variables are independent of the unobservable confounding factors, the cross-sectional tests conditional on real management and nonaudit services should be less susceptible to this potential problem. What cannot be addressed is the possibility that banks have simply shifted their attention from the accounting metrics investigated in this study to other accounting metrics, altering the specificity of their focus on accounting information but not their overall reliance on financial reporting. Further research is needed to explore this possibility.

The next chapter introduces the background of SOX and reviews related literature. Chapter 3 develops the hypotheses. Chapter 4 outlines the research design, discussing the operationalization of debt contracting value, the selection of representative accounting

metrics, and the choice and measurements of control variables. Chapter 5 describes the sampling procedure and discusses empirical results, and Chapter 6 concludes.

# Chapter 2:

# BACKGROUND OF SOX AND RELATED LITERATURE

## 2.1 Background of Sox

Following a series of corporate accounting scandals involving high-profile companies, Congress passed the Sarbanes-Oxley Act on July 30, 2002 to "protect investors by improving the accuracy and reliability of corporate disclosures".[3] SOX creates the Public Company Accounting Oversight Board (PCAOB) to regulate the audit of public companies and establishes new rules aimed at increasing management responsibility for financial reporting, enhancing auditor independence, and strengthening board independence from the management.

SOX mandate that speaks directly to financial reporting is Section 404, which requires both a management certification of and an auditor attestation to the effectiveness of the issuer's internal control over financial reporting. [4] Section 404(a) stipulates that both quarterly and annual reports filed with the Securities Exchange Commission (SEC) include a management certification to assure accuracy of the financial statements and the

[3] http://www.gpo.gov/fdsys/pkg/PLAW-107publ204/content-detail.html.

[4] According to the Auditing Standard No. 5 (AS5), "Effective internal control over financial reporting provides reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes. If one or more **material weaknesses** exist, the company's internal control over financial reporting cannot be considered effective."

effectiveness of the internal control system in producing reliable disclosures. Any deficiency in the issuer's internal control system must be disclosed in these periodic filings. This disclosure is also referred to as "Section 302 disclosure" because Section 302 has the same requirement. Section 404(b) further requires that the auditor must attest to the annual management certification by stating a clear auditor opinion as to whether the registrant maintained effective internal control over financial reporting.

The large expected compliance cost related to Section 404(b) caused controversy over its net benefit, [5] especially for small businesses. SOX 404(b) requirements came into effect for large public companies (those with public float of $75 million or more) for their first fiscal year ending on or after November 15, 2004. In response to concerns over disproportionate compliance costs but unclear benefits to small public firms, the SEC granted seven deadline extensions to non-accelerated filers, [6] and the Congress, via Dodd-Frank Act of July 21, 2010, eventually exempted these firms from SOX Section 404(b).

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[5] According to an SEC estimate, the direct annual cost of implementing Section 404(a) is around $1.24 billion (or $91,000 per company). See http://www.sec.gov/rules/final/33-8238.htm#P483_150194. However, a study of Korn/Ferry International reports an average compliance cost of $5.1mm per company. http://www.kornferry.com/PressRelease/840

[6] The initial SEC rules of June 5, 2003 provided that non-accelerated filers comply with Section 404 in their first fiscal year ending on or after June 15, 2004. Later SEC releases extended the deadline to April 15, 2005; July 15, 2005; July 15, 2006; July 15, 2007; December 15, 2007 for Section 404 (a) and December 15, 2008 for Section 404(b); December 15, 2009; and June 15, 2010. A non-accelerated filer refers to an issuer that is neither an accelerated filer nor a large accelerated filer as defined in Rule 12b-2 of the Securities Exchange Act of 1934. It is principally an issuer with a public float of less than $75 million. http://www.sec.gov/about/laws/secrulesregs.htm.

SOX holds the management directly responsible for the quality of financial reporting. Section 304 states that the company's CEO and CFO should forfeit their bonuses and related profits from selling the company's securities if an issuer is required to prepare an accounting restatement "as a result of misconduct". The CEO and CFO are also subject to criminal penalty of up to 20 years in prison for "knowingly" providing a false certification (Section 802).

Provisions on auditor independence include requirements on the composition of audit committee, restrictions of non-audit services, and mandatory rotation of lead partners. SOX charges the audit committee of a corporate board with the responsibility for appointing and compensating the auditor and stipulates that all members of the audit committee be independent directors (Section 301). Section 201 prohibits an auditor from "contemporaneously" providing a number of consulting and other non-audit services to its public auditing client. Under this section, permissible non-audit services, tax services included, have to be preapproved by the audit committee. Section 203 requires the rotation of the lead audit partner after auditing the same client for five years.

## 2.2 Related Literature

This section briefly reviews the literature on (1) financial reporting and private debt contracting and (2) SOX and financial reporting quality.

### *2.2.1. Financial reporting and private debt contracting*

Theories of financial intermediation postulate that banks are quasi-insiders among capital providers because they have the ability to request private information (Diamond, 1984; Fama, 1985). Nonetheless, financial statement data are a primary source of information about the borrower's ability to pay the obligation as stated in the loan agreement (Libby 1979). In practice, audited financials form the basis of lending decisions, and credit agreements routinely require the delivery of audited financial statements as part of the monitoring process (Smith and Warner 1979; Leftwich 1983; Taylor and Sansone, 2007). Prior research finds that accounting data possess significant power for predicting two important elements of credit risk, the likelihood of default (e.g. Horrigan 1965; Beaver 1966; Altman 1968; Ohlson 1980) and the magnitude of loss given default (Amiram 2011). Recognizing lending as one source of demand for accounting information, Watts and Zimmerman (1986) hypothesize that debt covenants affect the borrower's accounting policy.

Focusing on accounting's monitoring role in the lending process, the literature documents that one important accounting property, timely loss recognition, enhances debt contracting efficiency (e.g. Ahmed et al. 2002; Watts, 2003a, b; Zhang, 2008; Beatty et al. 2008). Based on cross-country tests, Ball et al. (2008) find that debt markets, not equity markets, are associated with important financial reporting properties such as timely recognition of loss. They infer that the well documented increase in conditional

conservatism may be due to the increasing economic importance of the corporate debt market.

Recent studies have explored the implications of other accounting attributes for private debt contracting. The accumulated evidence indicates that the borrower's financial reporting features, or accounting quality measured in different ways, affect a multitude of debt contract features, such as the initial interest rates, the likelihood of the loan being securitized, the loan's syndicate structure, the strictness and structure of financial covenants, and the choice of accounting ratio versus credit rating in determining performance pricing grids (Bharath et al. 2008; Amiram, 2011; Ball et al. 2008; Christensen and Nikolaev, 2012; Demerjian, 2011).

### *2.2.2. SOX and Reporting Quality*

The literature has presented evidence on reporting changes following SOX, but it is not clear whether and how these changes have affected banks' use of accounting information. The reported accounting improvements include lower incidence of restatements (Nagy 2010; Audit Analytics, 2010), smaller discretionary accruals (Lobo and Zhou, 2006; Cohen et al., 2008; Singer and You, 2011), and more timely recognition of losses (Lobo and Zhou, 2006). Reporting changes that may not benefit financial statement users include the shifting from accrual management to real management following SOX (Graham et al. 2005; Cohen et al. 2008; Zang 2012) and reduced timeliness of the audited financial statement (SEC, 2009).

A major product of SOX is disclosures of internal control weaknesses (ICWs) under Section 302 and Section 404. The literature generally shows that stockholders respond to Section 302 reports of ICWs negatively (Beneish et al. 2008; Kim and Park, 2009), but findings on the audited Section 404 reports of ICWs are inconclusive (Beneish et al. 2008; Ogneva et al. 2007; Ashbaugh et al. 2009). Rice and Weber (2012) find that SOX 404 reports disclose less than 1/3 of internal control problems in restatement cases, casting doubts over their effectiveness in providing advance warning to financial statement users. On the debt market, Kim et al. (2011) report that banks increase interest rates after the borrower discloses internal control deficiencies in Section 404 filings. However, Dhaliwal et al. (2011) find that the bond market response to Section 404 ICW reports is negative only for unrated firms or firms without bank monitoring, suggesting that the added disclosure under Section 404 is not informative to banks.

### *2.2.3. Summary*

The survey of extant studies suggests that public reporting is a subset of the information used by private lenders, and SOX may have changed the way accounting information is used in the private debt contracting process. However, the literature does not provide an answer as to how private lenders use accounting information differently post SOX.

# Chapter 3

# HYPOTHESIS DEVELOPMENT

## 3.1. SOX and the Debt Contracting Value (DCV) of Accounting Information

Accounting data contain information about credit risk (e.g. Horrigan 1965; Beaver 1966; Altman 1968; Ohlson 1980; Amiram 2011). The terms of a debt contract revolve around estimated credit risk. Given accounting information's ability to predict the probability of default and the potential loss given default, it is not surprising that accounting attributes are linked to various debt contract features.

Since the outputs from different accounting information systems do not possess the same predictive power for credit risk, their usefulness in debt contracting should also vary. The literature shows that the debt contracting use of accounting information varies with accounting's ability to predict credit risk measured in different ways. For example, accounting numbers' ability to explain credit rating or credit deterioration determines the mix of financial covenants or whether the interest spread is allowed to vary with accounting-based metric of firm performance (Ball et al. 2008; Christensen and Nikolaev, 2012). And according to Demerjian (2011), accounting metrics' variability negatively affects their inclusion in financial covenants.

A common theme of this stream of research is to explore the attributes of accounting information that appear to be valuable in the context of debt contracting. Ball et al. (2008) conceptualize debt contracting value as "the ability of publicly reported accounting data to predict deteriorations in the credit quality of a borrower on a timely basis" (p. 250). Christensen and Nikolaev (2012) define accounting information contractibility as "the inherent ability of accounting information to measure the state of nature" (p. 84). Building on these notions, I adopt the term DCV to denote accounting data's ability to convey credit risk at the inception of the loan agreement. This definition reflects the fact that accounting data available at loan closing are an important subset of the information that the lender uses to decide how to manage that risk with price and non-price contract terms. It focuses on accounting's informational role in the debt contracting process; it does not presume that conservative accounting has higher debt contracting value.

Some of the SOX-induced changes in accounting attributes—for example, a lower incidence of restatements, smaller discretionary accruals, and more timely recognition of losses (Audit Analytics 2010; Lobo and Zhou 2006; Nagy 2010; Singer and You 2011)—are generally interpreted as accounting quality improvements. If these changes result in reported accounting measures being more informative of borrower's credit risk, banks will rely more on accounting numbers when structuring the loan. Other changes, however, may have opposite implications for accounting data's usefulness in bank lending. Cohen et al. (2008), for instance, report evidence consistent with a post-SOX

switch from AEM to REM; the latter can impair a firm's ability to generate future earnings and introduce uncertainty to its cash flow streams. Likewise, SOX's requirement of management certification and auditor attestation of internal control effectiveness has reduced the timeliness of audited financial statements (US Securities and Exchange Commission 2009), potentially forcing banks to increase their reliance on more timely sources of information, private or public, to make lending decisions and write contracts.

Since SOX could have both decreased and increased accounting DCV via different mechanisms, its net impact or average effect is indefinite. I therefore specify the following two competing hypotheses stated in alternative form:

**H1A:** Following SOX, affected borrowers experience an increase in the DCV of their accounting information.

**H1B:** Following SOX, affected borrowers experience a decrease in the DCV of their accounting information.

### 3.2. Internal Control Weaknesses and DCV of Accounting Information

SOX Sections 302 and 404(a) stipulate that both quarterly and annual reports filed with the Securities Exchange Commission (SEC) must include a management certification assuring the reliability of the financial reporting. Section 404(b) further requires that the auditor must clearly attest on the annual management certification to the (in)effectiveness of the registrant's internal control over financial reporting. These rules

essentially require that any deficiency in the issuer's internal control over financial reporting must be disclosed.

According to prior studies, the existence and disclosure of ICWs is associated with firm characteristics, such as size, age, growth, organizational complexity, financial distress, and management and auditor changes (Ashbaugh-Skaife et al. 2007; Doyle et al. 2007; Ge et al. 2005), and only a minority of firms with internal control deficiencies disclose the problems (Rice and Weber 2012). The stock market response to unaudited Section 302 quarterly reports of ICWs is generally negative, whereas its response to audited Section 404 annual reports of ICWs is mixed (Beneish et al. 2008; Ogneva et al. 2007; Ashbaugh-Skaife et al. 2009; Kim and Park 2009).

By definition, ICW is indicative of unreliable information from financial reporting. Hence, if banks are aware of the problems underlying the ICW disclosure, ICW borrowers should have lower accounting DCV than non-ICW firms do irrespective of the disclosure. Given the low proportion of internal control problems being disclosed, it is likely that only the most serious deficiencies result in ICW disclosures. Banks, as sophisticated users of accounting information, may be able to infer the internal control problems from observable firm characteristics and private communication even without formal public disclosure. If this is the case, the borrower's ICW disclosure will not change banks' use of the borrower's accounting numbers. Dhaliwal et al. (2011) indirectly support this argument by showing that the bond spread increases upon ICW disclosure under Section 404, but only for firms with no bank monitoring. Their finding

suggests that even before formal disclosure, bond price incorporates the negative information related to the issuing firm's internal control deficiencies, probably channeled via banks that have also issued loans to the firm.

If, however, banks do not fully assimilate the information from observable firm characteristics and borrowers do not communicate their ICWs to their banks absent regulatory mandate, the accounting DCV of ICW borrowers will not differ from that of non-ICW firms until the existing ICWs are disclosed. In this case, banks will not be indifferent to ICW reports but rather will adjust the reliance they place on accounting information when pricing the credit risk associated with the loan. This argument is supported by Kim et al. (2011), who, examining the contracting differences between borrowers disclosing or not disclosing ICWs under SOX 404, report that ICW borrowers experience an increase in interest spread after SOX, whereas non-ICW borrowers experience a decrease. Likewise, Costello and Wittenberg-Moerman (2011), find that banks charge higher interest and rely less on accounting information to set covenants or performance pricing provisions after the borrower reports ICW under Section 302. Both findings suggest that banks update their beliefs about the borrower's accounting quality upon ICW disclosure.

In sum, the question of whether SOX-mandated ICW disclosure has information content for banks has two potential answers, each with different empirical implications. One predicts that banks (1) discount an ICW borrower's accounting numbers even before the official ICW disclosure but (2) will not change their discounting of the ICW borrower'

accounting numbers after the ICW disclosure. The other predicts that banks apply a discount or a deeper discount to an ICW borrower's accounting information after the ICW disclosure. These arguments are specified in alternative form in the following competing hypotheses:

**H2A:** ICW borrowers have lower accounting DCV before SOX 404 but they do not experience a larger decline in their accounting DCV after SOX 404.

**H2B:** ICW borrowers have lower accounting DCV than non-ICW borrowers after SOX 404.

### 3.3. Real Earnings Management and the DCV of Accounting Information

Roychowdhury (2006) defines REM as activities that depart from normal operational practices and are motivated by financial reporting goals, which includes reduction of discretionary expenditures to improve reported margins, price discounts to temporarily increase sales, and overproduction to report lower cost of goods sold. Graham et al. (2005) shed light on not only the prevalence of REM but also managers' rationale for choosing REM over AEM. In their study, 80% of the survey participants reported a willingness to decrease discretionary spending on R&D, advertising, and maintenance in order to meet earnings targets; and more than half would delay the start of new projects. One executive remarked that "while auditors can second-guess the firm's accounting policies, they cannot readily challenge real economic actions to meet earnings targets that are taken in the ordinary course of business" (p. 36). This comment suggests

that, after SOX, closer scrutiny of accounting practices plays a part in the managerial choice of REM over AEM. Empirical findings by both Cohen et al. (2008) and Zang (2012) mirror this observation in their showing that since SOX, AEM has on average declined, whereas REM has increased.

In contrast to AEM, which shifts income across different accounting periods without directly impacting the stream of cash flows, REM alters the timing and structure of operating activities, adding uncertainty to the firm's long-term performance and impairing its cash-generating ability. For example, reducing discretionary expenses can weaken the company's competitiveness, while an expedient strategy of boosting sales with deep discounts can result in difficulty selling goods or services under normal terms and consequently jeopardizes future profit margins. Primarily concerned about the borrower's ability to pay interest and principal within the debt horizon, lenders focus more on cash flow position and its changes when examining the borrower's accounting information. Among debt contracts in the DealScan database, total debt to cash flow is both the most popular risk indicator in financial covenants and the most popular performance indicator used in grid pricing. Given lenders' sensitivity to the borrower's cash flow position and REM's cash flow consequences, lenders are expected to adjust down the weight they place on accounting numbers in response to the borrower's shift from AEM to REM. The third hypothesis, expressed in alternative form, captures this relation:

**H3:** Following SOX, borrowers suspected of REM experience a larger decline in their accounting DCV than non-REM borrowers.

### 3.4. Nonaudit Services and the DCV of Accounting Information

Quality of financial reporting is determined by both the preparer and the auditor. Quality of audit, in turn, is "the market-assessed joint probability that an auditor will both (a) discover a breach in the client's accounting system, and (b) report the breach" (DeAngelo 1981, p 186). The auditor's economic dependence on a client weakens the auditor's willingness to report a discovered breach and therefore can lead to lower quality of the audited financial statements. In particular, nonaudit services sold to the client can increase the auditor's revenue dependence on the client, potentially reducing the auditor's willingness to report a discovered breach.

To assure auditor independence, SOX Section 201 prohibits the auditor from "contemporaneously" providing certain consulting services to its public auditing client, ranging from bookkeeping and information system design to management and legal services. Tax service is permissible but must be preapproved by the audit committee. Because of litigation and reputation concerns, in the post-SOX era most public companies have not only turned away from the forbidden consulting services but also voluntarily reduced tax service (Maydew and Shackleford 2007).

However, joint production of audit and nonaudit services can also generate knowledge spillover, which potentially increases the probability of discovering an

existing breach in the accounting system and consequently financial reporting quality (Simunic 1984). In summary, auditor-provided nonaudit services potentially have two opposing effects on financial reporting: negative effect due to the erosion of auditor independence and positive effect via knowledge spillover. The overall influence of nonaudit services on financial reporting quality depends on which effect dominates and may vary with the nature or type of the service.

