

## **Sarbanes-Oxley Act and Corporate Credit Spreads**

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## **Abstract**

In July 2002, Congress passed the Sarbanes-Oxley Act in part to resolve manager/shareholder conflicts of interest that have led to the collapse of corporate icons such as Enron. We conjecture the classical manager/bondholder agency problem of asset switching was as much to blame and the Act may have been able to mitigate these problems. We investigate whether the Act has affected credit spreads. We show that the Act indeed has caused one third of the 150 basis points increase in credit spreads preceding the passage of the Act to dissipate, implying that the Act succeeded in partially resolving underlying problems.

The Sarbanes-Oxley Act of 2002 has changed the landscape for corporate finance, accounting and governance. Motivated by failures of iconic corporate hallmarks like Enron and WorldCom, the Act was passed to prevent managerial misconduct and deceptive accounting in an effort to ensure incentives alignment between managers and shareholders. To that end, the Act instituted a host of new requirements, such as, more timely disclosure of insiders' transactions, top executives' certification of financial statements, greater penalties for managerial misconduct and stricter corporate governance. Whether the Act has been effective in mitigating the problems that it set out to resolve is the subject of a lively debate, discussion and research.

Most current analyses of the Act focus on stock market evidence to assess whether compliances with the Act have been value enhancing (Defond, Hann, and Hu, 2005; Kinney, Palmrose, and Scholz, 2004; Chhaochharia and Grinstein, 2007; Zhang, 2007).<sup>1</sup> While examining stock market reaction is informative, such an approach may not paint a complete picture because it assumes that underpinning agency conflicts that gave rise to high-profile corporate failures of 2001 – 2002 were exclusively limited to incentive misalignments between managers and investors. If the managerial misconducts and accounting deceptions were a reflection of a different agency conflict, per se that of managers and bondholders, then the evidence from corporate bond markets would be much more telling simply because the brunt of such an agency cost would be borne by creditors (Myers, 1977).

Indeed, we conjecture that the problems which lead to the aforementioned corporate failures mainly stem from the classical Myers' (1977) agency conflicts of overinvestment and asset substitution. These debacles trace back to managerial engagement in extremely risky projects and overexpansion in an attempt to meet unreasonable expectations. After the long

decade of the 1990s with unprecedented successful expansion and growth, managers of these corporate icons have set the expectations bar so high that they were almost surely bound to fail. But, since "... companies can't afford to disappoint Wall Street's earnings expectations, ... they are tempted to push their earnings, even to the point of deception ... (Levitt, 2002)." Of course, complexity and outright obscurity of accounting rules tremendously facilitated managers' implementation of these elaborate deceptions.

"... As the collapse of Enron has made painfully clear, the complexity of corporate accounting has grown exponentially... Add the fact that many companies disclose as little as possible, and the financial reports of an increasing number of companies have become impenetrable and confusing. ... The result has been a rise in so-called black-box accounting: financial statements, like Enron's, that are so obscure that their darkness survives the light of day. Even after disclosure, the numbers that some companies report are based on accounting methodologies so complex, involving such a high degree of guesswork, that it can't easily be determined precisely how they were arrived at. Hard to understand doesn't necessarily mean inaccurate or illegal, of course. ... The bottom line: There is a lot more open to interpretation when it comes to the bottom line."

"Deciphering the Black Box: Many Accounting Practices, Not just Enron's, Are Difficult to Penetrate." By Steve Liesman.  
Heard on the Street. *The Wall Street Journal*. January 23, 2002,

With such flexible "black-box" accounting, any reporting has become nothing more than a voluntary disclosure under complete managerial discretion. As Shin (2003) points out, with voluntary disclosure however, managers tend to only report successes and hide failures. Such a biased disclosure, rampant in almost all troubled companies of the time, is merely an attempt by managers to literally buy time while managers 'roll the dice' with shareholders' fortunes, hoping for unlikely favorable results that could meet unreasonably high expectations. While stockholders ultimately pay for excessive managerial risk takings, as Myers (1977) notes, the bondholders' reaction could be a great telling story and should work as an early warning. Since bondholders bear the cost of wealth transfer due to asset substitution, a priori, they will charge a

premium. As Leland (1998) shows, while agency cost as a percentage of firm value increases moderately with firm's riskiness, the bonds' credit spreads exponentially rise. Examining the impact of the Sarbanes-Oxley on credit spreads then provides us with an excellent setting to determine to what extent manager/bondholder agency problems affects corporate bonds and the firm value. If the corporate failures that gave rise to the Act enactment were indeed results of severe overinvestment and asset substitution problems, then prior to the passage of the Act, credit spread should have risen sharply. Moreover, if enactment of Sarbanes-Oxley has succeeded in bringing about managerial conservatism and commitment to more truthful disclosure, as Goto, Watanabe, and Xu (2008) predict, then the cost of borrowing should have fallen subsequent to passage of the Act.

Here, we examine how the Sarbanes-Oxley Act has changed the credit spreads. Similar to recent empirical studies of credit spreads (Collin-Dufresne, Goldstein, and Martin, 2001; Chen, Lesmond, and Wei, 2007; Guntay and Hackbarth, 2007; and Klock, Maxwell, Mansi, 2005), we examine the impact of the Act on credit spreads using panel regression analyses of credit spreads and changes in credit spreads. We adopt a panel regression framework, in which the dependent variable, the credit spread, is defined as the difference between the yield to maturity on a corporate bond and the interpolated constant maturity Treasury yields. This is regressed on dummy variables indicating whether the Act was in effect or not, controlling for structural variables including macroeconomic factors such as risk-free rates and term structure of interest rates, bond-level attributes such as maturity and liquidity, and firm-level characteristics such as equity volatility and debt to equity ratio.

Our choice of time dummies to capture the bondholder/firm agency cost can be subject to criticism. Clearly, a time dummy could merely capture the time varying risk premium that

has coincided with Sarbanes-Oxley act. Figure 1, however, show that when both corporate and municipal bond yields are compared for the period of 1998 – 2007, it is the corporate bond yield that changes drastically during the period of 2001 – 2003 when Enron went through its financial upheavals and Sarbanes-Oxley act was instituted. Since municipal bonds were not affected by the Act, this heuristic evidence suggests that indeed our time dummies can capture the underlying economic reasons for corporate credit spread variations. Indeed, to control for any time-varying risk premium effect, we use the municipal bonds' credit spread in our regressions.

Furthermore, to isolate the effect of bondholder's agency costs, we use a battery of additional control variables such as earnings forecasts' dispersion, accrual management, insider trading, and corporate governance to account for other forms of agency costs. This, of course, also enables us to investigate how different aspects of the Act exactly affected the credit spreads. According to Chhaochharia and Grinstein (2007), the Act's different sections have influenced managerial accountability, financial reporting, insiders trading and corporate governance. We use a host of variables to capture these different aspects of the Act. More specifically, we use non-discretionary current and total accruals, earnings forecast dispersion, Gomper's governance index, board independence, auditor's change, and Sarbanes-Oxley sections 302 and 404 compliance. We estimate our benchmark model with these variables included to see if the impact of our time dummies remains intact. We then estimate our panel model in subsamples of our data sorted based on the aforementioned variables. We then compare how the coefficient on Sarbanes-Oxley dummy differs across subsamples. The idea, of course, is that if these variables capture different aspects of the Act, then they should affect the manner with which the Act's effect, as measured by our time dummies, comes into play.<sup>2</sup>

We find that indeed the enactment of the Sarbanes-Oxley Act has led to a significant and meaningful decrease in credit spreads albeit smaller than the increase in spreads due to Enron's debacle. Passage of the Act has decreased the spreads by almost 50 basis points; roughly one half to a third of the rise in credit spreads between January 2000 and December 2002. This confirms our contention that bondholders/managers agency conflicts had a significant role in the events that led to the Sarbanes-Oxley Act. We further find that small, highly levered firms with low credit ratings and shorter term debt tended to have benefited most from the Act. Our analysis also shows that, in the order of their importance, various aspects of the Act—reporting quality, internal control mechanisms, insider trading restrictions, and corporate governance independence—impacted credit spreads significantly.