General nonaudit services appear to have an adverse effect on *perceived* auditor independence and reporting quality. There is evidence that the stock market response to quarterly earnings surprises is weaker for firms with more nonaudit services (Francis 2006; Francis and Ke 2006; Krishnan et al. 2005). On the bond market, higher level of nonaudit services is linked with higher yield spread and also a lower association between earnings and the spread (Dhaliwal et al. 2008). These empirical patterns suggest that equity and bond investors perceive nonaudit services as impairing the quality of financial reports.

The adverse investor perception of nonaudit services might be driven by unspecified other services. Kinney et al. (2004) identify a positive association between other unspecified services and restatements in the pre-SOX era. Schmidt (2012), using a sample of 2001–2007 restatements, reports that restatement-related audit litigation is more likely when fees for other unspecified services are higher.

An important type of nonaudit services, tax services, have been found in multiple studies to be associated with higher reporting quality and positive market reactions.

These services appear to reduce the instances of (tax-related) restatements (Kinney et al. 2004; Seetharaman et al. 2011), restrain loss avoidance, and improve tax reserves estimation (Krishnan and Visvanathan 2011; Gleason and Mills 2011). Bond holders reward firms that have higher tax services with lower yield spread, and equity investors view the earnings of firms with high tax services as more value relevant (Fortin and Pittman 2008; Krishnan et al. 2012).

Given the opposite effects of different types of nonaudit services on perceived reporting quality, the net impact of a borrower's overall post-SOX reduction of nonaudit services on banks' use of accounting information is an empirical question. If banks associate other unspecified services with less reliable financial reporting and share the negative perception of nonaudit services held by stock and bond holders, they should welcome the post-SOX separation of nonaudit services from the auditor. However, they may respond to the reduction of tax services differently. They may view tax services as having a positive influence on reporting quality via knowledge spillover. In this case, a reduction of tax services, and resultant reduction of comprehensive nonaudit services, would have either no or negative effect on the weight that lenders place on accounting metrics when pricing credit risk. This argument leads to two complementary hypotheses stated in alternative form:

**H4A:** Following SOX, a borrower's reduction of tax service is negatively related to the change in the DCV of its accounting information.

**H4B:** Following SOX, a borrower's reduction of the other unspecified nonaudit services is positively related to the change in the DCV of its accounting information.

# Chapter 4

# RESEARCH DESIGN

## 4.1 Proxies for DCV of Accounting Information

One important term of a credit agreement is the price or interest rate of the loan. The loan interest rate is commonly expressed as the sum of a base component, such as the federal fund rate or the London Inter-Bank Offered Rate (LIBOR), and a loan-specific margin or spread over the base component. The base rate serves as a market-wide benchmark for the cost of funds; the spread represents a credit risk premium, or compensation for the credit risk exposure specific to the loan. Given the loan structure, the spread summarizes the lender's assessment of credit risk of the borrower (Beatty 2008). The extent that the lender draws on accounting information to determine the spread reflects the lender's belief in accounting information's ability to inform on the loan's credit risk. Hence, I measure accounting DCV with some key accounting metrics' ability to explain the variability of the initial interest spread.

### *4.1.1. The Association between Interest Spread and Key Accounting Metrics*

#### *4.1.1.1 Average Effect*

To test H1, I use OLS to estimate the following model and analyze the change in

the coefficients of key accounting variables from pre- to post-SOX periods:

$$SPREAD=\alpha 0+\Sigma\alpha_{1\text{-}4}*ACCT+\beta_0*POSTSOX+\Sigma\beta_{1\text{-}4}*POSTSOX*ACCT+\Sigma\gamma_{1\text{-}12}*Controls+\varepsilon. \quad (1)$$

Here, *SPREAD* represents initial interest spread of the loan, *POSTSOX* is an indicator variable that takes the value 1 for loans issued after SOX, and *ACCT* represents a set of four accounting metrics that the literature has documented to be predictive of loan interest spread. The coefficients of these variables, $\alpha 1$–$\alpha 4$, serve as the baseline relation between each accounting metric and the interest spread, respectively. *Controls* represents a vector of loan-level, firm-level, and macroeconomic factors that are known to influence the loan spread.

Of particular interest are the coefficient estimates on the interaction terms *POSTSOX*ACCT*. Specifically, the estimated $\beta_1$–$\beta_4$ indicate how the relation between interest spread and each of the accounting metrics changes from pre- to post-SOX issuance of loans. If the estimated $\beta_i$ is significantly different from zero and has the same sign as $\alpha_i$, then the corresponding accounting variable becomes more closely associated with interest spread after SOX. Such a change suggests that the lender perceives the accounting metric to be more informative of credit risk, lending support to H1A. Conversely, if the estimated $\beta_i$ is significantly different from zero but has the opposite sign to that of $\alpha_i$, then the accounting metric has a smaller weight in the loan pricing process after SOX, the change supporting H1B and indicating a decline in that accounting

metric's DCV following SOX. The selection and definition of the accounting and control variables is detailed later in this section.

#### *4.1.1.2. Conditional Effects*

To test the cross-sectional differences conditional on the disclosure of internal control weaknesses, real management, and nonaudit services, I augment Model 1 by adding a partitioning variable, PART∈(ICW, REM, DROP):

$$SPREAD=\alpha_0+\Sigma\alpha_{1\text{-}4}*ACCT+\alpha_5*PART+\Sigma\alpha_{6\text{-}9}*PART*ACCT+\beta_0*POSTSOX$$
$$+\Sigma\beta_{1\text{-}4}*POSTSOX*ACCT+\beta_5*PART*\ POSTSOX$$
$$+\Sigma\beta_{6\text{-}9}*POSTSOX*ACCT*PART+\Sigma\gamma_{1\text{-}12}*Controls+\varepsilon. \quad (2)$$

In this model, *ICW* is an indicator variable that takes the value 1 for firms that disclosed internal control weaknesses in at least one of their Section 404 reports, and *REM* indicates whether the borrower is suspected of REM activities, taking the value 1 if yes and zero otherwise. DROP is also an indicator variable, taking three forms to represent the overall reduction in nonaudit services (NAS_DROP), the reduction in tax services (TAX_DROP), or the reduction in other unspecified services (OTH_DROP), respectively. It takes the value 1 for borrowers that substantially reduced their purchase of nonaudit services. The estimated $\beta_6$–$\beta_9$ indicate whether the accounting metrics of ICW (or REM or DROP) firms have experienced post-SOX DCV changes differently from non-ICW (or non-REM or non-DROP) firms.

H2A specifies the empirical implications if ICW disclosures do not provide new risk relevant information to lenders. It predicts that (1) one or more coefficients among $\alpha_6$–$\alpha_9$ is significantly different from zero with sign opposite to its corresponding coefficient among $\alpha_1$–$\alpha_4$, and (2) none of the estimated $\beta_6$–$\beta_9$ is significantly different from zero. Conversely, H2B predicts that at least one of the estimated $\beta_6$–$\beta_9$ is significantly different from zero with sign opposite to its corresponding coefficient among $\alpha_1$–$\alpha_4$.

Under the assumption that real management weakens accounting metrics' credit risk informativeness, H3 predicts that at least one of the estimated coefficients on *POSTSOX*ACCT*REM*, $\beta_6$–$\beta_9$, will be significantly different from zero and carry the opposite sign to its corresponding coefficient among $\alpha_1$–$\alpha_4$.

H4 predicts that the reductions in tax service and other unspecified services have opposite effects on the change of accounting DCV. Specifically, when the sample is partitioned by the borrower's extent of reduction in tax services, i.e. *PART=TAX_DROP*, at least one of the coefficient estimates on *POSTSOX*ACCT*PART*, $\beta_6 - \beta_9$, will be significantly different from zero with the sign opposite to that of its corresponding coefficient among $\alpha_1 - \alpha_4$. In contrast, when *PART=OTH_DROP*, at least one of the coefficient estimates on $\beta_6 - \beta_9$ will be significantly different from zero with same sign of its corresponding coefficient among $\alpha_1 - \alpha_4$.

### *4.1.2. The Explanatory Power of Key Accounting Metrics*

Although the multiple accounting variables reflect different aspects of credit risk, their expected correlation has the potential to produce multicollinearity that would weaken the power of the coefficient test. More specifically, it could yield insignificant coefficient estimates on individual accounting variables even when the DCV of these accounting metrics as a whole has changed (Kennedy 2008). Hence, in line with extant research that uses accounting variables' statistical explanatory power to gauge their usefulness to investment decisions (e.g. Lev 1989; Collins et al. 1997; Biddle et al. 1995), I also infer accounting DCV from the key accounting metrics' collective ability to explain the interest spread.

Since the magnitude of $R^2$ is sensitive to the range of variation in the dependent variable, a simple comparison of $R^2$s from two samples may produce spurious inferences about explanatory powers (Gu 2007; Kennedy 2008). To mitigate this risk, I compute the partial $R^2$ attributable to the accounting variables following Anderson-Sprecher (1994),

$$R^2(acct) = 1 - \frac{RSS\ (full)}{RSS\ (reduced)}, \quad (3)$$

where RSS(full) and RSS(reduced) are the residual sum of squares obtained through OLS estimation of a full and reduced model, respectively, specified below.

Full model: $SPREAD=\alpha_0+\Sigma\alpha_{1\text{-}4}*ACCT+\Sigma\gamma_{1\text{-}11}*Controls+\varepsilon;$

Reduced model: $SPREAD=\alpha_0+\Sigma\gamma_{1\text{-}11}*Controls+\varepsilon.$

$R^2(acct)$ indicates how much the full model improves the reduced model in explaining the variability of *SPREAD*. It signifies the increase in explanatory power resulting from

the addition of accounting variables. I use this measure as a second proxy for the DCV of the selected accounting metrics. The $R^2(acct)$ is computed separately for the pre- and post-SOX periods. The difference between the two partial R-squares indicates the change in accounting DCV across the two periods. To address the concern that this partial $R^2$ can differ across the two periods merely due to the difference in the variability of dependent variable, I also compare a relative measure,$R^2(acct)/R^2(full)$, across the two periods. Since both $R^2(acct)$ and $R^2(full)$ would be affected by the change in the variability of *SPREAD*, the relative measure should be able to mitigate the inflation or deflation of $R^2$ resulting merely from the different variability of *SPREAD*.

## 4.2 Definition of Variables

### *4.2.1. Dependent Variable*

*SPREAD* is measured by all-in-drawn spread over the LIBOR as reported in DealScan. It captures the loan-specific risk premium on the amount drawn down under the loan commitment.

### *4.2.2. Key Accounting Metrics as Independent Variables*

I focus on four accounting metrics that the accounting and finance literature has identified to be predictive of credit risk (e.g., Begley and Feltham 1999; Bharath et al. 2008; Graham et al. 2008; Costello and Wittenberg-Moerman 2011; Christensen and Nikolaev 2012). These metrics or their components also frequently appear in debt

covenants as risk indicators. *ROA* indicates accounting profitability, measured as EBITDA deflated by book assets. It is a primary indicator of a firm's financial health. *INT_COV*, calculated as the ratio of earnings over interest expenses, (XINT+EBITDA)/XINT, measures a firm's ability to pay interest on outstanding debt. *LEV*, measured by total debt divided by total assets, reflects a firm's capital structure and its ability to meet debt obligations. *NW*, measured by the natural logarithm of net worth, represents the creditor's margin of protection from the owner's equity. A normal relation between *SPREAD* and *ROA*, *INT_COV*, or *NW* is negative, whereas a normal relation between *SPREAD* and *LEV* is positive.

#### *4.2.3. Partitioning Variables*

Among the partitioning variables, the *ICW* measure (described earlier) is straightforward, so only the definition of *POSTSOX*, *REM*, *NAS_DROP*, *TAX_DROP*, and *OTH_DROP* needs detailed explanation. *POSTSOX* partitions the sample loans based on whether the borrower's financial reporting process was affected by SOX or not. SOX was signed into law on July 30, 2002, but many parts of it did not become actually effective until various later dates. For example, the SOX rules prohibiting nonaudit services were adopted on January 22, 2003 by the SEC and became effective another three months later, while SOX Section 404 became effective from November 15, 2004 and onwards, depending on the filer's size. I let the objective of the test determine the demarcation of *POSTSOX* and define it in two different ways. First, I assume that the

shift from AEM to REM was driven more by the implementation of SOX stipulations, especially Section 404, rather than the enactment of SOX. Accordingly, when testing the impact of ICW disclosure and REM, I define *POSTSOX* to be 1 for loans issued after the borrower's first SOX 404 filing. When *POSTSOX* is so defined, it is labeled as *POST404* in tables and related discussion. Second, when testing how the reduction of nonaudit services affected the change of accounting DCV, I define *POSTSOX* to be 1 for loans issued in or after fiscal year 2003, when Section 201 that restricts nonaudit services became effective. When *POSTSOX* is so defined, it is labeled as *POST2003* in tables and related discussion.

*REM*, a binary variable indicating a higher likelihood of real earnings management activities, is measured in two steps. First, I estimate the expected levels of cash flow from operations (*CFO*), production costs (*PROD*), and discretionary expenses (*DISX*) for each two-digit SIC industry that has 10 or more firms in COMPUSTAT for each of the post-SOX years (see Roychowdhury 2006; Cohen et al. 2008). The residuals for each firm year, *R_CFO, R_PROD, R_DISX,* are taken to represent discretionary activities. Second, I rank the sample firms within the industry for each post-SOX year based on the level of these three types of discretionary activities separately. If a firm is above the median in all the three rankings in any of the post-SOX years, the variable *REM* takes the value 1, and 0 otherwise.

*NAS_DROP* is a binary variable indicating a significant reduction in the nonaudit services provided by the main auditor. I first deflate nonaudit fees by the square root of

the firm's total assets and label it as NAS (Kinney et al. 2004). Next, I compute the change of NAS in the post- and pre-SOX years of loan issuance, $NAS_{post} - NAS_{pre}$, with a negative value signifying reduction in NAS fees. If the fee for any pre-SOX year is unavailable, it is substituted with the fee of fiscal year 2002, the year immediately before the implementation of SOX Section 201. The sample firms are then ranked by this difference, and *NAS_DROP* takes the value 1 for firms ranked above the median in terms of their extent of reduction in nonaudit services. *TAX_DROP* and *OTH_DROP* are calculated in the same way except that the bases are tax fees and unspecified other fees, respectively.

#### *4.2.4. Control Variables*

All the models include three sets of variables to control for the loan-specific, firm-specific, and market-wide characteristics known to affect interest spread (e.g. Bradley and Roberts 2004; Bharath et al. 2008; Graham et al. 2008; Costello and Wittenberg-Moerman 2011). The loan-level controls are *PP*, which indicates whether the facility carries performance pricing provisions; *MATURITY*, the age of the facility in number of months; *DEAL_AT*, size of the loan measured as the total commitment of the loan package relative to the borrower's total assets; *SECURED*, the likelihood of being secured or guaranteed by a third party; and *LENDER_NUM*, the number of lenders participating in the facility. Also included in this group is *GEN_RESTR*, a numerical summary of general restrictions imposed on the loan. It sums *DIV_RESTR*, *CF_SW*,

*EQUI_SW, DEBT_SW, INS_SW,* and *ASSET_SW*, which are all binary variables with an assigned value 1 if the loan package carries dividend restrictions, cash flow sweep, equity sweep, debt sweep, insurance sweep, or asset sweep, respectively.

At the firm level, *RELATED* indicates whether the borrower has engaged the same lead bank to issue a loan within the past five years. A related lender may charge lower interests for the opportunity to cross-sell other products (Bharath et al. 2011). *RATING* is a numerical transformation of the S&P Domestic Long-Term Issuer Credit Rating, ranging from integers -2 for D (default) to 20 for AAA (highest). An unrated firm is assigned the value 0 for this variable. Also in this group is a control variable for risk, *VOLATILITY*, measured by the standard deviation of the borrower's monthly stock returns for 12 months before the loan issuance. If the borrower does not have public securities listed, *VOLATILITY* is assigned the value 0. Firm size, measured by the natural logarithm of the borrower's total assets, *SIZE_AT*, is also included in the model.

At the macro level, the controls include credit spread, *C_SPREAD*, measured by the difference between BAA and AAA corporate bond yields published by Moody's Investor Services, treasury spread, *T_SPREAD*, the difference between 20-year and 1-year treasury yields, and a time trend variable *YEAR*, the four-digit calendar year of the loan issuance. Credit spread tends to widen in recessions, serving as a control for the change in default risk due to economic conditions. Treasury spread indicates the prospect of inflationary growth, capturing the risk from unexpected interest rate changes (Fama and French 1993; Fabozzi 2000). The time trend variable is used to control for

unobservable economy-wide changes that could affect both SPREAD and the borrower's accounting performance. All the tests additionally take into account the fixed effects of borrower industry and primary purpose of the loan.

# Chapter 5

# DATA AND RESULTS

## 5.1. Overview of Samples

### *5.1.1. Sampling Procedure*

Two samples are drawn from non-financial U.S. firms that have issued loans both before and after SOX. The first sample starts from the borrower's SOX 404 filing. Of the 5,897 firms having Section 404 reports collected by Audit Analytics and financial information in Compustat, 3,940 have bank loans recorded in DealScan by April 2012. Of this set, I retain non-financial firms with total assets greater than $1 million that have issued revolving loans within three years both before and after the first SOX 404 report. [7] This procedure reduces the sample to 1,174 firms. When a firm issued multiple revolving loan facilities in either pre- or post-SOX period, the one that was closest to the initial SOX 404 report is retained. The final sample contains 2,348 revolving facilities, two for each sample firm. This sample is used to analyze the change of accounting DCV following the implementation of SOX 404 and the conditional effects of ICW disclosures and REM.

[7] Revolving lines of credits constitute approximately two thirds of the credit facilities collected in DealScan. I examine accounting's role in the pricing of this type of loan to mitigate confounding effects due to the difference in loan types.

The second sample contains firms that issued revolving loans before and after fiscal year 2003, when the reduction of nonaudit services started. I start with all the revolving lines of credits issued after 1990 by US firms that have financial information in Compustat: 38,451 facilities by 8,748 borrowers. I then drop (1) the smaller firms with total assets lower than $1 million, (2) firms in the financial service industry, and (3) facilities issued more than five years before or after 2003. Of the remaining facilities, I select one issued before and one issued after the borrower's fiscal year 2003, generating a sample of 3,258 facilities by 1,629 firms. This sample is used to analyze the change of accounting DCV conditional on REM and the reduction of nonaudit services.

### *5.1.2. Sample Characteristics*

Using the company's primary SIC code for classification (see Barth et al. 1998), Panel B of Table 1 outlines the industry composition of the firms in the samples. As expected, the companies are concentrated in three industries: durable manufacture, retail, and services. Panel C presents the fiscal year distribution of loan initiation. The majority of the Sample 1 loans (79%) were issued between 2002 and 2005, with pre-SOX issuances concentrated in 2002 and 2003 and post-SOX issuances in 2004 and 2005. This temporal distribution alleviates the concern that two major economy-wide events—Regulation FD and the recent financial crisis—may confound the results. Loans in Sample 2 span a longer time period, with pre-SOX issuances ranging from 1998 to 2002,

**TABLE 1**
**Sample Description**

**Panel A: Sample Procedure**

| ***Sample 1:*** | *Firms* | *Facilities* |
|---|---|---|
| Firms with SOX404(b) reports collected by Audit Analytics by October 2011 that have financial information in Compustat | 5,897 | |
| Firms with loan records in DealScan* by April 2012 | 3,940 | |
| Non-financial US firms that issued revolving lines before and after the first SOX404(b) report and with AT>$1MM | 1,174 | 2,348 |
| ***Sample 2:*** | | |
| Revolving lines of credit recorded in DealScan by April 2012 | 38,456 | 94,041 |
| Revolving lines of credits issued after 1990 by US firms that have financial information in Compustat * | 8,748 | 38,451 |
| Revolving lines issued by non-financial firms with AT>$1MM; two facilities are retained for each borrower, one issued before and the other one issued after SOX (fiscal year 2003) | 1,629 | 3,258 |

**Panel B: Industry Composition of Sample Firms**

| | **Sample 1** | | **Sample 2** | |
|---|---|---|---|---|
| **Industry **** | **N** | **Percentage** | **N** | **Percentage** |
| Durable Manufacturers | 255 | 21.72 | 389 | 23.88 |
| Retail | 194 | 16.52 | 265 | 16.27 |
| Services | 135 | 11.5 | 196 | 12.03 |
| Utilities | 101 | 8.6 | 117 | 7.18 |
| Textiles, Printing & Publishing | 89 | 7.58 | 115 | 7.06 |
| Transportation | 87 | 7.41 | 129 | 7.92 |
| Extractive Industries | 79 | 6.73 | 91 | 5.59 |
| Computers | 63 | 5.37 | 100 | 6.14 |
| Mining & Construction | 48 | 4.09 | 48 | 2.95 |
| Chemicals | 46 | 3.92 | 70 | 4.3 |
| Food | 36 | 3.07 | 61 | 3.74 |
| Pharmaceuticals | 26 | 2.21 | 33 | 2.03 |
| Other | 15 | 1.28 | 15 | 0.92 |
| | 1,174 | 100.00 | 1,629 | 100.00 |

**TABLE 1 - continued**
**Sample Description**

**Panel C: Distribution of Loans by Year of Issuance**

| Year of Issuance | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | ***Sample 1:*** | | | | | | |
| POST404=0 | | | 60 | 113 | 253 | 586 | 123 | 29 | 9 | 1 | |
| POST404=1 | | | | | | 1 | 506 | 353 | 173 | 90 | 51 |
| Percent of Sample | | | 2.56 | 4.81 | 10.78 | 25.00 | 26.79 | 16.27 | 7.75 | 3.88 | 2.17 |
| | | | | | ***Sample 2:*** | | | | | | |
| POST2003=0 | 448 | 366 | 375 | 315 | 124 | | | | | | |
| POST2003=1 | | | | | | 855 | 487 | 158 | 79 | 32 | 17 |
| Percent of Sample | 13.76 | 11.24 | 11.52 | 9.67 | 3.81 | 26.26 | 14.96 | 4.85 | 2.43 | 0.98 | 0.52 |

* The Compustat-DealScan Link Table (Chava and Robersts 2008) is used to identify borrowers in DealScan that have filed SOX404(b) reports and/or have financial information in Compustat.

** Industry classification follows Barth et al. 1998.

and post-SOX issuances, from 2003 to 2008. This sample is not free of the impact from Regulation FD and may also be affected by business cycles.

Table 2 lists the pertinent characteristics of the sample firms and loans across the pre- and post-SOX periods. On average, the sample firms did not experience significant changes in leverage across the two periods, but they had higher net worth and higher interest coverage in post-SOX years. The mean ROA increased after SOX for firms in Sample 1, but decreased for firms in Sample 2. As regards loan characteristics, the loans issued after SOX tended to have longer maturity and were more likely to be arranged by a related bank. The firms in Sample 1 experienced a downward trend in treasury spread and an upward trend in credit spread, suggesting that the post-SOX sample years were more likely to coincide with economic recession. Corresponding to the difference in time periods, firms in sample 2 experienced opposite trends in these two macroeconomic indicators.

### 5.2 Bivariate Analysis

Table 3 reports the Pearson correlation of variables. The correlation structures obtained from the two samples are quite similar. First, all four accounting measures are significantly correlated with *SPREAD*, which increases in *LEV* and decreases in *ROA*, *INT_COV*, and *NW*. This pattern is consistent with the literature and indicates that these accounting metrics contain information about credit risk that the interest spread reflects. Second, although the variable construction inherently leads to correlation among the

**TABLE 2**
**Characteristics of Sample Firms and Loans**

| Variables* | *Sample 1* | | | | | | *Sample 2* | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | POST404=0 | | POST404=1 | Diff. in Means | | | POST2003=0 | | POST2003=1 | | Diff. in Means | |
| | N | Mean | Mean | Diff. | t | Pr > \|t\| | N | Mean | N | Mean | Diff. | t | Pr > \|t\| |
| **SPREAD** | 1,174 | 153.18 | 143.33 | -9.84 | -2.18 | 0.029 | 1,542 | 162.49 | 1,560 | 158.61 | -3.88 | -0.99 | 0.323 |
| **ROA** | 1,174 | 0.13 | 0.14 | 0.00 | 1.60 | 0.109 | 1,542 | 0.14 | 1,560 | 0.13 | -0.01 | -5.16 | <.0001 |
| **INT_COV** | 1,174 | 14.28 | 15.74 | 1.46 | 1.75 | 0.080 | 1,542 | 10.59 | 1,560 | 12.82 | 2.23 | 4.67 | <.0001 |
| **LEV** | 1,174 | 0.60 | 0.59 | -0.01 | -1.39 | 0.165 | 1,542 | 0.62 | 1,560 | 0.61 | -0.01 | -0.64 | 0.525 |
| **NW ($ Mil)** | 1,174 | 1,429.29 | 1,773.69 | 344.40 | 2.51 | 0.012 | 1,542 | 1,485.54 | 1,560 | 2,059.59 | 574.05 | 2.42 | 0.015 |
| **PP** | 1,174 | 0.71 | 0.69 | -0.01 | -0.68 | 0.500 | 1,542 | 0.61 | 1,560 | 0.66 | 0.05 | 2.82 | 0.005 |
| **MATURITY** | 1,174 | 50.98 | 53.73 | 2.75 | 4.66 | <.0001 | 1,542 | 44.92 | 1,560 | 50.77 | 5.85 | 9.33 | <.0001 |
| **SECURED** | 1,174 | 0.63 | 0.62 | -0.02 | -0.62 | 0.532 | 1,542 | 0.38 | 1,560 | 0.55 | 0.17 | 9.67 | <.0001 |
| **DEAL_AT** | 1,174 | 0.31 | 0.32 | 0.01 | 0.88 | 0.377 | 1,542 | 0.35 | 1,560 | 0.30 | -0.06 | -2.76 | 0.006 |
| **GEN_RESTR** | 1,174 | 1.62 | 1.52 | -0.10 | -1.26 | 0.206 | 1,542 | 1.48 | 1,560 | 1.59 | 0.11 | 1.68 | 0.093 |
| **LENDER_NUM** | 1,174 | 9.85 | 9.70 | -0.15 | -0.47 | 0.638 | 1,541 | 8.86 | 1,559 | 9.31 | 0.45 | 1.56 | 0.120 |
| **RELATED** | 1,174 | 0.34 | 0.43 | 0.09 | 4.51 | <.0001 | 1,542 | 0.18 | 1,560 | 0.32 | 0.14 | 9.06 | <.0001 |
| **RATING** | 1,174 | 6.41 | 6.46 | 0.06 | 0.25 | 0.802 | 1,542 | 5.72 | 1,560 | 6.04 | 0.32 | 1.53 | 0.127 |
| **VOLATILITY** | 1,174 | 9.74 | 9.89 | 0.15 | 0.54 | 0.588 | 1,542 | 11.55 | 1,560 | 9.24 | -2.30 | -7.55 | <.0001 |
| **AT ($Mil)** | 1,174 | 4,245.90 | 4,914.20 | 668.30 | 1.90 | 0.058 | 1,542 | 4,636.10 | 1,560 | 6,334.00 | 1697.90 | 2.50 | 0.012 |
| **T_SPREAD** | 1,174 | 2.47 | 0.77 | -1.71 | -36.64 | <.0001 | 1,542 | 1.69 | 1,560 | 2.30 | 0.61 | 13.12 | <.0001 |
| **C_SPREAD** | 1,174 | 0.87 | 1.06 | 0.19 | 13.10 | <.0001 | 1,542 | 0.92 | 1,560 | 0.84 | -0.08 | -10.26 | <.0001 |
| **ICW** | 1,174 | 0.13 | 0.13 | | | | | | | | | | |
| **REM** | 1,174 | 0.24 | 0.24 | | | | 1,404 | 0.17 | 1,422 | 0.17 | | | |
| **NAS_FEE ($ '000)** | | | | | | | 1,470 | 1,388.62 | 1,470 | 1,155.15 | -233.47 | -7.62 | <.0001 |
| **TAX_FEE ($ '000)** | | | | | | | 1,470 | 682.54 | 1,470 | 616.28 | -66.2549 | -5.36 | <.0001 |
| **OTH_FEE ($ '000)** | | | | | | | 1,470 | 291.21 | 1,470 | 98.05 | -193.159 | -14.69 | <.0001 |

* All variables are defined in the appendix.

**TABLE 3**
**Pearson Correlation of Variables**

**Panel A: Sample 1**

| VARIABLES | SPREAD | ROA | INT_COV | LEV | NW | POST404 | PP | MATURITY | SECURED | DEAL_AT | GEN_RESTR | LENDER_NUM | RELATED | RATING | VOLATILITY | SIZE_AT | T_SPREAD | C_SPREAD | ICW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ROA | **-0.25** | | | | | | | | | | | | | | | | | | |
| INT_COV | **-0.18** | **0.37** | | | | | | | | | | | | | | | | | |
| LEV | **0.18** | **-0.18** | **-0.46** | | | | | | | | | | | | | | | | |
| NW | **-0.44** | 0.02 | **0.06** | **-0.28** | | | | | | | | | | | | | | | |
| POST404 | **-0.05** | 0.03 | 0.04 | -0.03 | **0.08** | | | | | | | | | | | | | | |
| PP | **-0.15** | **0.09** | **0.04** | **-0.09** | 0.00 | -0.01 | | | | | | | | | | | | | |
| MATURITY | **-0.28** | **0.11** | -0.01 | 0.01 | **0.18** | **0.10** | **0.11** | | | | | | | | | | | | |
| SECURED | **0.42** | **-0.09** | **-0.09** | **0.05** | **-0.34** | -0.01 | **0.21** | **-0.06** | | | | | | | | | | | |
| DEAL_AT | **0.17** | **0.19** | **0.06** | **-0.09** | **-0.33** | 0.02 | **0.08** | **0.13** | **0.24** | | | | | | | | | | |
| GEN_RESTR | **0.36** | **-0.05** | **-0.07** | 0.04 | **-0.31** | -0.03 | **0.30** | **0.06** | **0.49** | **0.33** | | | | | | | | | |
| LENDER_NUM | **-0.32** | **0.06** | **-0.07** | **0.11** | **0.41** | -0.01 | **0.19** | **0.23** | **-0.17** | -0.01 | **-0.10** | | | | | | | | |
| RELATED | **-0.14** | 0.04 | 0.01 | -0.03 | **0.05** | **0.09** | 0.05 | 0.00 | **-0.10** | -0.03 | **-0.07** | **0.06** | | | | | | | |
| RATING | **-0.38** | **0.10** | **-0.11** | **0.20** | **0.56** | 0.01 | 0.04 | **0.22** | **-0.28** | **-0.24** | **-0.19** | **0.42** | 0.04 | | | | | | |
| VOLATILITY | **0.26** | **-0.06** | -0.01 | **-0.07** | **-0.20** | 0.01 | 0.02 | **-0.14** | **0.22** | **0.07** | **0.14** | **-0.21** | -0.02 | **-0.25** | | | | | |
| SIZE_AT | **-0.34** | **-0.06** | **-0.13** | **0.28** | **0.75** | **0.08** | **-0.09** | **0.21** | **-0.33** | **-0.41** | **-0.30** | **0.51** | 0.03 | **0.69** | **-0.25** | | | | |
| T_SPREAD | **0.26** | -0.02 | -0.01 | -0.02 | **-0.08** | **-0.60** | 0.01 | **-0.26** | **0.06** | **-0.09** | 0.01 | **-0.04** | **-0.13** | -0.04 | **0.12** | **-0.10** | | | |
| C_SPREAD | **0.31** | -0.01 | 0.04 | **-0.08** | **-0.05** | **0.26** | -0.03 | **-0.25** | **0.11** | -0.02 | 0.02 | **-0.12** | **-0.06** | **-0.12** | **0.23** | **-0.09** | **0.26** | | |
| ICW | **0.18** | **-0.08** | 0.01 | **0.05** | **-0.16** | n/a | -0.01 | **-0.08** | **0.14** | -0.02 | **0.10** | **-0.11** | -0.03 | **-0.16** | **0.11** | **-0.13** | 0.02 | 0.01 | |
| REM | -0.03 | **0.17** | **0.07** | **-0.08** | -0.01 | n/a | **0.05** | 0.03 | 0.02 | **0.08** | 0.01 | 0.00 | 0.02 | 0.02 | -0.03 | -0.04 | 0.00 | -0.02 | 0.04 |

All variables are defined in the appendix. The statistics in the bold cells are significant at 5% or higher level.

**TABLE 3 - continued**
**Pearson Correlation of Variables**

**Panel B: Sample 2**

| VARIABLES | SPREAD | ROA | INT_COV | LEV | NW | POST2003 | PP | MATURITY | SECURED | DEAL_AT | GEN_RESTR | LENDER_NUM | RELATED | RATING | VOLATILITY | | T_SPREAD | C_SPREAD | REM | NAS | TAX |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ROA | **-0.21** | | | | | | | | | | | | | | | | | | | | |
| INT_COV | **-0.26** | **0.39** | | | | | | | | | | | | | | | | | | | |
| LEV | **0.23** | **-0.10** | **-0.39** | | | | | | | | | | | | | | | | | | |
| NW | **-0.58** | **-0.06** | **0.15** | **-0.40** | | | | | | | | | | | | | | | | | |
| POST2003 | -0.03 | **-0.09** | **0.08** | -0.01 | **0.08** | | | | | | | | | | | | | | | | |
| PP | **-0.11** | **0.08** | **0.06** | **-0.07** | **0.04** | **0.05** | | | | | | | | | | | | | | | |
| MATURITY | **-0.26** | **0.11** | **0.06** | 0.00 | **0.24** | **0.16** | **0.23** | | | | | | | | | | | | | | |
| SECURED | **0.48** | **-0.11** | **-0.10** | **0.10** | **-0.37** | **0.17** | **0.17** | **-0.04** | | | | | | | | | | | | | |
| DEAL_AT | **0.12** | **0.08** | -0.01 | -0.02 | **-0.23** | -0.03 | **0.04** | **0.09** | **0.11** | | | | | | | | | | | | |
| GEN_RESTR | **0.42** | **-0.04** | **-0.10** | **0.13** | **-0.30** | 0.03 | **0.30** | **0.12** | **0.49** | **0.14** | | | | | | | | | | | |
| LENDER_NUM | **-0.37** | 0.00 | -0.03 | **0.08** | **0.52** | 0.03 | **0.16** | **0.33** | **-0.20** | **-0.04** | **-0.06** | | | | | | | | | | |
| RELATED | **-0.07** | 0.01 | 0.02 | -0.01 | **0.07** | **0.16** | 0.01 | -0.01 | **-0.08** | **-0.03** | **-0.05** | **0.04** | | | | | | | | | |
| RATING | **-0.44** | 0.02 | **-0.10** | **0.15** | **0.56** | 0.03 | **0.04** | **0.24** | **-0.29** | **-0.16** | **-0.19** | **0.51** | **0.04** | | | | | | | | |
| VOLATILITY | **0.19** | -0.03 | 0.02 | **-0.15** | **-0.12** | **-0.15** | -0.01 | **-0.13** | **0.13** | **0.04** | **0.07** | **-0.18** | -0.01 | **-0.22** | | | | | | | |
| SIZE_AT | **-0.51** | **-0.09** | -0.03 | **0.16** | **0.76** | **0.10** | 0.01 | **0.29** | **-0.35** | **-0.28** | **-0.25** | **0.65** | **0.06** | **0.71** | **-0.25** | | | | | | |
| T_SPREAD | **0.12** | **-0.06** | **-0.04** | **0.07** | 0.02 | **0.22** | -0.02 | **-0.10** | **0.12** | **-0.05** | 0.00 | **0.04** | **0.04** | **0.07** | **-0.10** | **-0.10** | | | | | |
| C_SPREAD | **0.10** | -0.03 | 0.01 | **-0.05** | **-0.06** | **-0.19** | -0.02 | **-0.17** | **0.10** | **-0.04** | -0.03 | **-0.12** | **-0.12** | **-0.08** | 0.02 | 0.02 | **0.31** | | | | |
| REM | **-0.06** | **0.17** | **0.08** | **-0.08** | **0.04** | 0.00 | 0.03 | **0.04** | **-0.04** | -0.01 | -0.03 | 0.03 | 0.00 | 0.03 | 0.01 | 0.01 | 0.00 | 0.01 | | | |
| NAS | **-0.13** | 0.06 | 0.02 | **0.05** | **0.20** | **-0.22** | -0.03 | **0.05** | **-0.14** | **-0.06** | **-0.09** | **0.20** | -0.06 | **0.22** | 0.00 | 0.00 | **0.06** | 0.03 | 0.02 | | |
| TAX | **-0.11** | -0.01 | 0.05 | 0.01 | **0.17** | **0.13** | 0.01 | **0.09** | **-0.08** | **-0.05** | -0.04 | **0.12** | 0.00 | **0.16** | **-0.05** | **-0.05** | **0.09** | -0.02 | 0.01 | **0.56** | |
| OTH | **-0.07** | **0.14** | 0.00 | 0.04 | **0.07** | **-0.44** | **-0.06** | -0.05 | -0.11 | -0.02 | **-0.09** | **0.11** | -0.07 | **0.10** | **0.05** | **0.05** | 0.04 | **0.09** | 0.02 | **0.63** | **-0.10** |

All variables are defined in the appendix. The statistics in the bold cells are significant at 5% or higher level.

accounting variables—for example, a positive correlation between *ROA* and *INT_COV* because they share *EBITDA* in their numerators and a negative correlation between *INT_COV* and *LEV* because the former's denominator (interest expense) is directly related to the latter's numerator (debt amount)—they reflect different dimensions of firm performance. More specifically, the moderate correlation of these two pairs, 0.37 to 0.39 and -0.46 to -0.39, indicate that each variable contains substantially different information. Nonetheless, the correlation among key accounting variables does imply that the conditional correlation in the later multivariate analysis may understate the significance of the relation between *SPREAD* and the individual accounting metrics. All control variables exhibit significant correlation with *SPREAD*, consistent with the literature.