Our analysis contributes to the extant literature on the cost/benefit analysis of regulatory interventions in capital markets (e.g., Bushee and Leuz, 2005; Greenstone, Oyer, and, Vissing-Jorgensen, 2006). Our results show that since a new regulation impact on firm value may not be limited to a pure equity channel then any cost/benefit analysis should examine the impact on all securities, not just common stocks. More importantly, when effects of events leading to new regulation are more visible on other securities, then the cost/benefit analysis of new regulation could gain substantially from examining the changes in these other securities prices. Focusing only on equities provides only a partial picture. Several recent studies associate the passage of the Sarbanes-Oxley Act with negative cumulative abnormal returns and conclude that the Act has imposed net costs to firms in general (e.g., Engel, Hayes, Wang, 2007; Zhang, 2007). If events leading to the Sarbanes-Oxley Act have already increased credit risk premiums which then have been mitigated by the Act, then the Act has been successful. It is also conceivable that while stocks experience negative returns, these may be offset, at least partly, by gains among

other capital holders, i.e., bondholders. Thus, while the Act may prove unfriendly to shareholders, it may be value enhancing when aggregated across all capital holders. Moreover, the equity losses could have easily reflected the reversion of wealth transfers that would have occurred if the Act was not enacted. Our results indicate that the mere enactment of Sarbanes-Oxley Act has led to at least one-third reduction of previous sharply risen borrowing costs. Depending on debt maturity and credit rating, the wealth effect of such a dramatic change in spreads would have been as low as 1% and as high as 5% of bond values. Clearly, for certain firms this could have offset losses in equity value. Of course, even our results show that the Act was not able to mitigate the entire rise in spreads due to corporate failures of the early 2000s. Whether the implementation costs, negative externalities, or overall assessment of risk premiums have prevented credit spreads to come back to their pre-2000 levels remains a question for future research.

The remainder of this paper is organized as follows: In the following section, we elaborate on the role of Sarbanes-Oxley Act on credit spreads. In Section II, we describe the different data sources used and the sample used in this study. Section III describes our empirical methodology and the measurement of variables in our models. Section IV presents our empirical findings and section V presents results on how different aspects of the Act have affected the credit spreads. Section VI concludes the paper.

## **I. Sarbanes-Oxley Act and Credit Spreads**

The main objective of this paper is to analyze whether implementation of the Sarbanes-Oxley Act has played a role in corporate bond markets similar to the one it plays in equity markets. In particular, we first test whether the Sarbanes-Oxley as an event has changed credit

spreads. Moreover, we also investigate through what channels and via what aspects, as it pertains to corporate accounting, finance and governance, the Act has affected the credit spreads.

A comprehensive review of the Act is beyond the scope of this paper and, moreover, is available from other sources (e.g., Chhaochharia and Grinstein, 2007; Defond, Hann, and Hu, 2005; Kinney, Palmrose, and Scholz, 2004; Zhang, 2007). However, a brief review of the key provisions as they relate to our study is useful. A main focus of the Act is to enhance internal control and increase corporate accountability. This has arguably been the most controversial and expensive aspect of the Act. Section 404 requires that managers document and evaluate the effectiveness of the firm's internal controls with verification by the auditor. In theory this should identify potential weaknesses in the firm's accounting system and limit potential for fraud. Executive responsibility is also enhanced through several provisions in the Act. Among other things, the Act requires that the CEO and CFO certify annual and quarterly reports to the SEC, prohibits personal loans to executives, stipulates a code of ethics for senior financial officers, and increases penalties for corporate fraud. The Act also enhances governance by mandating an independent audit committee and disclosure of an audit committee financial expert. Independent of the Act, the NYSE almost contemporaneously imposed new governance requirements ostensibly to increase board independence and monitoring by: requiring a majority of independent directors, more strictly defining what constitutes an independent director, requiring only independent directors to comprise the compensation, nominating, and audit committees, and requiring that all audit committee members have accounting/financial expertise. Also, relevant is the impact of the Act on auditor independence. Auditor independence and responsibility is achieved through a new oversight body that governs audit practice, restricts non-audit services to the firm by the auditor, and rotation of audit partners on a periodic basis.

The above provisions in theory should add value to the firm. However, as noted by extant literature, the Act imposes out of pocket costs (e.g., implementing new accounting systems and hiring additional personnel to implement internal controls) as well as opportunity costs (e.g., reduced risk-taking by top management because of fear of litigation) and ultimately whether the Act is successful or not depends on the trade-off between the perceived benefits and costs of the regulation. The studies to date using stock returns attempt to address this by evaluating overall stock market performance and also by conditioning the sample based on their compliance with respect to the various provisions of the Act. Chhaochharia and Grinstein (2007) document that less compliant firms earn positive abnormal returns (benefit) compared to more compliant firms. Specifically, Chhaochharia and Grinstein (2007) find firms that restated their financial restatements, had insiders that engaged in timing, had related party transactions, and did not comply with board independence realized greater returns than their peers over the long event window that comprised the Act legislative process. Zhang (2007) finds that overall the Act imposes statistically significant net costs as revealed by the negative abnormal returns over the Act rule making period. Further, he finds that the abnormal returns decrease with the purchase of non-audit services, weak shareholder rights, with more business lines and more incentive pay. These results are consistent with the Act imposing net costs to these firms.

As argued earlier, a complete picture of the wealth effect of the Act on firm value requires that we evaluate its impact on all capital holders, not just equityholders. Thus, even though some researchers conclude that the Act is wealth decreasing for shareholders, it may be wealth enhancing for bondholders. It is easy to argue that the Act is likely to have a beneficial impact on bondholders and at worst a benign impact. Given that financial disclosures are significant determinants of bond yields (e.g., Botosan, 1997; Bhojraj and Sengupta, 2003), we

would expect the certification, auditor independence and auditor quality elements of the Act to result in lower credit spreads. The improved governance elements such as audit committee and overall board independence, and greater penalties for corporate fraud also should result in lower yields. To the extent that these elements reduce opportunistic behavior on the part of managers, bondholders should benefit from it as much as shareholders. Finally, to the extent that the Act encourages more conservative behavior on the part of top management, i.e., lower risk investments, we should observe a decrease in credit spreads. While such risk-shifting behavior may be detrimental to shareholders, bondholders may benefit from it. In fact, in this scenario, the Act may inadvertently serve to transfer wealth from shareholders to senior security holders and management. Overall, it would appear that bond holders are likely to come out ahead with the Act. The argument is especially compelling given that common stockholders, as residual claimants, are likely to bear most of the direct and indirect costs of implementing the Act.