### 5.3. Key Accounting Metrics' Relation with Interest Spread

Since accounting DCV is operationalized with some key accounting metrics' association with interest spread, I validate this measure in multivariate settings with Sample 1 before examining its changes following SOX. Table 4 summarizes the results.

Column 1 shows that when the four accounting metrics are the only predictor variables, three of them, *ROA*, *INT_COV*, and *NW*, are negatively related to *SPREAD* as predicted by theory. When loan structures are held constant, the relation between *SPREAD* and all the four accounting metrics is consistent with theory (Column 2). This relation is robust to the inclusion of deal purpose and industry indicators (Column 3),

firm characteristics (Column 4), as well as macroeconomic factors (Column 5) in the regression model.

The estimated coefficients of the control variables are also consistent with the literature. *SPREAD* is generally higher for secured loans, loans of larger size relative to the borrower's assets, carrying more restrictions, by borrowers of higher stock volatility, or issued at a time of higher interest rate risk; but it is lower for loans that have performance pricing provisions, wider participation, longer maturity, from related banks, and to borrowers with better credit rating.

The consistent relation between *SPREAD* and the accounting variables indicates that, conditional on loan structure, firm characteristics, and market-wide economic condition, loan price does vary with credit risk revealed in accounting information. It confirms that, given the loan structure, the examined accounting metrics do provide the lender with credit risk information incremental to what can be extracted from the non-accounting borrower and macroeconomic characteristics. This regularity allows me to draw inference about whether accounting information becomes more or less relevant in the corporate loan pricing process over time and across sections.

**TABLE 4**
**Key Accounting Metrics' Relation with Interest Spread**

| Dependent Variable: SPREAD | Expected sign | *1* Estimate | P-value | *2* Estimate | P-value | *3* Estimate | P-value | *4* Estimate | P-value | *5* Estimate | P-value |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ROA | - | **-338.77** | **<.0001** | **-234.11** | **<.0001** | **-210.97** | **<.0001** | **-197.38** | **<.0001** | **-216.14** | **<.0001** |
| INT_COV | - | **-0.47** | **<.0001** | **-0.31** | **0.002** | **-0.36** | **0.000** | **-0.36** | **0.000** | **-0.33** | **0.000** |
| LEV | + | **-11.46** | **0.344** | **35.43** | **0.002** | **31.88** | **0.005** | **58.77** | **0.000** | **74.78** | **<.0001** |
| NW | - | **-27.51** | **<.0001** | **-10.52** | **<.0001** | **-10.27** | **<.0001** | **-7.17** | **0.003** | **-6.25** | **0.005** |
| PP | - | | | -49.54 | <.0001 | -44.23 | <.0001 | -40.61 | <.0001 | -41.04 | <.0001 |
| MATURITY | | | | -1.50 | <.0001 | -1.54 | <.0001 | -1.43 | <.0001 | -0.77 | <.0001 |
| SECURED | + | | | 37.65 | <.0001 | 33.49 | <.0001 | 27.55 | <.0001 | 24.58 | <.0001 |
| DEAL_AT | + | | | 20.50 | 0.000 | 10.18 | 0.088 | 7.32 | 0.222 | 14.48 | 0.010 |
| GEN_RESTR | + | | | 13.56 | <.0001 | 12.69 | <.0001 | 12.31 | <.0001 | 12.45 | <.0001 |
| LENDER_NUM | - | | | -1.53 | <.0001 | -1.40 | <.0001 | -1.21 | <.0001 | -1.35 | <.0001 |
| RELATED | - | | | | | | | -13.09 | <.0001 | -5.95 | 0.061 |
| RATING | - | | | | | | | -2.09 | <.0001 | -2.18 | <.0001 |
| VOLATILITY | + | | | | | | | 1.81 | <.0001 | 1.03 | <.0001 |
| SIZE_AT | - | | | | | | | 2.54 | 0.402 | 2.36 | 0.406 |
| T_SPREAD | + | | | | | | | | | 13.72 | <.0001 |
| C_SPREAD | + | | | | | | | | | 51.49 | <.0001 |
| DEAL PURPOSE | | | | | | YES | | YES | | YES | |
| INDUSTRY | | | | | | YES | | YES | | YES | |
| ADJ. R-SQUARE | | 0.25 | | 0.44 | | 0.47 | | 0.50 | | 0.56 | |

These tests show that the selected accounting metrics are related to interest spread in predicted directions. Interest spread decreases in accounting profitability (ROA), interest coverage (INT_COV), and net worth (NW), but increases in book leverage (LEV), consistent with theory. Intercepts are suppressed. P-values are from two-tailed tests. All variables are defined in the appendix. N = 2,348

## 5.4. Multiple Regressions

### *5.4.1. Main Results – Change of Accounting DCV Following SOX 404*

#### *5.4.1.1. Changes in Individual Coefficients*

Table 5 reports the change in accounting DCV inferred from the changed association between the accounting metrics and the initial interest spread following SOX 404. Models 1 – 4 examine *ROA, INT_COV, LEV,* and *NW,* respectively, whereas Model 5 includes all the four accounting metrics in the same regression. All the models control for loan features, firm characteristics, and macroeconomic factors, and include indicator variables for industry and loan purpose.

Model 1 reveals a post-SOX decline in the *ROA* coefficient from -345.22 to -211.22 (-345.22+134.00), suggesting that loan pricing has become less sensitive to accounting profitability. Model 2 shows a similar pattern with respect to *INT_COV,* with the estimated coefficient changing from -1.04 to -0.75 (-1.04+0.29). When *LEV* or *NW* is the only accounting variable in the model, its association with *SPREAD* also becomes weaker after SOX 404, but the change is not significant at conventional level.

Model 5 tests for the change in accounting DCV when all the four metrics are included as independent accounting variables. Again, the *ROA* coefficient declines significantly following SOX 404, from -285.43 to -155.33 (-285.43+130.10). *SPREAD* also appears to be less sensitive to *NW* after SOX 404, with coefficient estimate changing from -7.87 to -4.33 (-7.87+3.54), whereas the loadings on the other two accounting metrics, *INT_COV* and *LEV,* show no statistically significant changes. Overall, the results

**TABLE 5**
**The Change of Accounting DCV Following SOX 404 - Individual Accounting Measures**

| Dependent Variable: SPREAD | *1* | | *2* | | *3* | | *4* | | *5* | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Estimate | P-value | Estimate | P-value | Estimate | P-value | Estimate | P-value | Estimate | P-value |
| ROA | **-345.22** | **<.0001** | | | | | | | -285.43 | <.0001 |
| INT_COV | | | **-1.04** | **<.0001** | | | | | -0.39 | 0.003 |
| LEV | | | | | **134.87** | **<.0001** | | | 71.98 | <.0001 |
| NW | | | | | | | **-17.81** | **<.0001** | -7.87 | 0.001 |
| POST404 | -16.56 | 0.041 | -4.37 | 0.439 | 9.73 | 0.382 | -18.97 | 0.138 | -42.65 | 0.042 |
| ROA*POST404 | **134.00** | **0.004** | | | | | | | **130.10** | **0.007** |
| INT_COV*POST404 | | | **0.29** | **0.066** | | | | | 0.09 | 0.628 |
| LEV*POST404 | | | | | -15.62 | 0.342 | | | 6.14 | 0.744 |
| NW*POST404 | | | | | | | 2.87 | 0.122 | **3.54** | **0.058** |
| PP | -45.27 | <.0001 | -45.41 | <.0001 | -44.16 | <.0001 | -44.07 | <.0001 | -41.03 | <.0001 |
| MATURITY | -0.81 | <.0001 | -0.91 | <.0001 | -0.85 | <.0001 | -0.88 | <.0001 | -0.74 | <.0001 |
| SECURED | 30.03 | <.0001 | 29.02 | <.0001 | 26.77 | <.0001 | 29.24 | <.0001 | 24.16 | <.0001 |
| DEAL_AT | 15.06 | 0.010 | 6.46 | 0.262 | 2.49 | 0.661 | 0.68 | 0.906 | 11.07 | 0.050 |
| GEN_RESTR | 13.99 | <.0001 | 13.96 | <.0001 | 13.71 | <.0001 | 13.86 | <.0001 | 12.59 | <.0001 |
| LENDER_NUM | -1.29 | <.0001 | -1.36 | <.0001 | -1.23 | <.0001 | -1.17 | <.0001 | -1.26 | <.0001 |
| RELATED | -6.76 | 0.039 | -7.27 | 0.026 | -6.68 | 0.039 | -7.02 | 0.032 | -6.49 | 0.039 |
| RATING | -1.82 | <.0001 | -2.86 | <.0001 | -2.80 | <.0001 | -2.35 | <.0001 | -2.13 | <.0001 |
| VOLATILITY | 0.97 | 0.000 | 1.05 | <.0001 | 1.12 | <.0001 | 1.20 | <.0001 | 0.94 | 0.000 |
| SIZE_AT | -1.23 | 0.517 | 0.44 | 0.816 | -3.51 | 0.064 | 14.09 | <.0001 | 0.91 | 0.747 |
| T_SPREAD | 18.64 | <.0001 | 18.34 | <.0001 | 18.58 | <.0001 | 17.96 | <.0001 | 18.80 | <.0001 |
| C_SPREAD | 30.92 | <.0001 | 30.25 | <.0001 | 33.11 | <.0001 | 32.24 | <.0001 | 34.97 | <.0001 |
| YEAR | 6.91 | <.0001 | 7.19 | <.0001 | 7.01 | <.0001 | 7.05 | <.0001 | 7.22 | <.0001 |
| ADJ. R-SQUARE | 0.538 | | 0.537 | | 0.549 | | 0.537 | | 0.573 | |

These tests investigate how the associations between accouting variables and the loan interest spread change after SOX404. Models 1 - 4 indicate that each accounting metric, in the absence of other accounting metrics, is related to the loan spread in the way predicted by theory but the relation becomes weaker after SOX404 . Model 6 shows that with other accounting metrics under control, ROA becomes less closely associated with SPREAD following SOX404. This pattern is robust to the exclusion of loss firms. All models include industry (Barth et al. 1998) and loan purpose indicators. Intercepts are suppressed. P-values are from two-tailed tests. All variables are defined in the appendix. N = 2,348.

tabulated in Table 5 suggest that, following SOX 404, the lenders have reduced the weight they place on accounting metrics, especially *ROA*, when pricing corporate loans.

#### *5.4.1.2. Changes in Collective Explanatory Power*

Since the coefficient estimate on *LEV*POST404* is positive, suggesting a closer relation between *SPREAD* and *LEV* after SOX 404, it is possible that lenders simply shifted the weight they had placed on profitability and net worth to leverage. In this case, the DCV of accounting measures as a whole might remain unchanged or even decrease. To investigate this possibility, I examine whether and how the overall explanatory power of these accounting variables with respect to *SPREAD* changes across the two periods.

Table 6 shows the result of this test. Following SOX 404, the partial R-square of accounting variables drops by 7.72%, from 16.43% to 8.71%. In relative terms, accounting variables contribute to 31.22% of the full model's explanatory power before SOX 404 but only 15.98% afterwards. This result confirms that the decline in *ROA*'s relevance in loan pricing was not compensated by the increasing relevance of other accounting variables, such as book leverage. Rather, after SOX 404, accounting measures collectively have been perceived as less informative about credit risk.

**Table 6**
**The Change of Accounting DCV Following SOX 404 - Accounting Measures As a Whole**

**Comparision of Partial R-squares Attributable to Accounting Variables from Pre- to Post-SOX Regressions:**

| R2 (full) | | | R2 (reduced) | | | R2 (acct) | | | R2 (acct) / R2 (full) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Pre-SOX | Post-SOX | Change | Pre-SOX | Post-SOX | Change | Pre-SOX | Post-SOX | Change | Pre-SOX | Post-SOX | Change |
| 52.62% | 54.54% | 1.92% | 43.51% | 50.38% | 6.87% | 16.43% | 8.71% | **-7.72%** | 31.22% | 15.98% | **-15.25%** |

*Full Model:* $SPREAD = \beta 0 + \beta 1*ROA + \beta 2*INT\_COV + \beta 3*LEV + \beta 4*NW + \gamma 1*PP + \gamma 2*MATURITY + \gamma 3*SECURED + \gamma 4*DEAL\_AT + \gamma 5*GEN\_RESTR + \gamma 6*LENDER\_NUM + \gamma 7*RELATED + \gamma 8*RATING + \gamma 9*VOLATILITY + \gamma 10*SIZE\_AT + \gamma 11*T\_SPREAD + \gamma 12*C\_SPREAD + \varepsilon 1$

*Reduced Model:* $SPREAD = \gamma 1*PP + \gamma 2*MATURITY + \gamma 3*SECURED + \gamma 4*DEAL\_AT + \gamma 5*GEN\_RESTR + \gamma 6*LENDER\_NUM + \gamma 7*RELATED + \gamma 8*RATING + \gamma 9*VOLATILITY + \gamma 10*SIZE\_AT + \gamma 11*T\_SPREAD + \gamma 12*C\_SPREAD + \varepsilon 2$

This table reports the change in accounting variables' explanatory power with respect to SPREAD from pre- to post-SOX404 period. It shows that (1) the portion of variability of SPREAD explanable by accounting variables falls by 7.72% following SOX, from 16.43% to 8.71%, and (2) the ratio of accounting $R^2$ to the full-model $R^2$ falls from 31.22% to 15.98%. This pattern is consistent with a decline in the key accounting variables' collective ability to explain the change in the loan spread.

The explanatory power of accounting variables is represented by partial $R^2$ attributable to these variables from a regression of SPREAD on a set of accounting and non-accounting variables as specified in the Full Model. $R^2$ (acct) = 1 - RSS (full)/RSS (reduced), where RSS is the sum of squared residuals (Anderson-Sprecher, 1994). Both models are estimated with OLS. All variables are defined in the appendix.

### *5.4.2. Results Conditional on Internal Control Weakness and Real Earnings Management*

I next investigate whether the decline in accounting DCV can be attributable to ICW firms or firms suspected of REM.

#### *5.4.2.1. Firms with Internal Control Weaknesses*

Table 7 reports the result when sample firms are partitioned by whether their SOX 404(b) filing revealed any deficiency in their internal control over financial reporting. The regression in Column 2 restricts the coefficients for control variables to be the same for these two types of borrowers. It shows a positive and significant coefficient estimate on the interactive term *POST404*ROA*, 113.30 (p=0.034), indicating a post-SOX decrease in interest spread's sensitivity to *ROA*. However, the loading on *POST404*ROA*ICW*, though positive, is not significant at conventional level, suggesting that ICW borrowers do not experience a larger decline in the DCV of *ROA* than non-ICW borrowers. None of the other three accounting metrics exhibits difference between ICW and non-ICW firms after SOX 404, either.

When the control variables are allowed to have different coefficients across ICW and non-ICW borrowers, *SPREAD* becomes less sensitive to *ROA* and *NW* for non-ICW borrowers in the period following their SOX 404 filing (Column 4). For ICW borrowers, none of the accounting metrics experiences significant post SOX 404 changes in its association with *SPREAD* (Column 3). This pattern indicates that the post-SOX 404

**TABLE 7**
**ICW Disclosures and the Change of Accounting DCV following SOX 404**

| | ALL, N=2,348 | | ICW=1, N=312 | | ICW=0, N=2,036 | |
|---|---|---|---|---|---|---|
| Dependent Variable: SPREAD | Estimate | Pr > \|t\| | Estimate | Pr > \|t\| | Estimate | Pr > \|t\| |
| ROA | -261.31 | <.0001 | -285.061 | 0.009 | -267.90 | <.0001 |
| INT_COV | -0.37 | 0.010 | -0.773 | 0.056 | -0.35 | 0.010 |
| LEV | 64.05 | 0.000 | 54.611 | 0.380 | 67.90 | 0.000 |
| NW | -7.48 | 0.003 | -12.605 | 0.099 | -6.72 | 0.008 |
| ICW | 22.67 | 0.587 | | | | |
| ICW*ROA | -109.08 | 0.225 | | | | |
| ICW*INT_COV | -0.17 | 0.608 | | | | |
| ICW*LEV | 31.41 | 0.395 | | | | |
| ICW*NW | -1.31 | 0.737 | | | | |
| POST404 | -44.36 | 0.049 | -47.519 | 0.509 | -46.25 | 0.031 |
| **POST404*ROA** | **113.30** | **0.034** | 182.586 | 0.222 | **117.79** | **0.019** |
| POST404*INT_COV | 0.12 | 0.535 | 0.092 | 0.867 | 0.10 | 0.608 |
| POST404*LEV | 18.16 | 0.379 | -48.652 | 0.429 | 12.54 | 0.521 |
| **POST404*NW** | 2.82 | 0.166 | 6.134 | 0.362 | **3.84** | **0.047** |
| POST404*ICW | -4.92 | 0.933 | | | | |
| **POST404*ROA*ICW** | 90.60 | 0.475 | | | | |
| POST404*INT_COV*ICW | -0.19 | 0.695 | | | | |
| POST404*LEV*ICW | -53.83 | 0.299 | | | | |
| POST404*NW*ICW | 4.95 | 0.368 | | | | |
| PP | -41.09 | <.0001 | -68.908 | <.0001 | -34.17 | <.0001 |
| MATURITY | -0.74 | <.0001 | -0.714 | 0.087 | -0.82 | <.0001 |
| SECURED | 23.68 | <.0001 | 4.967 | 0.576 | 28.04 | <.0001 |
| DEAL_AT | 12.01 | 0.034 | 20.477 | 0.485 | 12.72 | 0.023 |
| GEN_RESTR | 12.35 | <.0001 | 26.365 | <.0001 | 9.06 | <.0001 |
| LENDER_NUM | -1.18 | <.0001 | -1.553 | 0.015 | -1.07 | 0.000 |
| RELATED | -6.21 | 0.049 | 5.212 | 0.661 | -7.49 | 0.018 |
| RATING | -2.06 | <.0001 | -5.287 | 0.005 | -1.76 | <.0001 |
| VOLATILITY | 0.88 | 0.001 | 0.546 | 0.495 | 0.94 | 0.001 |
| SIZE_AT | 0.73 | 0.797 | 13.285 | 0.178 | -1.74 | 0.551 |
| T_SPREAD | 18.67 | <.0001 | 8.519 | 0.175 | 19.80 | <.0001 |
| C_SPREAD | 35.60 | <.0001 | 65.774 | 0.001 | 31.54 | <.0001 |
| YEAR | 7.52 | <.0001 | 1.967 | 0.702 | 8.03 | <.0001 |
| ADJ. R-SQUARE | 0.58 | | 0.59 | | 0.59 | |

These regressions test how internal control weakness (ICW) disclosures are related to the decline in DCV following SOX404. Model 1 restricts the coefficients on control variables to be the same for ICW and non-ICW borrowers. The results indicate that following SOX404 filing, ICW firms did not experience a larger decline in the DCV of ROA than non-ICW firms, rejecting the notion that ICW firms drive the post-SOX404 decline in accounting DCV. All models include industry (Barth et al. 1998) and loan purpose indicators. Intercepts are suppressed. P-values are for two-tailed tests. All variables are defined in the appendix.

decline in accounting DCV was not driven by firms that started to disclose internal control deficiency after SOX, refuting H2B but consistent with H2A.

Under the premise that ICW firms present more credit risk to lenders than non-ICW firms, H2A also predicts that lenders place less weight on the accounting numbers of ICW firms than non-ICW firms before SOX. Since the coefficient estimates on the interactive terms between ICW and accounting metrics are not significant, H2A is not fully supported, either.

This pattern could be due to a few reasons. First, the lender can mitigate the credit risk associated with internal control problems with other contractual features, such as requiring collaterals or imposing restrictions on the borrower's investment or financing options. These non-price risk control measures do not have to affect interest spread's sensitivity to accounting metrics. Second, lenders may have adjusted the weight they put on other public financial information, such as other risk-informative ratios not included in my model and/or qualitative information disclosed in footnotes and management discussions. These adjustments are not captured by the DCV measures. Third, the internal control deficiency identified post-SOX 404 might not exist in the period before SOX 404. As long as ICW is not a permanent feature of a borrower, this possibility is quite real.

The objective of this test is to determine whether the post-SOX 404 decline in accounting DCV is due to borrowers that disclosed internal control deficiencies upon SOX 404 compliance. The results provide evidence consistent with the notion that the post-SOX decline in accounting DCV cannot be attributed to ICW firms. More research

will be needed to determine why lenders do not appear to differentiate the usefulness of the accounting metrics of ICW and non-ICW borrowers in loan pricing.

#### *5.4.2.2. Firms Suspected of Real Earnings Management*

Table 8 presents the results of the second cross-sectional test, which examines whether real earnings management is related to the post-SOX 404 decline in the DCV of accounting information. Column 2 shows significantly positive coefficient estimates on both *POST404*ROA*REM,* 244.25 (p-value=0.025) and *POST404*NW*REM,* 8.09 (p-value=0.061). In contrast, the loadings on *POST404*ROA* and *POST404*NW,* though both positive, are not significant at conventional levels. These results suggest that the average decline in the DCV of *ROA* was concentrated among firms suspected of REM. Moreover, the lenders have also reduced the weight they place on the net worth of these firms after SOX 404.

This pattern does not change when the same test is run on the REM and non-REM firms separately, without forcing the coefficients on the control variables to be the same across the two subsamples (Columns 3 and 4). Only REM firms experienced significant changes in the coefficient estimates of *ROA* and *NW* from pre- to post-SOX 404 periods. These findings suggest that banks perceive accounting measures as less informative of credit risk when the borrower is suspected of real earnings management. They are consistent with the prediction of H3 that the post-SOX 404 decline in the DCV of *ROA* is related to the rise of REM.

**TABLE 8**
**REM and the Change of Accounting DCV Following SOX 404**

| Dependent Variable: SPREAD | ALL, N=2,348 | | REM=1, N=566 | | REM=0, N=1,782 | |
|---|---|---|---|---|---|---|
| | Estimate | Pr > \|t\| | Estimate | Pr > \|t\| | Estimate | Pr > \|t\| |
| ROA | -246.12 | <.0001 | -396.46 | <.0001 | -245.05 | <.0001 |
| INT_COV | -0.30 | 0.059 | -0.57 | 0.012 | -0.29 | 0.073 |
| LEV | 83.74 | <.0001 | 28.00 | 0.408 | 81.36 | <.0001 |
| NW | -7.20 | 0.004 | -12.81 | 0.007 | -7.23 | 0.011 |
| REM | 79.18 | 0.016 | | | | |
| REM*ROA | -172.27 | 0.027 | | | | |
| REM*INT_COV | -0.28 | 0.301 | | | | |
| REM*LEV | -42.72 | 0.156 | | | | |
| REM*NW | -3.72 | 0.216 | | | | |
| POST404 | -15.56 | 0.514 | -149.23 | 0.001 | -10.09 | 0.675 |
| POST404*ROA | 74.93 | 0.192 | **300.58** | **0.002** | 74.86 | 0.194 |
| POST404*INT_COV | -0.04 | 0.857 | 0.44 | 0.201 | -0.06 | 0.792 |
| POST404*LEV | -3.54 | 0.871 | 48.52 | 0.206 | -5.35 | 0.807 |
| POST404*NW | 1.65 | 0.436 | **10.36** | **0.008** | 1.48 | 0.488 |
| POST404*REM | -112.17 | 0.015 | | | | |
| POST404*ROA*REM | **244.25** | **0.025** | | | | |
| POST404*INT_COV*REM | 0.43 | 0.286 | | | | |
| POST404*LEV*REM | 27.46 | 0.523 | | | | |
| POST404*NW*REM | **8.09** | **0.061** | | | | |
| PP | -40.81 | <.0001 | -44.03 | <.0001 | -38.59 | <.0001 |
| MATURITY | -0.73 | <.0001 | -0.18 | 0.519 | -0.86 | <.0001 |
| SECURED | 24.40 | <.0001 | 12.87 | 0.025 | 27.62 | <.0001 |
| DEAL_AT | 10.78 | 0.058 | -1.07 | 0.919 | 14.18 | 0.039 |
| GEN_RESTR | 12.54 | <.0001 | 16.72 | <.0001 | 11.12 | <.0001 |
| LENDER_NUM | -1.26 | <.0001 | -1.37 | 0.023 | -1.24 | <.0001 |
| RELATED | -6.85 | 0.030 | 0.79 | 0.903 | -9.46 | 0.009 |
| RATING | -2.10 | <.0001 | -2.17 | 0.014 | -2.05 | <.0001 |
| VOLATILITY | 0.95 | 0.000 | 0.66 | 0.263 | 1.10 | 0.000 |
| SIZE_AT | 0.98 | 0.731 | -1.02 | 0.857 | 2.04 | 0.545 |
| T_SPREAD | 18.92 | <.0001 | 19.09 | <.0001 | 19.05 | <.0001 |
| C_SPREAD | 34.84 | <.0001 | 42.37 | 0.001 | 32.22 | <.0001 |
| YEAR | 7.35 | <.0001 | 7.74 | 0.008 | 6.68 | <.0001 |
| ADJ. R-SQUARE | 0.58 | | 0.59 | | 0.58 | |

These regressions test how real earnings management (REM) is related to the decline in DCV following SOX404. Model 1 is run on the entire sample, restricting the coefficients on control variables to be the same for REM and non-REM firms, while Models 2 and 3 are run on REM and non-REM borrowers separately. The results suggest that SPREAD responds less to both ROA and NW after SOX404 for REM borrowers but not for non-REM borrowers. An REM borrower is identified based on its post-SOX404 operational characteristics; 46% the REM borrowers also exhibited similar REM characteristics before SOX404. All models include industry (Barth et al. 1998) and loan purpose indicators. Intercepts are suppressed. P-values are for two-tailed tests. All variables are defined in the appendix.

**TABLE 9**
**REM and the Change of Accounting DCV after 2003 - Sample 2**

| Dependent Variable: SPREAD | ALL, N=2,824 | | REM=1, N=482 | | REM=0, N=2,340 | |
|---|---|---|---|---|---|---|
| | Estimate | Pr > \|t\| | Estimate | Pr > \|t\| | Estimate | Pr > \|t\| |
| ROA | -210.38 | <.0001 | -257.75 | 0.001 | -212.86 | <.0001 |
| INT_COV | -1.05 | <.0001 | 0.01 | 0.983 | -1.05 | <.0001 |
| LEV | 54.65 | <.0001 | 137.50 | <.0001 | 48.71 | <.0001 |
| NW | -5.92 | 0.002 | 6.61 | 0.142 | -7.85 | 0.000 |
| REM | -41.44 | 0.143 | | | | |
| REM*ROA | -97.66 | 0.230 | | | | |
| REM*INT_COV | 1.09 | 0.012 | | | | |
| REM*LEV | 39.29 | 0.132 | | | | |
| REM*NW | 2.67 | 0.300 | | | | |
| POST2003 | -21.12 | 0.235 | -32.35 | 0.427 | -18.49 | 0.306 |
| POST2003*ROA | -62.21 | 0.233 | **173.52** | **0.111** | -62.95 | 0.227 |
| POST2003*INT_COV | 0.23 | 0.397 | -0.21 | 0.689 | 0.23 | 0.411 |
| POST2003*LEV | 10.14 | 0.445 | 6.92 | 0.838 | 8.50 | 0.522 |
| POST2003*NW | 1.10 | 0.478 | -1.21 | 0.719 | 1.05 | 0.501 |
| POST2003*REM | 14.71 | 0.709 | | | | |
| POST2003*ROA*REM | **200.74** | **0.089** | | | | |
| POST2003*INT_COV*REM | -0.47 | 0.429 | | | | |
| POST2003*LEV*REM | -21.58 | 0.539 | | | | |
| POST2003*NW*REM | -4.00 | 0.265 | | | | |
| PP | -35.57 | <.0001 | -27.96 | 0.001 | -36.47 | <.0001 |
| MATURITY | -0.55 | <.0001 | -1.05 | <.0001 | -0.47 | <.0001 |
| SECURED | 34.20 | <.0001 | 30.95 | 0.000 | 34.43 | <.0001 |
| DEAL_AT | -2.96 | 0.217 | -12.68 | 0.303 | -2.48 | 0.310 |
| GEN_RESTR | 13.10 | <.0001 | 13.39 | <.0001 | 13.40 | <.0001 |
| LENDER_NUM | -0.26 | 0.289 | 0.05 | 0.937 | -0.35 | 0.208 |
| RELATED | -1.22 | 0.701 | -4.17 | 0.599 | -0.44 | 0.899 |
| RATING | -1.68 | <.0001 | -1.88 | 0.043 | -1.73 | <.0001 |
| VOLATILITY | 0.66 | <.0001 | 0.39 | 0.282 | 0.72 | 0.000 |
| SIZE_AT | -12.09 | <.0001 | -26.31 | <.0001 | -9.30 | 0.000 |
| T_SPREAD | 12.04 | <.0001 | 12.15 | <.0001 | 11.61 | <.0001 |
| C_SPREAD | -11.27 | 0.144 | 0.38 | 0.985 | -12.51 | 0.136 |
| YEAR | 2.02 | 0.160 | 4.92 | 0.170 | 1.34 | 0.393 |
| ADJ. R-SQUARE | 0.67 | | 0.64 | | 0.59 | |

These regressions test how real earnings management (REM) is related to the change in DCV after 2003. Model 1 is run on the entire sample, restricting the coefficients on control variables to be the same for REM and non-REM borrowers, while Models 2 and 3 are run on REM and non-REM borrowers separately. The results suggest that SPREAD responds less to ROA after SOX (or 2003) for REM borrowers but not for non-REM borrowers. An REM borrower is identified based on its post-SOX operational characteristics; 29% the REM borrowers also exhibited similar REM characteristics before SOX (or 2003). All models include industry (Barth et al. 1998) and loan purpose indicators. Intercepts are suppressed. P-values are for two-tailed tests. All variables are defined in the appendix.

The same test is repeated with Sample 2, in which loans issued after fiscal year 2003 are deemed as post-SOX issuances. Table 9 summarizes the results. The significantly positive coefficient estimate on *POST2003*ROA*REM,* 200.74 (p-value=0.089), provides evidence consistent with that from the test performed on Sample 1. It confirms that lenders have reduced the weight they place on *ROA* for firms suspected of REM after 2003.

### *5.4.3. Results Conditional on Reduction of Nonaudit Services*

Since SOX Section 201 that restricts nonaudit services did not become effective until May 2003, I use Sample 2 to test H4, investigating how the reduction in nonaudit services affects the change in accounting DCV. In Sample 2, loans issued after fiscal year 2003 are labeled as post-SOX observations, with POST2003 taking the value 1. Since the demarcation of pre- and post-SOX in this sample is different from that of Sample 1, I start with a test of the average change of accounting DCV after 2003, followed by tests of accounting DCV changes conditional on the extent of reduction in nonaudit services, tax services, and other unspecified services.

#### *5.4.3.1. Average Changes in Accounting DCV after 2003*

Panel A of Table 10 summarizes the tests that examine whether lenders have changed the weight they place on key accounting metrics after 2003. Model 1 shows that when *ROA* is the only accounting metric in the loan pricing model, it receives more

**TABLE 10**
**The Change of Accounting DCV after 2003 - Sample 2**

**Panel B: Individual Accounting Measures**

| | *1* | | *2* | | *3* | | *4* | | *5* | |
|---|---|---|---|---|---|---|---|---|---|---|
| Dependent Variable: SPREAD | Estimate | P-value | Estimate | P-value | Estimate | P-value | Estimate | P-value | Estimate | P-value |
| ROA | **-255.36** | **<.0001** | | | | | | | **-212.26** | **<.0001** |
| INT_COV | | | **-1.72** | **<.0001** | | | | | **-0.78** | **<.0001** |
| LEV | | | | | **95.07** | **<.0001** | | | **57.78** | **<.0001** |
| NW | | | | | | | **-15.79** | **<.0001** | **-5.85** | **0.001** |
| POST2003 | -8.00 | 0.373 | -12.16 | 0.093 | -18.21 | 0.059 | -10.83 | 0.275 | -24.18 | 0.126 |
| ROA*POST2003 | **-79.62** | **0.062** | | | | | | | -36.98 | 0.404 |
| INT_COV*POST2003 | | | 0.09 | 0.672 | | | | | 0.12 | 0.604 |
| LEV*POST2003 | | | | | 15.0392926 | 0.1496 | | | 13.49 | 0.257 |
| NW*POST2003 | | | | | | | 0.34 | 0.785 | 1.13 | 0.382 |
| PP | -37.83 | <.0001 | -37.67 | <.0001 | -34.41 | <.0001 | -36.99 | <.0001 | -32.29 | <.0001 |
| MATURITY | -0.57 | <.0001 | -0.63 | <.0001 | -0.68 | <.0001 | -0.71 | <.0001 | -0.56 | <.0001 |
| SECURED | 43.13 | <.0001 | 42.72 | <.0001 | 40.70 | <.0001 | 42.77 | <.0001 | 34.78 | <.0001 |
| DEAL_AT | -1.32 | 0.601 | -2.27 | 0.362 | -3.36 | 0.171 | -2.86 | 0.252 | -3.33 | 0.161 |
| GEN_RESTR | 16.36 | <.0001 | 15.41 | <.0001 | 14.38 | <.0001 | 15.13 | <.0001 | 13.60 | <.0001 |
| LENDER_NUM | -0.54 | 0.023 | -0.72 | 0.002 | -0.53 | 0.021 | -0.49 | 0.038 | -0.42 | 0.060 |
| RELATED | -1.09 | 0.736 | -2.34 | 0.464 | -1.91 | 0.545 | -1.30 | 0.685 | -1.11 | 0.716 |
| RATING | -0.80 | 0.022 | -1.82 | <.0001 | -1.80 | <.0001 | -1.33 | 0.000 | -1.57 | <.0001 |
| VOLATILITY | 0.40 | 0.018 | 0.60 | 0.000 | 0.86 | <.0001 | 0.77 | <.0001 | 0.76 | <.0001 |
| SIZE_AT | -16.78 | <.0001 | -13.84 | <.0001 | -16.30 | <.0001 | -0.26 | 0.879 | -13.01 | <.0001 |
| T_SPREAD | 12.62 | <.0001 | 12.19 | <.0001 | 11.56 | <.0001 | 11.96 | <.0001 | 11.41 | <.0001 |
| C_SPREAD | -20.16 | 0.011 | -16.11 | 0.039 | -9.45 | 0.221 | -11.53 | 0.142 | -11.74 | 0.117 |
| YEAR | 1.64 | 0.250 | 2.00 | 0.158 | 1.43 | 0.307 | 0.97 | 0.493 | 2.13 | 0.117 |
| ADJ. R-SQUARE | 0.539 | | 0.549 | | 0.561 | | 0.546 | | 0.590 | |

These regressions investigate how the associations between accouting variables and the initial interest spread change following SOX with a sample of firms that issued revolving lines of credit both before and after fiscal year 2003. Loans issued in or after the borrower's fiscal year 2003 are treated as post-SOX observations. Models 1 - 4 indicate that each of the accounting variables, in the absence of other accounting measures, is related to the loan spread in the way predicted by theory. Model 5 shows that when all the four accounting variables are included, none of them experienced a significant change in its relation with SPREAD. All models include industry (Barth et al. 1998) and loan purpose indicators. Intercepts are suppressed. P-values are from two-tailed tests. All variables are defined in the appendix. N = 3,100.