Beyond the overall effects, as with the stock studies, we will be evaluating the impact of the Act on credit spreads for various categories of firms. We hypothesize that the risk-shifting, audit quality, disclosure, governance, and fraud deterrence effects of the Act will be more beneficial for lower rated bonds and high leverage firms. Higher rated bonds and low leverage firms are presumed to be more transparent and subject to less agency problems; consequently, the benefits of the Act on bondholders is likely to be much smaller. Similarly, we anticipate that smaller firms and firms with high analyst earnings forecast dispersion that are presumed to be less transparent will benefit most from the improved disclosure the Act is likely to yield resulting in a relatively greater decline in spreads for these firms. We also anticipate that firms with the greatest propensity for management opportunistic behavior will likely exhibit the greatest decline in spreads if the Act can curb such behavior. Our proxy for managerial opportunistic behavior is

change in management stock ownership and change in stock option compensation. We also anticipate that the gains to bondholders will be higher for weaker governance firms as measured by the G-index of shareholder rights (Gompers, Ishii, and Metrick, 2003). We use compliance with section 302 and auditor change as proxies for weak internal controls. To the extent that internal controls are valuable to bondholders, we expect a larger drop in spreads for firms that are most likely to experience significant improvements in internal controls. We also expect bigger declines in spreads for high growth (M/B) firms. To the extent that the Act induces managers to become more conservative we would expect bondholders to benefit from such risk-shifting. We expect this potential to be strongest in high growth firms and firms and high R&D firms.

## **II. Data Sources and Sample Construction**

We start with all bonds issued by US firms that can be identified in the Fixed Income Securities Database (FISD), as provided via WRDS, for the period of 1994 to 2006 to construct our sample of the potential corporate bonds. Our main focus is on bond transaction as reported by FISD.<sup>3</sup> As is the convention of previous papers, we ensure that payout characteristics of bonds in our sample are similar; hence we exclude all bonds with option-like features such as callability, putability, convertibility, and sinking fund provisions convertible. Additionally, we exclude zero-coupon and floating-rate bonds. We also delete the bonds without ratings by either Standard & Poors (S&P) or Moody's. Similar to previous bond pricing studies [see e.g. Collin-Dufresne, Goldstein, and Martin (2001) or Eom, Helwege, and Huang (2004)], we exclude financial companies. This leaves us with 1,560,430 transactions.

Following extant literature [Collin-Dufresne, Goldstein, and Martin (2001), Yu (2005),

Chen, Lesmond, and Wei (2007), and Guntay and Hackbarth (2007)], we use a number of independent variables as typical control determinants of credit spreads which include transaction-related variables (i.e. trading liquidity), macroeconomic factors (i.e., Treasury term structure and Euro-dollar rate), stock-related attributes (i.e., stock return and market return volatilities), and firm-level variables based on accounting characteristics (i.e., leverage, asset liquidity, business risk). Our transaction data provide us with necessary information to construct transaction related determinants. To obtain commensurate macroeconomic conditions at the time of transaction, we merge our initial sample with Treasury term structure information from Board of Governors of Federal Reserve. Since some bonds have multiple transactions per month, we then find the average characteristic of each transaction per firm per month, leaving us with 407,778 firm-month transactional observations. In addition to macroeconomic conditions, we also need stock-related variables. As such, we merge the resulting sample with data from monthly CRSP and OptionMetrics. We use monthly CRSP to obtain stock prices, stock return volatility and market volatility. We use OptionMetrics to obtain probability of return jump implied by SP500 Index options. We only keep firms that have valid transaction month-end's stock price and rolling two-year return standard deviation. The resulting sample contains 403,150 firm-month observations. To construct our firm-level determinants, we use COMPUSTAT annual database to obtain accounting information about the firm such as leverage, interest coverage, quick ratio, profitability, earnings volatility, and earnings management (accruals). We require our firms to have valid accounting measures in the year prior to transaction. Some of accounting characteristics are, however, multi-year averages. In general, for a firm to be considered, accounting information must be available for three years prior to transactions. To avoid biases due to outliers, all of our accounting characteristics are winsorized at the 2% level

(i.e. observations are trimmed at the 1% level at both tails). After merging with COMPUSTAT, we have a final sample of 77,515 firm-month observations.

We also use additional databases to amend our final sample with information pertaining to different aspects of the Sarbanes-Oxley Act such as earning management (accruals), earning forecast dispersion, insider trading, governance, auditor change, internal control, and disclosure control. We follow methodology of Teoh, Welch, Wong (1998) to define discretionary and non-discretionary current and total accruals. Based on the ranking of the firm for its usage of discretionary accruals, we can then define firms as aggressive, moderate and conservative earning managers. We use I/B/E/S to construct the earning dispersion. Following Guntay and Hackbarth (2007), we construct quarterly forecast dispersions. We then use earning forecasts that precedes the earnings announcement date by no less than 30 days and no more than 120 days to construct the forecast dispersion. Following Diether et al. (2002) and Guntay and Hackbarth (2007), we require at least two forecasts to calculate forecast dispersion, and hence we drop firm-quarter observations whenever the issuer is covered by less than two analysts in a quarter. Despite these filters, we are able to find valid earnings dispersion for all firms in our final sample. We also use ExecuComp database to construct insider holding and trading variables. Firm whose managers' have reduced stock and option holdings are considered insider sellers. We use all shares owned by all executives and officers (with and with option shares) to construct annual insider ownership measures. We then use annual changes of insider ownership to find out who are the insider sellers. After all filtering, we can only find valid insider trading information for 66,583 firm-month observations.

Following Chhaochharia and Grinstein (2007), we use Gomper's governance index, courtesy of Professor Metrick's homepage, for our governance measures. After merging the

governance data with our final sample, we are only able to find valid Gompers' index for 26,277 of the firm-month observations. Additionally, we amend our governance data by IRRC data to obtain more detailed information about number of board members, independent directors, and auditor directors. We use Audit Analytics databases to obtain information pertaining auditor change, internal control measures, and disclosure measures. Audit Analytics reports auditors' changes (voluntary and involuntary) since 2000. If the auditors' change is not due to auditor's own resignation, we consider the firm as the one that has changed auditors. We are able to find valid data for 52,754 of our final sample. Audit Analytics also provides information on how well firms conform to Sections 404 and 302 of Sarbanes-Oxley Act. The Section 404 pertains to managerial assessments of internal control measures. We consider a firm ineffective if Audit Analytics alphanumeric summary variable on efficacy of internal control is negative. Audit Analytics only reports this variable since 2004. As such, we can only find valid observation for 14,856 of our final firm-month observations. Section 302 pertains to managerial certification of the accounting reports. If Audit Analytics alphanumeric summary variable on managerial opinion on efficacy is positive, we consider the disclosure sufficient. Audit Analytics report this variable since 2002. Hence, we are able to find valid data for 38,129 our final sample.

### III. Empirical Methodology

The empirical tests conducted in this paper address two main questions: First, Is there a negative relation between credit spreads and enactment of Sarbanes-Oxley Act? Second, how does the Sarbanes-Oxley Act affect credit spreads? As noted before, to answer the aforementioned questions, we set out to estimate a series of panel regressions as follows:

$$YLDSPRD_{it} = \alpha + \beta_{SOX} POSTSOX_{it} + \Phi_{i,t} \mathbf{X}_{it} + \varepsilon_{i,t} \quad (1)$$

$$YLDSPRD_{it} = \alpha + \beta_{ENRON} PREENRON_{it} + \Phi_{i,t} \mathbf{X}_{it} + \varepsilon_{i,t} \quad (2)$$

where the dependent variable ( $YLDSPRD_{it}$ ) is the credit spread on the debt issue of firm  $i$  at time  $t$ ;  $POSTSOX$  and  $PREENRON$  are dummy variables which denotes whether the transaction for firm  $i$  at time  $t$  happened, respectively, after July 2002 when Sarbanes-Oxley Act was enacted or before December 2001 when Enron filed for protection under Chapter 11 of bankruptcy code.  $\mathbf{X}_{it}$  is a vector of control variables for firm  $i$  at time  $t$ . The explanatory variables in  $\mathbf{X}_{it}$  attempt to control for macroeconomic conditions, bond-level characteristics and firm-level attributes. We shall discuss these control variables at length in the following sections.

Since collapse of Enron has been the instigator to a series of events that have eventually led to Sarbanes-Oxley Act, we use a series of timeline dummies to further tease out effects of each event and the eventual enactment of the Act on credit spreads. Our model with these timeline dummies is as follows:

$$YLDSPRD_{it} = \alpha + \sum_{i=0}^9 \beta_i TIMELINE_i + \Phi_{i,t} \mathbf{X}_{it} + \varepsilon_{i,t} \quad (3)$$

$$YLDSPRD_{it} = \alpha + \beta_{SOX} POSTSOX + \sum_{i=1}^8 \beta_i TIMELINE_i + \Phi_{i,t} \mathbf{X}_{it} + \varepsilon_{i,t} \quad (4)$$

where  $TIMELINE_0$  denotes the period prior to Jan. 2000 before the first false Enron annual reports were signed and filed;  $TIMELINE_1$  denotes the period of Jan. 2000 to Mar. 2000 when first false Enron annual reports were signed and filed;  $TIMELINE_2$  denotes the period prior of Apr. 2000 to Oct. 2000 before then Enron's CEO, Kenneth Lay sold one million of his shares;  $TIMELINE_3$  denotes the period of Nov. 2000 to Feb. 2001 just before FORTUNE magazine features Enron on its front cover as "too expensive to buy";  $TIMELINE_4$  denotes the period of

Mar. 2001 to Jul. 2001 just before Enron's accountant Sharon Walkings raises questions about firm's accounting practices in an internal memo; *TIMELINE*<sub>5</sub> denotes the period of Aug. 2001 to Dec. 2001 just before Enron's files its restated financial reports and subsequently files for Chapter 11 bankruptcy protection; *TIMELINE*<sub>6</sub> denotes the period of Jan. 2002 to Feb. 2002 just before the Department of Justice and the Congress initiate their own investigations of Enron; *TIMELINE*<sub>7</sub> denotes the period of Mar. 2002 to Jul. 2002 just before Sarbanes-Oxley Act becomes enacted; *TIMELINE*<sub>8</sub> denotes the period of Aug. 2002 to Dec. 2002 the grace period subsequent to Sarbanes-Oxley Act becomes enacted; and lastly *TIMELINE*<sub>9</sub> denotes the period of Jan. 2003 to Dec. 2006 when Sarbanes-Oxley Act has been in effect.

Our approach is different from Chhaochharia and Grinstein (2007) in that we do not perform an event study to examine the impact of the Sarbanes-Oxley act's effects on corporate bonds. There are two main reasons for our choice of methodology. First, for an event study to be accurate, we need to have daily price information on subject bonds for an event window and a control window (see, e.g., Bessembinder, Kahle, Maxwell, and Xu (2008)). As noted by Sarig and Warga (1989), corporate bond market, particularly for off-the-run bonds, is illiquid and price data is sparse. More importantly though, we are interested to see if Sarbanes-Oxley Act has resolved the agency problems that have lead to the corporate failures of 2001-2002. To that end, it is reasonable to construct a sample across large number of firms which spans long period before and after the enactment of the Act and then run our experiment to see if the Act has fundamentally changed the credit spreads.

#### **A. Dependent Variable**

Empirically, the credit spread is often computed as the difference between the corporate bond yield and the fitted yield on an otherwise equivalent Treasury bond. Following Duffee (1998) Collin-Dufresne, Goldstein, and Martin(2001), and Guntay and Hackbarth (2007), we use a linear interpolation scheme for the Treasury yield rates reported by the Federal Reserve Board of Governors (H.15 release of the Federal Reserve System) for maturities 1, 2, 3, 5, 7, 10, 20, and 30 years to approximate the entire yield curve. Since only yields on the aforementioned bonds are available from the Fed, for the maturity commensurate with each of the corporate bonds in our sample, we find via interpolation what the corresponding Treasury yield would be. We then define the credit spread (*YLDSPRD*) as the difference between the reported yield-to-maturity of the corporate bond and the corresponding Treasury yield.<sup>4</sup>

## **B. Control Variables**

We include a large number of standard control variables to ensure that known determinants of credit spreads do not confound the impact of our test variables. The choice of credit spread determinants is largely based on Elton et al. (2001), Collin-Dufresne, Goldstein and Martin (2001) Campbell and Taksler (2003), Chen, Lesmond, and Wei (2007), and Guntay and Hackbarth (2007). Theoretically, firms with a higher default probability and/or lower expected recovery rates have higher credit spreads. We thus use various macroeconomic, bond-specific and firm-specific proxies to control for common default and recovery risk factors. Table I provides a list of all variables with brief descriptions. The main control variables are defined as follows.

1. *Credit rating*. As in Collin-Dufresne, Goldstein, and Martin (2001) and Chen, Lesmond, and Wei (2007), I use this numerical rating, CRD, as a determinant of credit spreads. I

follow the convention of COMPUSTAT to assign numerical values for different ratings. So, for instance, a value 2 denotes AAA rating whereas a value 4 denotes A rating. I use the average of Moody's rating and Standard and Poor's rating unless one is not available, in which case is the available rating is used.

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3. *Risk-free rate.* In structural models of credit risk, a rise in the spot rate effectively reduces the likelihood of default (Leland 1994 and Longstaff and Schwartz 1995). Previous

empirical studies (Duffee 1998 and Chen, Lesmond, and Wei, 2007) indicate that credit spreads tend to fall when Treasury yields rise. As such, I use the 1-year Treasury bill yield, LEVEL, as a determinant of credit spreads.

4. *Treasury term structure.* The slope of the term structure of the Treasury interest rates seems to have explanatory power in predicting both interest rate movements and macroeconomic growth (Litterman and Scheinkman 1991). In a structural model, Ju and Ou-Yang (2006) show that as the yield curve becomes steeper, the credit spreads widens. I thus use the difference between Treasury 10-year and 2-year constant maturity bonds' yields, SLOPE, as a determinant of credit spreads.
5. *Time-varying risk premium.* To control for time varying nature of the credit spreads, we use the after-tax municipal credit spread, MUNI, which Sarbanes-Oxley has not affected. We define this credit spread as the municipal bond yield, as reported by the Board Governors of the Federal Reserve, divided by the federal marginal tax rate, as reported by NBER, minus the corresponding Treasury yield.
6. *Treasury Liquidity.* As in Chen, Lesmond, and Wei (2007), I use the spread between 3-month Euro-dollar rate and the 3-month Treasury bill yield, EURO, to capture the Treasury bonds' "crowding out" adverse liquidity effect.
7. *Years-to-Maturity.* Merton (1974) shows that credit spreads and maturity are nonlinearly related and this relationship is a function of credit quality. Helwege and Turner (1999), however, find that, on average, the term structure of credit spreads is upward-sloping. The log maturity of a bond, LogMAT, is included to describe the shape of the credit spread term structure.

8. *Age*. Bond age has been shown to relate positively to credit spreads (see Warga 1992, Perraudin and Taylor 2004, and Yu 2005). I include the log of bond age, LogAGE, and define it as the log of the difference (in years) between the settlement date and the issuing date.
9. *Volatility*. Structural models also predict that the volatility of firm value is positively related to credit spreads (see, Leland 1994, Longstaff and Schwartz 1995, and Acharya and Carpenter 2002). Since firm value and its volatility are unobservable, as suggested by Campbell and Taksler (2003), I choose equity volatility, RETVOL, instead. Specifically, I define RETVOL as the annualized standard deviation of the firm's monthly stock returns over the preceding 24 months.
10. *Liquidity*. Recent work indicates that liquidity is a priced risk in corporate bonds' credit spreads (Chen, Lesmond, and Wei 2007 and Covitz and Downing 2007). I use Guntay and Hackbarth's (2007) measure of liquidity as a bond-level proxy for liquidity. I count the number of months a bond has a market quote during the past 12 months. I define liquidity, LIQ, as this count divided by 12 to standardize this measure to the unit interval.