**TABLE 10 - continued**
**The Change of Accounting DCV after 2003 - Sample 2**

**Panel B: Accounting Measures as a Whole**

**Comparision of Partial R-squares Attributable to Accounting Variables from Pre- to Post-SOX Regressions:**

| R2 (full) | | | R2 (reduced) | | | R2 (acct) | | | R2 (acct) / R2 (full) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Pre-SOX | Post-SOX | Change | Pre-SOX | Post-SOX | Change | Pre-SOX | Post-SOX | Change | Pre-SOX | Post-SOX | Change |
| 57.85% | 57.18% | -0.67% | 51.04% | 48.42% | -2.62% | 14.14% | 17.19% | **3.05%** | 24.44% | 30.07% | **5.63%** |

*Full Model:* $SPREAD = \beta 0 + \beta 1*ROA + \beta 2*INT\_COV + \beta 3*LEV + \beta 4*NW + \gamma 1*PP + \gamma 2*MATURITY + \gamma 3*SECURED + \gamma 4*DEAL\_AT + \gamma 5*GEN\_RESTR + \gamma 6*LENDER\_NUM + \gamma 7*RELATED + \gamma 8*RATING + \gamma 9*VOLATILITY + \gamma 10*SIZE\_AT + \gamma 11*T\_SPREAD + \gamma 12*C\_SPREAD + \varepsilon 1$

*Reduced Model:* $SPREAD = \gamma 1*PP + \gamma 2*MATURITY + \gamma 3*SECURED + \gamma 4*DEAL\_AT + \gamma 5*GEN\_RESTR + \gamma 6*LENDER\_NUM + \gamma 7*RELATED + \gamma 8*RATING + \gamma 9*VOLATILITY + \gamma 10*SIZE\_AT + \gamma 11*T\_SPREAD + \gamma 12*C\_SPREAD + \varepsilon 2$

This table reports the change in accounting variables' explanatory power with respect to SPREAD from pre- to post-SOX period, or before and after fiscal year 2003. Loans issued in or after the borrower's fiscal year 2003 are treated as post-SOX observations. It shows that (1) the portion of variability of SPREAD explanable by accounting variables increases by 3.05% following SOX, from 14.14% to 17.19%, and (2) the ratio of accounting R2 to the full-model R2 increases from 24.44% to 30.07%. This pattern is consistent with an increase in the key accounting variables' collective ability to explain the change in the loan spread.

The explanatory power of accounting variables is represented by partial R2 attributable to these variables from a regression of SPREAD on a set of accounting and non-accounting variables as specified in the Full Model. R2 (acct) = 1 - RSS (full)/RSS (reduced), where RSS is the sum of squared residuals (Anderson-Sprecher, 1994). Both models are estimated with OLS. All variables are defined in the appendix.

weight after 2003. The other three accounting metrics, *INT_COV, LEV,* and *NW,* do not exhibit a significant change (Models 2 – 4). However, when all the four accounting metrics are included in the SPREAD model, none of them experienced significant changes after 2003 in their associations with interest spread. This pattern suggests that lenders may have adjusted the weights they place on different accounting metrics after 2003, for instance, shifting attention from *INT_COV* and *NW* to *ROA*. But it does not tell whether accounting metrics as a whole, in lenders' eyes, have gained or lost informativeness with regard to credit risk after SOX.

Panel B of Table 10 reports the change in accounting metrics' collective explanatory power with respect to interest spread. The $R^2$ changes indicate that there is an increase in the four accounting metrics' collective ability to explain the variability of interest spread, though the magnitude of change, 3.05% for accounting $R^2$ and 5.63% for the relative measure, is small. The pattern observed from sample 2 suggests that, on average, lenders did not lower the weight they place on accounting measures from before to after 2003.

#### *5.4.3.2. Overall Reduction in Nonaudit Services*

Table 11 reports the tests of whether the change of accounting DCV varies with the extent of reduction in nonaudit services. Borrowers that substantially reduced their purchase of nonaudit services from the auditor after 2003 are designated as larger nonaudit service reducers, with *NAS_DROP* =1. The test of Column 2 restricts the

**TABLE 11**
**Reduction in Nonaudit Services and the Change of Accounting DCV after 2003**

| | *ALL, N=2,812* | | *NAS_DROP=1, N=1,418* | | *NAS_DROP=0, N=1,394* | |
|---|---|---|---|---|---|---|
| | Estimate | Pr > \|t\| | Estimate | Pr > \|t\| | Estimate | Pr > \|t\| |
| ROA | -186.54 | <.0001 | -222.15 | <.0001 | -191.36 | 0.000 |
| INT_COV | -0.78 | 0.008 | -0.92 | <.0001 | -0.64 | 0.050 |
| LEV | 50.86 | 0.001 | 49.26 | 0.002 | 64.61 | 0.002 |
| NW | -8.45 | 0.000 | -5.88 | 0.010 | -4.65 | 0.206 |
| NAS_DROP | -17.37 | 0.407 | | | | |
| NAS_DROP*ROA | -43.68 | 0.479 | | | | |
| NAS_DROP*INT_COV | -0.06 | 0.880 | | | | |
| NAS_DROP*LEV | 4.01 | 0.832 | | | | |
| NAS_DROP*NW | 4.47 | 0.027 | | | | |
| POST2003 | -1.42 | 0.948 | -21.15 | 0.341 | -6.76 | 0.784 |
| POST2003*ROA | -67.32 | 0.294 | -19.23 | 0.741 | -67.06 | 0.341 |
| POST2003*INT_COV | 0.16 | 0.675 | 0.25 | 0.380 | 0.10 | 0.814 |
| POST2003*LEV | 19.91 | 0.291 | 13.53 | 0.433 | 23.54 | 0.254 |
| POST2003*NW | -1.47 | 0.475 | 0.53 | 0.768 | -1.26 | 0.577 |
| POST2003*NAS_DROP | -23.79 | 0.430 | | | | |
| POST2003*ROA*NAS_DROP | 31.79 | 0.727 | | | | |
| POST2003*INT_COV*NAS_DROP | 0.16 | 0.745 | | | | |
| POST2003*LEV*NAS_DROP | 0.49 | 0.985 | | | | |
| POST2003*ASSETS*NAS_DROP | 2.14 | 0.451 | | | | |
| PP | -28.86 | <.0001 | -25.00 | <.0001 | -30.74 | <.0001 |
| MATURITY | -0.57 | <.0001 | -0.41 | 0.000 | -0.69 | <.0001 |
| SECURED | 30.68 | <.0001 | 21.54 | <.0001 | 34.73 | <.0001 |
| DEAL_AT | -4.39 | 0.017 | -2.55 | 0.144 | -10.01 | 0.125 |
| GEN_RESTR | 12.55 | <.0001 | 13.71 | <.0001 | 11.91 | <.0001 |
| LENDER_NUM | -0.06 | 0.809 | -0.56 | 0.052 | 0.33 | 0.433 |
| RELATED | 0.23 | 0.944 | 0.40 | 0.921 | 0.59 | 0.906 |
| RATING | -1.32 | 0.000 | -2.39 | <.0001 | 0.07 | 0.913 |
| VOLATILITY | 0.75 | <.0001 | 1.72 | <.0001 | 0.20 | 0.386 |
| SIZE_AT | -14.23 | <.0001 | -6.56 | 0.018 | -23.99 | <.0001 |
| T_SPREAD | 10.62 | <.0001 | 11.59 | <.0001 | 9.46 | <.0001 |
| C_SPREAD | -12.62 | 0.089 | -23.29 | 0.034 | -6.07 | 0.550 |
| YEAR | 1.88 | 0.185 | 2.43 | 0.195 | 2.26 | 0.286 |
| ADJ. R-SQUARE | 0.58 | | 0.63 | | 0.56 | |

These regressions test how the reduction in nonaudit services affects the changes in accounting DCV. They show that large reducers of unspecified services experienced an increase in the DCV of net worth following SOX. All models include industry (Barth et al. 1998) and loan purpose indicators. Intercepts are suppressed. P-values are for two-tailed tests. All variables are defined in the appendix.

coefficients for control variables to be the same for all borrowers; the test of Column 3 (Column 4) is performed on larger (smaller) reducers of nonaudit services, allowing the coefficients on all the variables to be different from that of smaller (larger) reducers. The results do not show significant differences in post-2003 accounting DCV changes between the two groups of borrowers.

#### *5.4.3.3. Reduction in Tax services*

Table 12 reports the tests on whether the change of accounting DCV varies with the extent of reduction in tax services. Borrowers that substantially reduced their purchase of tax services from the auditor after 2003 are designated as larger tax services reducers, with *TAX_DROP* =1. The test reported in Column 2 restricts the coefficients for control variables to be the same for all borrowers, while the test of Column 3 (Column 4) is performed on larger (smaller) reducers of tax services only. Column 2 shows an increase in the DCV of *ROA* for small reducers of tax services, with the coefficient estimate on *POST2003*ROA* to be -168.50 (p-value=0.013). There also appears to be an increase in the DCV of *LEV* for these borrowers, with the coefficient estimate on *POST2003*LEV* to be 42.72 (p-value=0.024). However, these changes do not carry on to larger reducers of tax services. The coefficients on *POST2003*ROA* and *POST2003*LEV* for larger reducers of tax services are only 41.09 (-168.50+209.59) and -2.61 (42.72-45.33). The tests summarized in Columns 3 and 4 provide consistent evidence: only small reducers of tax services experienced an increase in the DCV of *ROA* and *LEV*. These

**TABLE 12**
**Reduction in Tax Services and the Change of Accounting DCV after 2003**

| | *ALL, N=2,812* | | *TAX_DROP=1, N=1,410* | | *TAX_DROP=0, N=1,402* | |
|---|---|---|---|---|---|---|
| | Estimate | Pr > \|t\| | Estimate | Pr > \|t\| | Estimate | Pr > \|t\| |
| ROA | -169.36 | 0.000 | -244.00 | <.0001 | -169.39 | 0.000 |
| INT_COV | -0.89 | 0.001 | -0.69 | 0.009 | -0.91 | 0.001 |
| LEV | 67.51 | <.0001 | 53.10 | 0.004 | 60.32 | 0.001 |
| NW | -4.35 | 0.057 | -5.34 | 0.055 | -5.23 | 0.082 |
| TAX_DROP | 26.19 | 0.196 | | | | |
| TAX_DROP*ROA | -69.35 | 0.262 | | | | |
| TAX_DROP*INT_COV | 0.14 | 0.699 | | | | |
| TAX_DROP*LEV | -20.10 | 0.281 | | | | |
| TAX_DROP*NW | -1.53 | 0.432 | | | | |
| POST2003 | -12.19 | 0.582 | -7.06 | 0.770 | -17.83 | 0.427 |
| POST2003*ROA | **-168.50** | **0.013** | 29.44 | 0.645 | **-154.27** | **0.019** |
| POST2003*INT_COV | **0.64** | **0.082** | -0.07 | 0.830 | **0.61** | **0.083** |
| POST2003*LEV | **42.72** | **0.024** | -4.83 | 0.804 | **47.53** | **0.010** |
| POST2003*NW | -1.32 | 0.501 | -0.22 | 0.915 | -0.75 | 0.695 |
| POST2003*TAX_DROP | 2.91 | 0.921 | | | | |
| POST2003*ROA*TAX_DROP | **209.59** | **0.022** | | | | |
| POST2003*INT_COV*TAX_DROP | -0.67 | 0.175 | | | | |
| POST2003*LEV*TAX_DROP | **-45.33** | **0.085** | | | | |
| POST2003*NW*TAX_DROP | 1.33 | 0.628 | | | | |
| PP | -28.83 | <.0001 | -23.26 | <.0001 | -34.55 | <.0001 |
| MATURITY | -0.60 | <.0001 | -0.60 | <.0001 | -0.62 | <.0001 |
| SECURED | 30.68 | <.0001 | 26.27 | <.0001 | 36.95 | <.0001 |
| DEAL_AT | -5.09 | 0.005 | -5.78 | 0.030 | -4.72 | 0.058 |
| GEN_RESTR | 12.42 | <.0001 | 11.28 | <.0001 | 13.27 | <.0001 |
| LENDER_NUM | -0.02 | 0.941 | 0.18 | 0.628 | -0.12 | 0.712 |
| RELATED | -0.25 | 0.939 | 4.12 | 0.388 | -3.94 | 0.368 |
| RATING | -1.26 | 0.001 | -1.34 | 0.013 | -1.52 | 0.003 |
| VOLATILITY | 0.75 | <.0001 | 0.93 | <.0001 | 0.50 | 0.037 |
| SIZE_AT | -15.75 | <.0001 | -18.02 | <.0001 | -13.15 | 0.000 |
| T_SPREAD | 10.35 | <.0001 | 12.72 | <.0001 | 7.46 | <.0001 |
| C_SPREAD | -13.98 | 0.060 | -19.81 | 0.065 | -6.44 | 0.533 |
| YEAR | 2.03 | 0.159 | 2.86 | 0.177 | 1.67 | 0.395 |
| ADJ. R-SQUARE | 0.58 | | 0.56 | | 0.62 | |

These regressions test how the reduction in tax services affects the changes in accounting DCV. They show that borrowers that did not substantially reduce tax services following SOX experienced an increase in the DCV of ROA and leverage but a decrease in the DCV of interest coverage. However, the same change did not happen to borrowers that substantially reduced tax services after 2003. All models include industry (Barth et al. 1998) and loan purpose indicators. Intercepts are suppressed. P-values are for two-tailed tests. All variables are defined in the appendix.

results, consistent with the notion that tax services are perceived by lenders to have positive effect on accounting information's ability to inform on credit risk, suggest that large reduction in tax services moderated the post-SOX increase in accounting DCV, lending support to H4A.

#### *5.4.3.4. Reduction in Other Unspecified Services*

Table 13 summarizes the tests of whether the change of accounting DCV varies with the extent of reduction in other unspecified services. Borrowers that substantially reduced their purchase of other unspecified services from the auditor after 2003 are designated as larger reducers of these services with *OTH_DROP* =1. The test of Column 2 restricts the coefficients for control variables to be the same for all borrowers, while the test of Column 3 (Column 4) is performed on larger (smaller) reducers of tax services only. Column 2 shows a marginally significant coefficient estimate on *POST2003*NW*OTH_DROP*, -4.73 (p-value=0.092), indicating that lenders place more weight on the net worth of larger reducers of other unspecified services after 2003. In contrast, the net worth of these borrowers received less weight than the larger reducers of unspecified services before 2003, with the coefficient estimate on OTH_DROP*NW to be 5.57 (p-value=0.005). This pattern is consistent with the notion that lenders perceive the reduction of auditor-provided unspecified consulting services to have a positive impact on net worth's ability to inform on credit risk. However, these tests do not detect significant differences in the DCV of *ROA* or its post-2003 change between the two types

**TABLE 13**
**Reduction in Unspecified Other Services and the Change of Accounting DCV after 2003**

| | *ALL, N=2,812* | | *OTH_DROP=1, N=1,424* | | *OTH_DROP=0, N=1,388* | |
|---|---|---|---|---|---|---|
| | Estimate | Pr > \|t\| | Estimate | Pr > \|t\| | Estimate | Pr > \|t\| |
| ROA | -180.27 | <.0001 | -224.14 | <.0001 | -191.88 | <.0001 |
| INT_COV | -0.61 | 0.015 | -1.13 | <.0001 | -0.58 | 0.029 |
| LEV | 53.78 | 0.001 | 52.44 | 0.004 | 64.78 | 0.001 |
| NW | -8.14 | 0.000 | -4.40 | 0.119 | -5.67 | 0.052 |
| OTH_DROP | -14.62 | 0.482 | | | | |
| OTH_DROP*ROA | -59.14 | 0.335 | | | | |
| OTH_DROP*INT_COV | -0.46 | 0.220 | | | | |
| OTH_DROP*LEV | 2.48 | 0.896 | | | | |
| OTH_DROP*NW | 5.57 | 0.005 | | | | |
| POST2003 | -20.90 | 0.328 | -1.35 | 0.954 | -19.41 | 0.413 |
| POST2003*ROA | -20.37 | 0.743 | -83.38 | 0.197 | -25.26 | 0.697 |
| POST2003*INT_COV | 0.00 | 0.998 | 0.53 | 0.133 | 0.01 | 0.979 |
| POST2003*LEV | 14.96 | 0.420 | 19.21 | 0.307 | 14.24 | 0.465 |
| POST2003*NW | 2.08 | 0.305 | -2.67 | 0.156 | 1.87 | 0.385 |
| POST2003*OTH_DROP | 15.15 | 0.613 | | | | |
| POST2003*ROA*OTH_DROP | -61.86 | 0.497 | | | | |
| POST2003*INT_COV*OTH_DROP | 0.56 | 0.256 | | | | |
| POST2003*LEV*OTH_DROP | 11.22 | 0.674 | | | | |
| POST2003*NW*OTH_DROP | **-4.73** | **0.092** | | | | |
| PP | -28.69 | <.0001 | -28.45 | <.0001 | -27.05 | <.0001 |
| MATURITY | -0.59 | <.0001 | -0.43 | 0.000 | -0.78 | <.0001 |
| SECURED | 30.88 | <.0001 | 29.22 | <.0001 | 31.85 | <.0001 |
| DEAL_AT | -5.06 | 0.006 | -3.90 | 0.034 | -4.31 | 0.564 |
| GEN_RESTR | 12.46 | <.0001 | 13.06 | <.0001 | 11.93 | <.0001 |
| LENDER_NUM | -0.06 | 0.799 | -0.15 | 0.611 | 0.15 | 0.728 |
| RELATED | 0.20 | 0.950 | 2.13 | 0.615 | -2.50 | 0.613 |
| RATING | -1.25 | 0.001 | -2.28 | <.0001 | -0.22 | 0.684 |
| VOLATILITY | 0.78 | <.0001 | 1.40 | <.0001 | 0.23 | 0.349 |
| SIZE_AT | -15.46 | <.0001 | -9.47 | 0.003 | -21.76 | <.0001 |
| T_SPREAD | 10.72 | <.0001 | 10.51 | <.0001 | 10.14 | <.0001 |
| C_SPREAD | -13.01 | 0.079 | -9.69 | 0.426 | -15.35 | 0.113 |
| YEAR | 1.89 | 0.192 | 1.75 | 0.383 | 2.67 | 0.206 |
| ADJ. R-SQUARE | 0.58 | | 0.62 | | 0.56 | |

These regressions test how the reduction in other unspecified nonaudit services affects the changes in accounting DCV. They show that large reducers of unspecified services experienced an increase in the DCV of net worth following SOX. All models include industry (Barth et al. 1998) and loan purpose indicators. Intercepts are suppressed. P-values are for two-tailed tests. All variables are defined in the appendix.

of borrowers. Taken in all, these results provide only weak evidence to H4B, which predicts that large reduction of other specified services is associated with an increase in accounting DCV.

## 5.5. Additional Tests

### *5.5.1. A Larger Sample of Heterogeneous Loans*

The multiple regression test of the change of accounting DCV following SOX 404 is repeated on a larger sample of diverse loans and reported in Table 14. This sample consists of 7,194 loan facilities (5,292 packages) issued by 1,173 US firms. The major differences between this sample and Sample 1 are that the type of loans is not limited to revolvers and that the number of loans is not restricted to one for each borrower in each period. As shown in Panel B, revolvers represent 58.77% of the sample, with the rest of loans being term loans (25.63%), 364-day facilities (13.12%), and other facilities (2.47%). The median number of facilities for each borrower is 5, and packages, 4 (Panel C).

To mitigate confounding effect due to heterogeneous nature of the sample loans, I control for loan type in all the regressions. Since multiple loans are present for each sample firm, I also control for firm fixed effect in the test of average effect.

Model 1 indicates that *SPREAD* responds less to *ROA* following the borrower's SOX 404 compliance, consistent with the result reported in Table 5. It also shows significant loadings on *POST404*LEV* and *POST404*NW*, suggesting decreases in the DCV of leverage and net worth.

**TABLE 14**
**The Change of Accounting DCV Following SOX 404**
**- Multiple Types of Loans**

**Panel A: Multiple Regression**

| | 1 | | 2 | |
|---|---|---|---|---|
| Dependent Variable: SPREAD | Estimate | Pr > \|t\| | Estimate | Pr > \|t\| |
| ROA | -209.47 | <.0001 | -271.79 | <.0001 |
| INT_COV | -0.08 | 0.672 | -0.43 | 0.002 |
| LEV | 161.98 | <.0001 | 123.12 | <.0001 |
| NW | -0.18 | 0.952 | -3.97 | 0.055 |
| REM | | | 84.32 | 0.001 |
| REM*ROA | | | -40.47 | 0.487 |
| REM*INT_COV | | | -0.08 | 0.742 |
| REM*LEV | | | -20.29 | 0.383 |
| REM*NW | | | -9.39 | <.0001 |
| POST404 | -13.96 | 0.527 | -26.81 | 0.182 |
| POST404*ROA | **116.84** | **0.025** | **120.81** | **0.011** |
| POST404*INT_COV | 0.10 | 0.653 | -0.01 | 0.954 |
| POST404*LEV | **-53.28** | **0.008** | -28.07 | 0.131 |
| POST404*NW | **4.41** | **0.014** | **4.36** | **0.011** |
| POST404*REM | | | -110.51 | 0.005 |
| POST404*ROA*REM | | | **148.40** | **0.087** |
| POST404*INT_COV*REM | | | 0.16 | 0.661 |
| POST404*LEV*REM | | | 8.25 | 0.815 |
| POST404*NW*REM | | | **12.80** | **0.000** |
| PP | -38.76 | <.0001 | -61.03 | <.0001 |
| MATURITY | -0.28 | 0.004 | 0.12 | 0.060 |
| SECURED | 5.46 | 0.208 | 40.11 | <.0001 |
| DEAL_AT | -28.75 | 0.001 | -6.28 | 0.174 |
| GEN_RESTR | 9.45 | <.0001 | 13.70 | <.0001 |
| LENDER_NUM | -0.56 | 0.004 | -1.24 | <.0001 |
| RELATED | -3.65 | 0.189 | -17.62 | <.0001 |
| RATING | -6.85 | <.0001 | -4.35 | <.0001 |
| VOLATILITY | 0.67 | 0.012 | 1.94 | <.0001 |
| SIZE_AT | -8.49 | 0.202 | -4.27 | 0.061 |
| T_SPREAD | 21.93 | <.0001 | 21.80 | <.0001 |
| C_SPREAD | 43.60 | <.0001 | 35.43 | <.0001 |
| YEAR | 6.62 | <.0001 | 6.93 | <.0001 |
| ADJ. R-SQUARE | 0.82 | | 0.51 | |

These regressions test the change of accounting DCV following SOX 404 on 7,194 loan facilities (5,292 packages) issued by 1,173 US firms. The firms are required to (1) have SOX 404 filings in the database of AuditAnalytics by November 2011 and (2) have issued loans both before and after their first SOX 404 report. The type of loans is not limited to revolvers, and the number of loans is not restricted to one for each borrower in each period (see Panels B and C for detail). Model 1 indicates that SPREAD responds less to ROA, leverage, and net worth in the period following the borrower's SOX 404 compliance. Model 2 suggests that REM borrowers experienced a larger decline in the DCV of ROA and net worth than non-REM borrowers. Both models include industry (Barth et al. 1998), loan purpose, and loan type indicators; Model 1 controls for firm fixed effect. P-values are for two-tailed tests. All variables are defined in the appendix.

**TABLE 14 - continued**
**The Change of Accounting DCV Following SOX 404**
**- Multiple Types of Loans**

**Panel B: Loan Type Distribution**

| Loan Type | # of Facility | Percent of Sample |
|---|---|---|
| **Revolver** | 4,228 | 58.77 |
| **Term Loans** | 1,844 | 25.63 |
| **364-day Facility** | 944 | 13.12 |
| **Other** | 178 | 2.47 |
| **Total** | 7,194 | 99.99 |

**Panel C: Number of Loans per Borrower**

| | Sample Total | Q1 | Median | Q3 | Mean | Std Dev |
|---|---|---|---|---|---|---|
| **Facility** | 1,237 | 3 | 5 | 8 | 5.82 | 3.88 |
| **Package** | 5,292 | 3 | 4 | 5 | 4.28 | 2.36 |

Model 2 tests whether the post-SOX 404 changes in accounting DCV varies with REM. It shows positive and significant loadings on both *POST404*ROA* and *POST404*ROA*REM*, 120.81 (p-value=0.011) and 148.40 (p-value=0.087). The first coefficient suggests that *SPREAD* becomes less closely associated with *ROA* following SOX 404 for non-REM borrowers, while the second one indicates that this decrease in the DCV of *ROA* is more pronounced for borrowers suspected of REM. A similar change is also observable with *NW*. These results are qualitatively similar to those obtained from Sample 1 and Sample 2 as reported in Tables 8 and 9.

### *5.5.2. Alternative Control for Firm Size*

Finance literature shows that loan price is sensitive to firm size, and firm size is often operationalized with total assets or market capitalization. Column 3 of Table 15 reports the main result when the borrower's market capitalization is taken as a proxy for firm size. The post-SOX 404 decline in the DCV of *ROA* is not sensitive to this change, with the coefficient estimate for *ROA*POST404* to be 130.146 (p-value=0.007). However, the coefficient estimate on *NW* loses significance. It suggests that market value subsumes the credit risk information contained in *NW*, consistent with the fact that a listed firm's market value is a function of its net worth and the two variables are closely related.

**TABLE 15**
**The Change of Accounting DCV Following SOX 404 - Sensitivity Tests**

| | *SPREAD=AllInDrawn* *SIZE=SIZE_AT* | | *SPREAD=AllInDrawn* *SIZE=SIZE_MV* | | *SPREAD=Log(AllInDrawn)* *SIZE=SIZE_AT* | | *SPREAD=Log(AllInDrawn)* *SIZE=SIZE_MV* | |
|---|---|---|---|---|---|---|---|---|
| | Estimate | P-value | Estimate | P-value | Estimate | P-value | Estimate | P-value |
| ROA | **-285.272** | **<.0001** | **-240.914** | **<.0001** | **-1.945** | **<.0001** | **-1.464** | **<.0001** |
| INT_COV | **-0.388** | **0.003** | **-0.282** | **0.029** | **-0.004** | **<.0001** | **-0.003** | **<.0001** |
| LEV | **72.044** | **<.0001** | **94.766** | **<.0001** | **0.543** | **<.0001** | **0.606** | **<.0001** |
| NW | **-7.870** | **0.001** | **-0.423** | **0.839** | **-0.024** | **0.129** | **0.022** | **0.102** |
| POST404 | -42.617 | 0.042 | -45.492 | 0.029 | 0.085 | 0.534 | 0.061 | 0.646 |
| ROA*POST404 | **129.938** | **0.007** | **130.146** | **0.007** | **0.534** | **0.088** | **0.513** | **0.095** |
| INT_COV*POST404 | 0.087 | 0.628 | 0.080 | 0.654 | 0.000 | 0.958 | 0.000 | 0.957 |
| LEV*POST404 | 6.135 | 0.745 | 12.197 | 0.515 | -0.070 | 0.564 | -0.017 | 0.887 |
| NW*POST404 | **3.544** | **0.058** | **3.362** | **0.070** | -0.020 | 0.103 | -0.022 | 0.065 |
| PP | -41.028 | <.0001 | -42.015 | <.0001 | -0.184 | <.0001 | -0.186 | <.0001 |
| MATURITY | -0.738 | <.0001 | -0.682 | <.0001 | -0.006 | <.0001 | -0.006 | <.0001 |
| SECURED | 24.139 | <.0001 | 22.908 | <.0001 | 0.199 | <.0001 | 0.189 | <.0001 |
| DEAL_AT | 11.068 | 0.050 | 8.585 | 0.119 | 0.137 | 0.000 | 0.132 | 0.000 |
| GEN_RESTR | 12.587 | <.0001 | 12.044 | <.0001 | 0.077 | <.0001 | 0.072 | <.0001 |
| LENDER_NUM | -1.259 | <.0001 | -1.065 | <.0001 | -0.003 | 0.044 | -0.002 | 0.116 |
| RELATED | -6.493 | 0.039 | -6.687 | 0.032 | -0.028 | 0.164 | -0.030 | 0.137 |
| RATING | -2.130 | <.0001 | -1.483 | 0.000 | -0.029 | <.0001 | -0.024 | <.0001 |
| VOLATILITY | 0.950 | 0.000 | 0.767 | 0.003 | 0.010 | <.0001 | 0.009 | <.0001 |
| SIZE | 0.907 | 0.749 | -12.063 | <.0001 | -0.041 | 0.027 | -0.121 | <.0001 |
| T_SPREAD | 18.799 | <.0001 | 17.739 | <.0001 | 0.117 | <.0001 | 0.105 | <.0001 |
| C_SPREAD | 34.902 | <.0001 | 36.606 | <.0001 | 0.120 | 0.001 | 0.139 | 0.000 |
| YEAR | 7.217 | <.0001 | 7.661 | <.0001 | 0.030 | 0.001 | 0.033 | 0.000 |
| ADJ. R-SQUARE | 0.573 | | 0.580 | | 0.657 | | 0.669 | |

These sensitivity tests investigate how the associations between accouting variables and the initial interest spread change after SOX404 when two modifications are made to the basic model. First, SPREAD is natural log-transformed. Second, SIZE_MV replaces SIZE_AT to control for firm size effect. Results from all specifications suggest that with other accounting variables under control, the association between SPREAD and ROA declined following SOX404. When market capitalization is under control, NW is not significant or even turns positive, reflecting the fact that market value, as a function of net worth, subsumes the credit risk information contained in NW. All models include industry (Barth et al. 1998) and loan purpose indicators. Intercepts are suppressed. P-values are from two-tailed tests. All variables are defined in the appendix. N = 2,348.

### *5.5.3. Interest Spread in Natural Logarithm Transformation*

Logarithm transformation of a variable reduces its curvature and helps mitigate excessive influence of extreme values in OLS estimation. Some loan price models take interest spread in its logarithm transformation. To investigate my main result's sensitivity to this alternative specification, I repeat the test after replacing the dependent variable with natural log-transformation of the raw interest spread. Column 4 of Table 15 reports the result. The positive loading on *ROA*POST404*, 0.534 (p-value=0.088) indicates that interest spread becomes less sensitive to *ROA* after the borrower files SOX 404 reports. This alternative specification of SPREAD, though reducing the significance of ROA's coefficient, does not change the main inference.

Column 5 of Table 15 summarizes the results when two changes are made to the model specification: firm size is proxied by market capitalization and interest spread is log-transformed. The coefficient estimate on *ROA*POST404* is now 0.513 (p-value=0.095). Again, loan price appears to become less closely associated with *ROA* after SOX 404, though the statistical significance is weakened.

### *5.5.4. Falsification Test*

The earlier tests have shown the temporal changes between interest spread and accounting metrics for borrowers affected by SOX. The interpretation of these changes as the effect of SOX relies on the assumption that the relation between the selected accounting metrics and *SPREAD* does not change as a result of other events

contemporaneous to SOX. The fact that sample firms' SOX 404 filings do not fall on the same year, together with the inclusion of macro-economic controls, reduces the likelihood that some unknown macroeconomic events contributed to the observed change in the SPREAD-ROA relation associated with SOX 404. The inclusion of time trend is also expected to reduce the confounding effect due temporal changes unrelated to SOX.

Additionally, I perform a falsification test to investigate whether the relations between *SPREAD* and the selected accounting metrics exhibited similar changes during a period before SOX 404 had become effective. If similar changes do not appear in earlier periods, it is less likely that the reported post-SOX 404 decline in accounting DCV merely reflects a time trend unrelated to SOX. This test is performed on a sample of revolving loans composed of (1) the pre-SOX 404 observations in Sample 1 and (2) revolving loans issued by the same set of borrowers at least one year before the original pre-SOX 404 loan. Each borrower has two loans in the sample; an artificial variable, POST, is set to 0 for the earlier loan, and 1 for the later one. Majority of the sample loans, 90.40%, were issued in years 1999 through 2004. Table 16 summarizes the test results (Panel A) as well as the sample characteristics (Panel B). Model 1 validates the measures of accounting DCV on the sample, showing *SPREAD* significantly associated with all the four accounting metrics in predicted directions. Model 2 shows that the association between *SPREAD* and *ROA* is stronger for loans issued in later years than earlier years, with the coefficient estimate on *ROA*POST* to be -86.835 (p-value=0.056). Model 3, repeating the test while excluding loss firm years, shows that there is no significant

## TABLE 16
## The Change of Accounting DCV Following SOX 404 - Falsification Test

**Panel A: Regression**

| | 1 *All, N=2,104* | | 2 *All, N=2,104* | | 3 *EBITDA>0, N=2,024* | |
|---|---|---|---|---|---|---|
| | Estimate | P-value | Estimate | P-value | Estimate | P-value |
| ROA | **-218.018** | **<.0001** | **-185.280** | **<.0001** | **-242.869** | **<.0001** |
| INT_COV | **-0.381** | **<.0001** | **-0.389** | **0.002** | **-0.336** | **0.006** |
| LEV | **76.368** | **<.0001** | **65.575** | **<.0001** | **52.902** | **0.002** |
| NW | **-6.970** | **0.004** | **-7.060** | **0.008** | **-12.474** | **<.0001** |
| POST | | | -13.160 | 0.503 | -28.889 | 0.143 |
| ROA*POST | | | **-86.835** | **0.056** | -20.656 | 0.670 |
| INT_COV*POST | | | 0.045 | 0.805 | -0.021 | 0.905 |
| LEV*POST | | | 23.255 | 0.199 | 17.898 | 0.320 |
| NW*POST | | | 0.571 | 0.754 | 1.869 | 0.308 |
| PP | -42.992 | <.0001 | -42.855 | <.0001 | -41.022 | <.0001 |
| MATURITY | -0.360 | 0.003 | -0.330 | 0.006 | -0.452 | 0.000 |
| SECURED | 28.474 | <.0001 | 28.834 | <.0001 | 29.909 | <.0001 |
| DEAL_AT | 3.412 | 0.397 | 2.954 | 0.465 | 4.784 | 0.227 |
| GEN_RESTR | 14.629 | <.0001 | 14.615 | <.0001 | 14.120 | <.0001 |
| LENDER_NUM | -1.171 | <.0001 | -1.157 | <.0001 | -1.115 | <.0001 |
| RELATED | -1.373 | 0.684 | -1.033 | 0.760 | -1.182 | 0.720 |
| RATING | -2.179 | <.0001 | -2.160 | <.0001 | -2.188 | <.0001 |
| VOLATILITY | 1.712 | <.0001 | 1.724 | <.0001 | 1.748 | <.0001 |
| SIZE | -0.874 | 0.771 | -1.229 | 0.685 | 4.598 | 0.144 |
| T_SPREAD | 9.328 | <.0001 | 9.516 | <.0001 | 9.266 | <.0001 |
| C_SPREAD | 28.219 | 0.001 | 26.419 | 0.002 | 21.932 | 0.008 |
| YEAR | -0.314 | 0.729 | 0.710 | 0.501 | 1.020 | 0.322 |
| ADJ. R-SQUARE | 0.571 | | 0.573 | | 0.585 | |

This falsification test is performed on a sample of revolving loans composed of (1) the pre-SOX404 observations in Sample 1 and (2) revolvers issued by the same set of borrowers at least one year before the original pre-SOX404 loan. See Panel B for description of loans. Each borrower has two loans in the sample. An artificial variable, POST, is set to 0 for the earlier loan, and 1 for the later one. Model 1 validates the measures of accounting DCV on the sample. Model 2 shows that SPREAD is more closely associated with ROA for loans issued in later years than earlier years. Model 3, repeating the test while excluding loss firm years, shows that there is no significant change to the relation between SPREAD and any accounting variables. All models include industry (Barth et al. 1998) and loan purpose indicators. Intercepts are suppressed. P-values are from two-tailed tests. All variables are defined in the appendix.