The following variables further control for credit spread risk factors:

11. *Total debt to capital*. Default risk, or the ability to meet pay outstanding debt, is directly related to amount of debt outstanding. In fact, the ratio of debt to value plays a pivotal role in structural models. As in Chen, Lesmond, and Wei (2007), I use the ratio of the book value of total liabilities to market value of equity, TD2Cap.
12. *Earning volatility*. As noted previously, the unobservable asset volatility matters greatly for credit spreads. Campbell and Shiller (1988a, 1988b) and Campbell (1991) show that

expected equity return represents shocks to the dividend stream as well as shocks to discount rates. I choose historical earnings volatility, *VOLEARN*, to capture expected riskiness of the future earnings stream. Specifically, I use the 5-year standard deviation of ratio of earnings before interest, taxes, depreciation, and amortization (EBITDA) to assets.

13. *Profitability*. Firms with a higher operational income can meet their debt service easier and hence are less likely to default in the near future. As in Guntay and Hackbarth (2007), I use the ratio of earnings before tax and depreciation divided by book value of total assets.

14. *Quick ratio*. In short term, the inability to meet debt obligations can be mitigated by liquid assets. I use the quick ratio (i.e., the ratio of cash and receivables to total assets) as a measure of asset liquidity.

15. *Interest coverage*. The ability to meet periodic debt service is the first test in determining whether a borrower is at default. Following Chen, Lesmond, and Wei (2007), I measure the incremental influence of the pre-tax coverage using four censored variables constructed per the procedure outlined in Blume, Lim, and MacKinlay (1998).

#### **IV. Sarbanes-Oxley and Credit Spreads**

##### **A. Summary Statistics and Univariate Results**

As noted in Table I, our sample contains quite a heterogeneous set of firms and corporate bonds. Credit spreads and the determinants, however, fall into reasonable parameter ranges similar to previous studies [see, e.g., Chen, Lesmond, Wei (2007) Guntay and Hackbarth (2007)]. The credit spreads in our sample ranges from a minimum of almost zero to a maximum

of 20% but the average is about 2.2%. Our firms have an average A-rated credit rating. Average bond has an age of 3.5 years and has 11.5 years to maturity. Our bonds trade on average one month a year with some trading every month. The average firm has 11.628 billion worth of assets. The average firm has 36% leverage, 12.9% profitability (EBITDA-to-Assets), 3.6% annual variability of profitability, and relatively sizable interest coverage ratio of 7.4.

We compare credit spreads and main determinants of the spreads among three periods: pre-Enron, Jan. 94 – Dec. 2001, Interim, Jan. 2002 – Jul. 2002, and post-SOX, Aug. 2002 – Dec. 2006. As is reported in Table II, credit spreads increased on average by almost 100 basis points after Enron's bankruptcy but only decreased by an average of almost 45 basis points after Sarbanes-Oxley Act. This indicates that indeed Sarbanes-Oxley Act has been successful in removing some of the sources of uncertainty. However, the market has viewed some of the risk which has given rise to Enron's fall as permanent.

Table III reports the credit spreads across different industries, credit rating, maturity classes, size categories and leverage levels. The overall pattern is that credit spreads increased after Enron filed for bankruptcy protection but the spreads decreased after Sarbanes-Oxley Act was passed. Interestingly, not all firms faced the same changes in credit spreads before Enron's bankruptcy and after Sarbanes-Oxley Act. For instance, firms in construction, steel, and retail industries faced a decrease in spreads larger in magnitude after Sarbanes-Oxley Act than increase in spreads subsequent to Enron's bankruptcy. The same is also true for all firms with BBB or better credit rating. The changes in credit spreads during the pre-Enron and post-SOX periods are almost equal for low leverage firms.

Table I, however, shows that other determinants of credit spreads also have changed significantly post-SOX compare to pre-Enron period. Bonds have become more liquid, shorter in

maturity and younger in age. Interest rates have dropped but the yield curve has become steeper. Firms remain almost same size, with almost same leverage but moderately lower profitability and significantly more interest coverage. These results, of course, underlie the importance of a multivariate analysis of the impact of Sarbanes-Oxley Act. In the section, we discuss the multivariate results of our panel regressions.

## **B. Multivariate Results**

Table IV reports the results of panel regressions estimation of models (1) – (4). We present two separate regressions for each of the model estimates. The first uses only the bond-level, macroeconomic conditions and stock-related attributes, while the second additionally incorporates the firm-level characteristics. Our panel regressions use heteroscedasticity, autocorrelation robust standard errors corrected for correlation across multiple observations of a given firm (i.e. firm-level clustering). The results are presented in Table III.

The most telling finding is the consistent significance of the POSTSOX and PREENRON variables regardless of the model specification. Coefficients on POSTSOX and PREENRON are negatively and positively related to the yield spread in all scenarios, even after we control for extensive bond-specific, firm-specific, and macroeconomic variables. These coefficients are highly significant (at 1%) in every scenario, supporting the hypothesis that Sarbanes-Oxley Act has permanently affected the credit spreads.

Our models (1) and (2) regressions have adjusted R-squares of 56.34% and 56.07%. This suggests that overall specification has a reasonable power in explaining the variation of credit spreads in the sample. The effects of control variables are as expected. As is shown in previous studies [Yu (2005), Chen, Lesmond, and Wei (2007), and Guntay and Hackbarth (2007)], credit

spreads increase with bond age, bond maturity, and firm's return volatility but decrease with credit quality, interest rates, Treasury spread, and bond liquidity. As far as firm-level characteristics go, our results are also consistent with extant evidence. More total and long-term leverage lead to larger spread while better asset liquidity narrows spreads. Not all firm-level characteristics have significant impact on spreads, leading to only marginal improvement in models' explanatory powers to 58.44% and 58.25% adjusted R-squares for models (1) and (2) when additional firm-level characteristic are added.

Enactment of Sarbanes-Oxley has reduced credit spreads by 43 basis points, while Enron's bankruptcy has widened spreads by 28 basis spreads. The results for coefficient estimates of models (3) and (4) indicate that while the spreads have started to increase ever since late 2000 when Enron files the first false financial reports, the increase in spreads starts to decelerate around March 2001 when Fortune magazine's cover page features Enron as too expensive to buy. Controlling for the time series patterns of changes in credit spreads over the two years preceding enactment of Sarbanes-Oxley, the permanent impact of the Act seems to in the order magnitude of a 43 basis points reduction in credit spreads, almost half of the previous two year's 100 basis points increase in the spreads.

### **C. Results Across Time**

Maxwell and Bessembinder (2008) show that since 2002 when TRACE system become operational, the corporate bonds' liquidity and hence their credit spreads have been dramatically changed. They note that increased transparency due to mandatory reporting of trades and quotes through TRCAE system by all corporate bond dealers is perhaps the main reason. Since starting date for TRACE also coincides with the beginning of events that have lead to the enactment of

Sarbanes-Oxley, we re-estimate our benchmark model using a series of subsamples which start from January 2002. Table VI reports the results of our sub-sample estimation and confirms our earlier findings. Thus, while institution of TRCAE may have changed the liquidity and credit spreads, our contention that the Sarbanes-Oxley has affected the credit spreads remains intact.

#### **D. Results Across Subsamples**

To further address the issue of non-linearities in the credit spread due to credit rating, maturity, firm size, and leverage, we follow the convention of the literature and re-estimate models (1) and (2) for sub-samples based on different hyperparametric attributes. As in Collin-Dufresne, Goldstein and Martin (2001) Campbell and Taksler (2003), Chen, Lesmond, and Wei (2007), Yu (2005), and Guntay and Hackbarth (2007), we estimate our regression models separately for firms sorted on credit rating, bond maturity, firm size and leverage.