**TABLE 16 - continued**
**The Change of Accounting DCV Following SOX 404 - Falsification Test**

**Panel B: Distribution of Loans by Year of Issuance**

| Year of Issuance | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| POST=0 | 2 | 5 | 18 | 33 | 46 | 69 | 122 | 206 | 201 | 231 | 96 | 17 | 4 | 2 |
| POST=1 | | | | | | | | 47 | 99 | 227 | 556 | 100 | 16 | 7 |
| Percent of Sample | 0.10 | 0.24 | 0.86 | 1.57 | 2.19 | 3.28 | 5.80 | 12.02 | 14.26 | 21.77 | 30.99 | 5.56 | 0.95 | 0.43 |

**Panel C: Characteristics of Sample Firms and Loans**

| Variables* | | POST=0 | POST=1 | Diff. in Means | | |
|---|---|---|---|---|---|---|
| | N | Mean | Mean | Diff. | t | Pr > \|t\| |
| **SPREAD** | 1052 | 164.00 | 151.02 | -12.99 | -2.88 | 0.004 |
| **ROA** | 1052 | 0.14 | 0.13 | -0.01 | -2.18 | 0.030 |
| **INT_COV** | 1052 | 13.34 | 13.89 | 0.56 | 0.65 | 0.518 |
| **LEV** | 1052 | 0.61 | 0.60 | -0.01 | -0.84 | 0.399 |
| **NW ($ Mil)** | 1052 | 1311.54 | 1496.32 | 184.78 | 1.41 | 0.158 |
| **PP** | 1052 | 0.70 | 0.72 | 0.02 | 1.25 | 0.212 |
| **MATURITY** | 1052 | 45.84 | 51.35 | 5.51 | 8.47 | <.0001 |
| **SECURED** | 1052 | 0.48 | 0.63 | 0.15 | 5.69 | <.0001 |
| **DEAL_AT** | 1052 | 0.36 | 0.29 | -0.06 | -3.05 | 0.002 |
| **GEN_RESTR** | 1052 | 1.61 | 1.62 | 0.01 | 0.12 | 0.906 |
| **LENDER_NUM** | 1052 | 9.78 | 10.21 | 0.42 | 1.30 | 0.193 |
| **RELATED** | 1052 | 0.24 | 0.36 | 0.12 | 6.06 | <.0001 |
| **RATING** | 1052 | 6.38 | 6.65 | 0.27 | 1.08 | 0.282 |
| **VOLATILITY** | 1052 | 11.34 | 9.88 | -1.46 | -4.87 | <.0001 |
| **SIZE_AT** | 1052 | 3994.38 | 4512.26 | 517.88 | 1.44 | 0.150 |
| **T_SPREAD** | 1052 | 2.55 | 2.51 | -0.04 | -0.73 | 0.465 |
| **C_SPREAD** | 1052 | 0.96 | 0.86 | -0.10 | -10.97 | <.0001 |

* All variables are defined in the appendix.

changes to the relation between *SPREAD* and any accounting metrics over the two time periods. This test suggests that the association between *ROA* and *SPREAD* did not exhibit a downward time trend before the introduction of SOX 404, helping address the concern that the post-SOX 404 decline in accounting DCV might simply be part of a time trend not related to SOX.

#### *5.5.5. Test of Difference in Differences*

A difference-in-differences design could generate more powerful tests but requires a comparable control sample that is not affected by SOX (or SOX 404). Two types of firms are considered as candidate control samples. First, borrowers that are listed in non-US securities exchanges were not subject to SOX. Second, some US-listed borrowers, though equally affected by other stipulations of SOX, did not have to comply with SOX 404. Since major capital markets in Canada and Europe adopted internal control regulations similar to SOX during the same period, I choose US firms that were exempted from the SOX 404 requirements as a control sample to examine whether the accounting DCV change associated with SOX 404 was different for borrowers that filed and those that did not file SOX 404 reports. The non-filers are assumed to be unaffected by SOX 404.

I start with US firms with revolving lines of credits recorded in the DealScan database and keep only those that had not filed SOX 404 reports by November 2011. Since these borrowers did not have an actual filing year, I arbitrarily designate their loans

made after fiscal year 2004 as post-SOX 404 issuances. Firms qualified for the control sample must have (1) relevant information in Compustat to compute necessary variables and (2) at least two revolving loans with contract information in DealScan, one before and one after fiscal year 2004. This procedure produces a control sample of 402 revolving facilities made by 201 US companies unaffected by SOX 404. Table 17 summarizes the analysis.

The test reported in Column 1 restricts the coefficients for control variables to be the same for both affected and unaffected borrowers; the tests of Columns 2 and 3 are performed on affected and unaffected borrowers, respectively, allowing each group of borrowers to have their own coefficients on all the variables. Columns 2 and 3 show that only affected borrowers experienced a statistically significant decline in the association between *ROA* and *SPREAD* following SOX 404, providing evidence that the post-SOX 404 decrease in *SPREAD*'s sensitivity to *ROA* occurred only to firms subject to SOX 404. However, the pooled test reported in Column 1 does not detect a significant difference in the change of accounting DCV between firms subject to SOX 404 and those that are not.

The discrepancy could be due to several reasons. First, the borrowers not filing under SOX 404 do not constitute a perfect control sample. These firms are generally smaller, less profitable, and have lower interest coverage but higher leverage. Except for *ROA*, the examined accounting metrics of these firms are not closely related to *SPREAD*. It is possible that lenders rely more on non-financial information when pricing loans to these firms. Second, while the actual SOX 404 compliance dates of the affected firms

**TABLE 17**
**The Change of Accounting DCV following SOX 404 - In Contrast with a Group of Unaffected Firms**

| Dependent Variable: SPREAD | ALL, N=2,750 | | TD=1, N=2,348 | | TD=0, N=402 | |
|---|---|---|---|---|---|---|
| | Estimate | Pr > \|t\| | Estimate | Pr > \|t\| | Estimate | Pr > \|t\| |
| ROA | -100.77 | 0.204 | -285.43 | <.0001 | -443.56 | 0.054 |
| INT_COV | -0.79 | 0.373 | -0.39 | 0.003 | -0.91 | 0.657 |
| LEV | -25.19 | 0.430 | 71.98 | <.0001 | -9.67 | 0.922 |
| NW | -10.88 | 0.001 | -7.87 | 0.001 | -16.34 | 0.228 |
| TD | -109.23 | 0.001 | | | | |
| TD*ROA | -181.90 | 0.039 | | | | |
| TD*INT_COV | 0.40 | 0.657 | | | | |
| TD*LEV | 106.79 | 0.001 | | | | |
| TD*NW | 5.08 | 0.099 | | | | |
| POST404 | -31.10 | 0.455 | -42.65 | 0.042 | -148.40 | 0.280 |
| POST404*ROA | -16.39 | 0.877 | **130.10** | **0.007** | 209.35 | 0.488 |
| POST404*INT_COV | -0.96 | 0.393 | 0.09 | 0.628 | -2.61 | 0.387 |
| POST404*LEV | 10.85 | 0.780 | 6.14 | 0.744 | 22.36 | 0.819 |
| POST404*NW | 3.16 | 0.398 | **3.54** | **0.058** | **17.55** | **0.067** |
| POST404*TD | -7.34 | 0.875 | | | | |
| POST404*ROA*TD | 143.77 | 0.227 | | | | |
| POST404*INT_COV*TD | 1.05 | 0.357 | | | | |
| POST404*LEV*TD | -3.81 | 0.931 | | | | |
| POST404*NW*TD | -0.09 | 0.982 | | | | |
| PP | -41.30 | <.0001 | -41.03 | <.0001 | -62.55 | 0.019 |
| MATURITY | -0.81 | <.0001 | -0.74 | <.0001 | -1.57 | 0.058 |
| SECURED | 24.54 | <.0001 | 24.16 | <.0001 | 2.76 | 0.933 |
| DEAL_AT | 6.33 | 0.281 | 11.07 | 0.050 | -48.75 | 0.438 |
| GEN_RESTR | 12.23 | <.0001 | 12.59 | <.0001 | 11.16 | 0.102 |
| LENDER_NUM | -1.29 | <.0001 | -1.26 | <.0001 | 2.27 | 0.350 |
| RELATED | -9.29 | 0.005 | -6.49 | 0.039 | -43.70 | 0.065 |
| RATING | -2.27 | <.0001 | -2.13 | <.0001 | 3.64 | 0.405 |
| VOLATILITY | 0.40 | 0.087 | 0.94 | 0.000 | -2.30 | 0.016 |
| SIZE_AT | -1.92 | 0.487 | 0.91 | 0.747 | -39.61 | 0.025 |
| T_SPREAD | 18.35 | <.0001 | 18.80 | <.0001 | -45.36 | 0.131 |
| C_SPREAD | 33.55 | <.0001 | 34.97 | <.0001 | -15.48 | 0.771 |
| YEAR | 6.98 | <.0001 | 7.22 | <.0001 | 79.54 | 0.002 |
| ADJ. R-SQUARE | 0.57 | | 0.57 | | 0.87 | |

These tests employ a set of 201 US firms that are not subject to SOX 404 as a control group, with TD=0. The objective is to investigate whether the post-SOX404 accounting DCV changes are different across firms affected (TD=1) and unaffected by SOX 404. Model 1 is run on the entire sample, restricting the coefficients on control variables to be the same for affected and unaffected borrowers, while Models 2 and 3 are run on affected and unaffected borrowers separately. The results suggest that there is no significant difference between the two groups of borrowers in the post-SOX 404 changes of their accounting DCV. All models include industry (Barth et al. 1998) and loan purpose indicators. Intercepts are suppressed. P-values are for two-tailed tests. All variables are defined in the appendix.

range from 2004 to 2007, I can only apply a uniform artificial SOX 404 date for the control firms. This arbitrary SOX 404 date further adds noise to the tests. Taken in all, the results from these tests provide weak evidence that affected firms experienced a decline in the DCV of *ROA* in the period following their compliance with SOX 404.

# Chapter 6

# CONCLUSION

## 6.1. Summary

This study investigates whether accounting data's decision usefulness to private lenders has changed after SOX and how the rise in real earnings management and the reduction in nonaudit services affect the change. Under the premise that loan interest spread's sensitivity to key accounting metrics reflects the lender's belief in their ability to inform on the borrower's credit risk, I use the association between interest spread and these accounting metrics as a primary proxy for accounting DCV. Building on the literature that there was a shift from AEM to REM after SOX and that REM distorts the stream of cash flows, I argue that REM weakens the DCV of accounting information more than AEM and that the rise of REM contributes to the decline in the DCV of accounting information following SOX. Auditing theory holds that nonaudit services' implications for financial reporting depend on the tradeoff between the positive effect from knowledge spillover and the negative effect from independence impairment. Based on this literature, I argue that auditor-provided tax services and other consulting services have different implications for accounting information's usefulness to lenders and

hypothesize that the borrower's post-SOX reductions in these two types of nonaudit services have opposite effects on its accounting DCV.

Tests performed on two samples of US firms that issued revolving loans both before and after SOX generate the following findings.

- The association between interest spread and the selected accounting metrics, most notably ROA, has become weaker following the borrower's SOX 404 compliance.
- This change is not concentrated among borrowers with disclosed internal control deficiency but is primarily driven by borrowers suspected of real earnings management.
- A large reduction in tax services is related to a weakened association between interest spread and ROA as well as leverage.
- A large reduction in other unspecified services is related to a strengthened association between interest spread and net worth.

These findings suggest that SOX has mixed implications for these major accounting metrics' usefulness to private lenders.

## 6.2. Limitations

The results from this research should be interpreted with an understanding of its limitations. Some of these limitations are discussed below.

### *6.2.1. Motivation*

The argument that REM leads to the post-SOX decline in accounting DCV hinges on the premise that REM weakens accounting information's usefulness to private lenders more than AEM does. Yet how private lenders respond to different forms of earnings management is not well established in the literature or completely analyzed in this study. Consequently this premise itself is a conjecture that is subject to analytical and empirical verification. Future research should thoroughly investigate how lenders price REM and AEM differently and how these two characteristics of accounting quality affect the weight they place on accounting information in the loan pricing process before and after SOX (or Section404).

### *6.2.2. Empirical Specification*

Financial reporting quality affects information risk, the change of which can manifest in interest spread, a common proxy for cost of debt. SOX could have changed interest spread via its effect on financial reporting. This dissertation focuses on the interest spread's sensitivity to accounting metrics rather than the spread itself out of the concern that the change in the latter can be more susceptible to factors other than financial reporting quality. First, lenders also use non-price terms to control or mitigate information risk, but it is not clear whether non-price terms play complementary or substitution roles in this regard. Second, economic events unrelated to SOX or financial reporting could have affected both the price and non-price terms during the sample period.

Nonetheless, the accounting DCV operationalized in this study, i.e. interest spread's sensitivity to key accounting metrics, is not a perfect proxy for financial reporting's effect on debt contract either. The primary measure of accounting DCV relies on the assumption that, at a given level of accounting information's credit risk informativeness, the inherent relation between spread and the key accounting metrics is linear and constant. If interest spread's sensitivity to these accounting metrics naturally varies with their levels even in the absence of any significant change in financial reporting quality, then the current accounting DCV measure will be very noisy, especially at the tails of the distributions of the accounting variables.

This study uses nonaudit service fees to proxy for auditor independence. Tests using alternative measures of the same construct, such as relative fees, fee dependence, or tenure, would help verify the empirical results.

This study also suffers from the lack of a comparable control sample for a stronger research design. Despite the support from a falsification test, it cannot completely rule out the possibility that the documented change in the sample firms' accounting DCV following SOX 404 reflects some temporal trends contemporary to but not driven by SOX.

### *6.2.3. Interpretation of Results*

This study uses four accounting metrics to proxy for accounting information. Though the examined accounting metrics are the most frequently used risk indicators in

debt contracts and are closely related to loan price, they are not the complete set of financial reporting information that lenders have access to. The tests cannot tell if lenders have shifted their attention to other accounting metrics not included in the model or qualitative information, such as footnotes and/or management discussion, provided in financial reporting. In this sense, less reliance on these select metrics does not necessarily mean that all accounting information has become less useful in loan pricing. Therefore, the findings should not be interpreted as evidence of diminishing relevance of financial reporting to private lenders.

## Appendix: Definition of Variables

***Dependent variables***

| | |
|---|---|
| SPREAD | AllInDrawn spread reported in DealScan. |

***Key accounting variables***

| | |
|---|---|
| ROA | Profitability, EBITDA/AT. |
| INT_COV | Interest coverage, (XINT+EBITDA)/XINT. |
| LEV | Total liabilities relative to total assets, LT/AT. |
| NW | Natural logarithm of net worth, LN(1+AT-LT). |

***Partitioning variables***

| | |
|---|---|
| POST404 | Binary variable, equal to 1 if the loan is issued after the borrower's first SOX404(b) report. |
| POST2003 | Binary variable, equal to 1 if the loan is issued in 2003 or later. |
| ICW | Binary variable, equal to 1 if the borrower reported internal control weakness in its SOX 404(b) report at least once. |
| REM | Binary variable, indicating a higher likelihood of real earnings management. Expected levels of cash flow from operations (CFO), production costs (PROD), and discretionary expenses (DISX) are estimated cross-sectionally by fiscal year for each two-digit SIC industry (Roychowdhury 2006; Cohen et al. 2008). The residuals for each firm year, R_CFO, R_PROD, R_DISX, are taken to represent discretionary activities. Sample firms are ranked by R_CFO, R_PROD, and R_DISX within the industry for each year after SOX. If a firm is above median for all three measures of real earnings management in any year, the variable REM takes the value of 1, and 0 otherwise. |

| | |
|---|---|
| NAS_DROP | Binary variable, indicating a significant reduction in nonaudit services provided by the main auditor. The measure is taken in two steps. First, the change in nonaudit fees between the post- and pre-SOX years, ($NAS_{post}$ - $NAS_{pre}$), is ranked, where NAS is nonaudit fees deflated by the square root of the firm's total assets. Second, firms with this change measure below the sample median are assigned 1 for the variable NAS_DROP. |
| TAX_DROP | Binary variable, indicating a significant reduction in tax service provided by the main auditor. The computation follows the same procedure as NAS_DROP except that the basis is tax fees. |
| OTH_DROP | Binary variable, indicating a significant reduction in other services provided by the main auditor. The computation follows the same procedure as NAS_DROP except that the basis is other fees. |

***Control variables***

| | |
|---|---|
| PP | Binary variable, equal to 1 if the interest rate varies with firm performance. |
| MATURITY | Maturity in months reported in DealScan. |
| SECURED | Binary variable, equal to 1 if loan is secured or guaranteed by a third party. |
| FAC_AMT | Natural logarithm of the facility amount. |
| DEAL_AT | The package amount relative to the borrower's total assets. |
| GEN_RESTR | Numerical summary of general restrictions on the borrower, =DIV_RESTR+CF_SW+EQUI_SW+DEBT_SW+INS_SW+ASSET_SW, where DIV_RESTR, CF_SW, EQUI_SW, DEBT_SW, INS_SW, and ASSET_SW are all binary variables with an assigned value of 1 if the package carries dividend restrictions, cash flow sweep, equity sweep, debt sweep, insurance sweep, or asset sweep, respectively. |
| LENDER_NUM | The number of lenders participating in the loan facility. |
| RELATED | Binary variable, PP= 1 if the borrower engaged the same lead bank to issue a loan within the past five years. |
| RATING | Numerical transformation of the S&P Domestic Long-term Issuer Credit Rating, ranging from -2 to 20 with higher numerical values assigned to better ratings. E.g. RATING=20 for AAA, RATING=-2 for Default, and |

| | |
|---|---|
| | RATING=0 if the borrower does not have S&P rating. |
| VOLATILITY | Volatility of the borrower's publicly traded stocks, measured as the standard deviation of past 12 monthly returns. |
| SIZE_AT | Natural logarithm of total assets, LN(1+AT). |
| SIZE_MV | Natural logarithm of total market value, LN(MKVALT). When MKVALT is missing, SIZE_MV is set to be equal to SIZE_AT. |
| T_SPREAD | Daily treasury spread, measured as the difference between 20-year and 1-year treasury yields. |
| C_SPREAD | Monthly credit spread, measured as the difference between Moody's seasoned AAA and BAA corporate bond yields. |
| YEAR | Calendar year of the loan issuance. |

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