Table VII shows results of panel regression in subsamples grouped based on credit rating, debt maturity, firm size and leverage. The impact of the enactment of Sarbanes-Oxley Act, as noted by the POSTSOX coefficient, is gets more pronounced as credit rating, maturity, and firm size declines. Low grade firms (BB or lower rated) gain almost 76 basis points in credit spreads from Sarbanes-Oxley as opposed to high grade firms which only benefited only 26 basis points in spreads. Firms with shorter maturity debt (12 years and less) have gained almost 43 basis points in spreads while longer term debt holders gained 16 basis points. Small firms' spreads dropped by 71 basis points after Sarbanes-Oxley as opposed to large firms which only benefited by 11 basis points in spreads. While high leverage firms have the largest drop in spreads subsequent to enactment of the Act, the mid-cap firms have the smallest drop in spreads. Our results are further confirmed by the impact of Enron's bankruptcy, as noted by the PREENRON

coefficient, on spread across different subsamples. Low rated, small firms with short-term debt and high leverage faced largest increase in their credit spreads. More interestingly, these increases in spreads are almost equal to the drop in spreads following enactment of Sarbanes-Oxley. Low rated firms' spreads increased by 56 basis points, while firms with short-term maturity faced a 35 basis points increase in spreads. Small firms' spreads rose by 76 basis points while high leverage firms spreads increased by 30 basis points. These results have two important implications: Enron's bankruptcy increased credit risk across firms but more so for small, low-rated, high leverage firms with short-term debt. However, most of this risk was mitigated by the enactment of Sarbanes-Oxley Act. The Act, hence, seem to have been able to resolve main sources of uncertainty that arose from early 2000s corporate collapses.

#### **E. Robustness Regressions**

In this section, we estimate our models using more restrictive econometric specifications to verify the significance of our baseline results. We estimate three different types of models [i.e. pooled OLS with fixed effects, OLS with Newey-West standard errors, and pure cross-sectional regression] to ensure that our results are not driven by spurious correlations in the cross-section and the time-series of credit spreads. Table 7 reports the results. First, we verify if our baseline results regarding the effect of Sarbanes-Oxley Act on credit spreads are not merely due to spurious cross-sectional correlations between credit spreads and other bond and firm characteristics. To that end, we add industry-level, firm-level, and bond-level dummies to baseline specifications. The inclusion of these fixed effects does not change the statistical significance of the coefficients on POSTSOX and PREENRON. By adding industry, firm, and bond level fixed effects, our baseline adjusted R-square increases to 59.85%, 72.88%, 75.97%,

respectively. With bond level fixed effects, the bond-level control variables such as age, maturity and liquidity become, as expected, statistically less significant.

Next, we control for time-series correlation in residuals using Newey-West standard errors. Both POSTSOX and PREENRON remain significant at better than 1%. The coefficient estimates for all other regressors are also very similar to the ones in the baseline model. Lastly, we verify our baseline results by exploiting cross-sectional variations using pure cross-sectional regressions based on firm-based time-series averages of our variables. Again, our results with respect to the relation between Sarbanes-Oxley and credit spreads remain significant.

In sum, our baseline results remain intact under various econometric specifications. Firm, industry and bond level fixed effects do not subsume the economic and statistical significance of Sarbanes-Oxley Act's effects. Coefficient estimates for both POSTSOX and PREENRON remain significant, with their values being roughly in line with the baseline results. We thus conclude Sarbanes-Oxley Act's impact on credit spreads was economically meaningful and statistically significant.

## **V. Why Sarbanes-Oxley Affect Credit Spreads?**

As noted earlier, we contend that the Sarbanes-Oxley act alleviated the bondholder/firm agency problems that underpin the financial debacles of early 2000s. However, as noted by other studies, the act may have contributed to resolution of other problems as well (see, Chhaochharia and Grinstein (2007) for detail discussions). We thus need to isolate the effect of bondholder/firm agency cost as much as possible. To this end, we use a number of variables which has been shown to proxy for information asymmetries and equity agency costs. Following Chhaochharia and Grinstein (2007), we focus on proxies of information asymmetry and equity

agency costs that relate closely the aspects of the Sarbanes-Oxley's Act which have influenced the stock market reactions. Per se, we use 1) analysts' forecasts' errors' dispersion as a measure of information asymmetry and imperfect information (Guntay and Hackbarth (2007), Yu (2005)), 2) discretionary accruals management as another measure of information asymmetry and manager/shareholder agency costs (Teoh, et al (1997)), 3) the annual percentage change of CEO shareholdings as a measure of insider trading and the equity agency costs (Habib and Ljungqvist (2005)), 4) the percentage of independent and auditor board members as a agency costs associated with corporate governance (Klock, Mansi, and Maxwell (2005)).

Table IX shows the even after controlling for known proxies of information asymmetry and equity agency costs, the Sarbanes-Oxley act has lead to a 48 basis point decline (statistically significant at 1% level) in credit spreads. Enron's bankruptcy premium is 37 basis points and statistically significant at 1% level. Even after controlling for detail time variations in the credit spreads, the Act has lead to a permanent decline of at least 53 basis points in credit spreads. Our results also indicate that of all proxies for information asymmetry and equity agency costs only earning forecasts dispersion, total discretionary accrual management, insider trading, and auditor's change affect credit spreads.

Since aforementioned proxies of information asymmetry and agency costs can influence the manner in which determinants of credit spreads manifest their impacts, we follow the tradition of the literature and further study their impact on sub-samples of the data which are separated along the dimensions of the degree of information asymmetry and equity agency cost. For the sake of robustness, we also expand our variable set. We use two measures for insider trading, changes in stock shares and changes in stock and option shares. We use three measures of corporate governance, the Gomper's index, the board independence, and the auditor board

members. For internal control, we use change of auditor as well as indicator variables for conforming to sections 404 and 302 of the Sarbanes-Oxley Act.

Table X shows the results for accruals interaction with the impact of Sarbanes-Oxley Act on credit spreads. Results from categorization of firms based on total accruals suggest that Enron's bankruptcy affected mostly the aggressive income smoothers while Sarbanes-Oxley affected mostly the conservative income smoothers. While Enron's bankruptcy premium is almost 30 basis points for aggressive income smoother, it is statistically insignificant for conservative firms. The Act, however, seems to have had lead to any significant decrease in spread of aggressive firms while it has lead to 57 basis point decrease in spreads of conservative firms. Results from categorization based on current accruals are a bit more complex. Only aggressive and conservative income smoothers have been affected by both Enron's bankruptcy and passage of Sarbanes-Oxley Act. Firms with moderate current income smoothing seem not have been affected by neither. Moreover, conservative current income smoothers seem to have been affected more by both events. Enron's premium, though, is smaller than decrease due to Sarbanes-Oxley Act. These results suggests that markets perhaps perceive total income smoothing as more telling sign of fundamental misalignment of incentives between bondholders and the firm. Firms with more propensities to engage in aggressive earnings management then have been penalized in a permanent basis and passage of Sarbanes-Oxley does not seem to have mitigated such fundamental problems. Firms that show the discipline to shy away from earnings management, however, have gained most by the Act.

As is shown in Table X, the impact of both Enron's bankruptcy and Sarbanes-Oxley Act has been more pronounced for high dispersion firms. Guntay and Hackbarth (2007) show that analyst forecast dispersion, as a measure of information asymmetry, affects credit spreads

adversely. The firms with highest information asymmetry then should be affected by an increase in and the subsequent resolution of agency related uncertainty. The high dispersion firms faced a drop of 35 basis points in their credit spreads after enactment of Sarbanes-Oxley Act as opposed to a 30 basis point drop for low dispersion firms.

Table X also reports how corporate governance affects the interaction between the impact of both Enron's bankruptcy and Sarbanes-Oxley Act and credit spreads. Klock, Maxwell, Mansi (2005) and Cremers, Nair, and Wei (2007) show that firms with strong shareholder rights suffer from larger spreads. This, of course, stems from the fundamental divergence of bondholders' and shareholders' interests. Following Chhaochharia and Grinstein (2007) and using Gomper's governance index, we separate firms into democratic, dictatorial and intermediate firms. Results indicate that democratic firms faced a drop of 50 basis points in their credit spreads after enactment of Sarbanes-Oxley Act as opposed to a 32 basis points decrease for dictatorial firms.

Table XII reports how insider trading affects the interaction between the impact of both Enron's bankruptcy and Sarbanes-Oxley Act and credit spreads. Klock, Maxwell, Mansi (2005) find that greater CEO ownership decreases spreads. We use ExecuComp data on executive ownership to find out whether during a year, insiders have sold shares. We separate firms into three groups, insider buyers whose shares have increased, insider sellers whose shares have decreased by more than 50% from previous year, and undetermined insiders. Results indicate that only for insider seller firms, the spread have reacted significantly to Enron's bankruptcy and Sarbanes-Oxley Act. The insider seller firms' spreads dropped by 71 basis points in response to the enactment of Sarbanes-Oxley Act, while they carried a 64 basis point Enron premium.

Lastly, our results from table XII indicate that firms that did not changed auditors have gained statistically significantly from passage of the Act to tone of 56 basis points. Firms that

have conformed to the Act subsection 302 have also gained more significantly. Such firms have seen a 165 basis points drop in their spreads while other firms only gain a mere 45 basis points decrease in their spreads, almost half of the average firm's savings.

In short, our results show that all major aspects of the Act, quality of reporting, insider trading transparency, independence of governance, auditors' stability, and internal control mechanism, have significantly affected the credit spreads. Perhaps in the order of importance, bondholder care about internal control, insider trading, and then reporting quality.

## VI. Sarbanes-Oxley Act and Changes in Credit Spreads

Investigations of possible relationships between Sarbanes-Oxley Act and spreads can be confounded by potential endogenous feedbacks. To further evaluate the importance of Sarbanes-Oxley Act for credit spread, we turn to the analysis of changes of credit spreads. With monthly observations, annual firm-level data, and a large panel of corporate bonds, great deal of our identification comes from the cross-sectional variations. However, the cross-sectional relation between credit spreads and Sarbanes-Oxley Act may be a noisy indicator of the underlying economic factors. Examining the relation between changes in credit spreads and Sarbanes-Oxley Act would then work as an alternative means of testing our main hypotheses.

We thus estimate a model based on annual changes in firm-based average of spreads and other control variables with Sarbanes-Oxley Act still entering as an event dummy. That is

$$\Delta YLDSPRD_{it} = \alpha + \beta_{SOX} POSTSOX_{it} + \Psi_{i,t} \Delta \mathbf{Z}_{it} + \varepsilon_{i,t} \quad (5)$$

$$\Delta YLDSPRD_{it} = \alpha + \beta_{ENRON} PREENRON_{it} + \Psi_{i,t} \Delta \mathbf{Z}_{it} + \varepsilon_{i,t} \quad (6)$$

where the dependent variable ( $\Delta YLDSPRD_{it}$ ) is the credit spread on the debt issue of firm  $i$  at time  $t$ ; POSTSOX and PREENRON are dummy variables which denotes whether the transaction for firm  $i$  at time  $t$  happened, respectively, after July 2002 when Sarbanes-Oxley Act was enacted or before December 2001 when Enron filed for protection under Chapter 11 of bankruptcy code.  $Z_{it}$  is a vector of control variables for firm  $i$  at time  $t$ . Following Duffee (1998) and Collin-Dufresne, Goldstein and Martin (2001), our control variables include changes in credit rating, log of maturity, log of age, interest rates, Treasury term spreads, return volatility. Our control variables also include probability of jump, per Collin-Dufresne, Goldstein and Martin (2001), and overall stock market volatility.

Table XIII shows results of coefficient estimates for models (5) and (6). The impact of Sarbanes-Oxley is statistically significant and economically pronounced. The passage of the Act has lead to a 36 basis points decrease in the change of spreads. This is further confirmed by the results based in our finer timeline dummy variables which indicates even controlling for detail time variations in credit spreads during the period of 2000 – 2003, the Act has permanently decreased the changed in credit spreads by at least 23 basis points.

## **VII. Conclusions**

Sarbanes-Oxley Act of 2002 was enacted in response to iconic corporate failures of early 2000s. The main reason behind most of these failures, such as collapse of Enron, WorldCom, and HealthSouth, was managerial excessive risk taking in an effort to keep up with heightened market expectation for superior performance. This, of course, is the classical asset switching problem which concerns bondholders gravely. As residual claimants, stockholders benefit from asset switching mainly because in absence of appropriate bond pricing, they enjoy a wealth

transfer from bondholders. Of course, in equilibrium, bondholders would charge a premium commensurate with the agency costs. If Sarbanes-Oxley succeeded in resolving the underpinning agency problems, then enactment of the Act should have led to dissipation of the agency premium portion of the credit spreads.

Our results indicate that Enron's bankruptcy have led to significant rise in credit spreads which for most part disappeared when Sarbanes-Oxley Act was passed. Our results are robust to model specification and variable selection. Furthermore, we find that the impact of Enron's bankruptcy and the subsequent counteracting effect of Sarbanes-Oxley Act on credit spreads are more pronounced for small, highly levered firms with low credit quality with short-term maturity. More interestingly, we find that, in order of pertinence, different aspects of the Act, internal control, insider trading, corporate governance and reporting quality, affect credit spreads significantly and pronouncedly.

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<sup>1</sup> Other studies take a different approach and examine whether firms have changed their accounting practices subsequent to the enactment of Sarbanes-Oxley (Cohen, Dey, Lys, 2007; Patterson and Smith, 2007)..

<sup>2</sup> This method is exactly same as the common practice among extant empirical models of credit spreads when effects of credit rating and debt maturity are examined. Since aforementioned affect how other determinants influence credit spreads, an intuitive way to study their overall effect to use separate sample based on their values and see if there are significant differences among sub-samples.

<sup>3</sup> Other recent studies by, for example, Elton, Gruber, Agrawal, and Mann (2001), Eom, Helwege, and Huang (2004) and Gebhardt, Hvidkjaer, and Swaminathan (2005), Guntay and Hackbarth (2007) also rely on the Fixed Income Securities Database.

<sup>4</sup> Although other more sophisticated methods can be used to find the fitted Treasury yield curve, Elton et al. (2001) note that these different proxies yield qualitatively similar results. As a result, we use simple interpolated fitted Treasury yields for the analysis pursued in the paper.

**Table I**  
**Variable Description and Sample Statistics**

This table reports mean, minimum and maximum of variables in our sample. Our sample consists of 77,515 coupon-paying, plain-vanilla corporate bonds of non-financial firms. The data is obtained from the Mergent's FISD database. The sample period covers the years 1994 through 2006. The data for the term structure of interest rates is from Board Governors of Federal Reserve. All accounting data are from annual COMPUSTAT. Earning forecasts are from I/B/E/S database. Governance index is courtesy Professor Metrick's homepage.

| Variable | Description  | Mean   | Minimum | Maximum |
|----------|--|--------|---------|---------|
| CSPRD    | Credit spread (%)  | 2.240  | 0.001   | 20.058  |
| CRD      | Numerical rating similar to COMPUSTAT convention   | 3.994  | 2.000   | 7.000   |
| LIQ      | Number of months in past twelve months with bond traded divided by twelve  | 0.108  | 0.000   | 1.000   |
| AGE      | Years past issuance (yrs.)   | 3.446  | 0.000   | 35.427  |
| MAT      | Years to maturity (yrs.)   | 11.508 | 1.091   | 100.000 |
| LEVEL    | One-year Treasury bill's yield (%)   | 3.607  | 0.880   | 7.320   |
| SLOPE    | Difference between 10-year and 2-year Treasury bonds' yields (%)   | 1.074  | -0.520  | 2.750   |
| EURO     | Difference between LIBOR and 3-month Treasury bill yield (%)   | 0.270  | -0.170  | 1.440   |
| MUNI     | Difference between the 20-year state and local bond yield and the after-personal-tax 20-year Treasury bond yield (%)                   |        |         |         |
| LTDB     | Long-term debt to total assets   | 0.368  | 0.078   | 1.084   |
| VOLEARN  | 5-year volatility of EBITDA to Assets  | 0.036  | 0.003   | 0.447   |
| ROA      | 5-year average of net income to Assets   | 0.129  | -0.058  | 0.331   |
| QUIK     | Cash plus receivables by current liabilities   | 1.533  | 0.090   | 10.000  |
| INTCOV   | EBITDA to interest expense   | 7.400  | 0.000   | 56.320  |
| TD2CAP   | Total debt to market value of equity   | 3.001  | 0.105   | 54.176  |
| RETVOL   | 2-year volatility of monthly stock returns (%)   | 10.426 | 0.000   | 69.614  |
| MKTVOL   | 2-year volatility of monthly market returns (%)  | 4.456  | 0.684   | 8.540   |
| JUMP     | Probability of jump per Collin-DuFrense et al (2003)   | 0.350  | 0.083   | 0.824   |
| VIX      | Average monthly VIX index (%)  | 20.963 | 10.818  | 38.205  |
| DISP     | Analysts' last earning forecast error dispersion for the quarter reported 30 days before earnings announcements divided by stock price | 0.001  | 0.000   | 0.021   |
| DTACC    | Discretionary long-term accruals per Teoh et al (1998)   | -0.062 | -2.118  | 1.243   |
| DCACC    | Discretionary current accruals per Teoh et al (1998)   | -0.012 | -0.522  | 0.422   |
| GINDEX   | Gompers et al (2003) governance index  | 9.606  | 3.000   | 16.000  |
| PINDDIR  | Percentage of independent board members  |        |         |         |
| PAUDDIR  | Percentage of board members who are auditors   |        |         |         |
| CEOSHRS  | Percentage annual change of CEO shareholding   |        |         |         |

**Table II**  
**Univariate Sample Comparison**

This table reports mean and median (in brackets) of variables in our sample. The mean difference between low industry sales and profits firms, as well as Wilcoxon p-value samples location comparisons and Kolmogrov-Smirnov's p-value for distributional equality are reported. Our sample consists of 77,515 coupon-paying, plain-vanilla corporate bonds of non-financial firms. The data is obtained from the Mergent's FISD database. The sample period covers the years 1994 through 2006. The data for the term structure of interest rates is from Board Governors of Federal Reserve. All accounting data are from annual COMPUSTAT. Earning forecasts are from I/B/E/S database. Governance index is courtesy Professor Metrick's homepage.

| Variable | Pre-Enron<br>(01/94 –<br>12/2001) | Interim<br>(01/2002 –<br>07/2002) | Post-SOX<br>(08/2002 –<br>12/2006) | Mean Diff.<br>(Pre-Enron<br>minus<br>Interim) | Mean<br>equality<br>p-value | Mean Diff.<br>(Pre-Enron<br>minus Post-<br>SOX) | Mean<br>equality<br>p-value | Mean Diff.<br>(Interim<br>minus Post-<br>SOX) | Mean<br>equality<br>p-value |
|----------|-----------------------------------|-----------------------------------|------------------------------------|---|-----------------------------|---|-----------------------------|---|-----------------------------|
|          | Mean<br>(N = 35170)               | Mean<br>(N = 7685)                | Mean<br>(N = 34387)                |   |                             |   |                             |   |                             |
| CSPRD    | 1.9424                            | 2.9449                            | 2.3869                             | -1.0025                                       | 0.000                       | -0.4445   | 0.000                       | 0.5580  | 0.000                       |
| LIQ      | 0.0645                            | 0.1248                            | 0.1483                             | -0.0603                                       | 0.000                       | -0.0838   | 0.000                       | -0.0235                                       | 0.000                       |
| AGE      | 3.4140                            | 3.4586                            | 3.4759                             | -0.0446                                       | 0.238                       | -0.0619   | 0.007                       | -0.0173                                       | 0.649                       |
| MAT      | 12.5794                           | 11.3126                           | 10.4558                            | 1.2668  | 0.000                       | 2.1235  | 0.000                       | 0.8568  | 0.000                       |
| LEVEL    | 5.2623                            | 2.2670                            | 2.2132                             | 2.9954  | 0.000                       | 3.0491  | 0.000                       | 0.0537  | 0.000                       |
| SLOPE    | 0.3474                            | 1.9059                            | 1.6322                             | -1.5585                                       | 0.000                       | -1.2848   | 0.000                       | 0.2736  | 0.000                       |
| EURO     | 0.4052                            | 0.0892                            | 0.1732                             | 0.3160  | 0.000                       | 0.2320  | 0.000                       | -0.0840                                       | 0.000                       |
| MUNI     |                                   |                                   |                                    |   |                             |   |                             |   |                             |
| SIZE     | 9.2056                            | 9.2999                            | 9.5340                             | -0.0942                                       | 0.000                       | -0.3284   | 0.000                       | -0.2341                                       | 0.000                       |
| LTDB     | 0.3727                            | 0.3925                            | 0.3568                             | -0.0199                                       | 0.000                       | 0.0159  | 0.000                       | 0.0357  | 0.000                       |
| VOLEARN  | 0.0364                            | 0.0353                            | 0.0355                             | 0.0011  | 0.091                       | 0.0008  | 0.040                       | -0.0002                                       | 0.711                       |
| ROA      | 0.1334                            | 0.1212                            | 0.1263                             | 0.0121  | 0.000                       | 0.0071  | 0.000                       | -0.0051                                       | 0.000                       |
| QUIK     | 1.5171                            | 1.3996                            | 1.5799                             | 0.1175  | 0.000                       | -0.0628   | 0.001                       | -0.1803                                       | 0.000                       |
| INTCOV   | 6.7297                            | 6.7824                            | 8.2247                             | -0.0527                                       | 0.612                       | -1.4950   | 0.000                       | -1.4423                                       | 0.000                       |
| TD2CAP   | 2.7826                            | 3.7166                            | 3.0655                             | -0.9340                                       | 0.000                       | -0.2829   | 0.000                       | 0.6511  | 0.000                       |
| NDTACC   | -0.0696                           | 0.1191                            | -0.0042                            | -0.1887                                       | 0.000                       | -0.0654   | 0.000                       | 0.1233  | 0.000                       |
| NDCACC   | 0.0036                            | -0.0013                           | 0.0005                             | 0.0050  | 0.000                       | 0.0032  | 0.000                       | -0.0018                                       | 0.000                       |
| DISP     | 0.0012                            | 0.0016                            | 0.0015                             | -0.0004                                       | 0.000                       | -0.0003   | 0.000                       | 0.0001  | 0.116                       |
| GINDEX   | 9.5083                            | 9.7706                            | 9.6291                             | -0.2622                                       | 0.000                       | -0.1207   | 0.001                       | 0.1415  | 0.002                       |

**Table III**  
**Sample Comparison by Categories**

This table reports mean and median (in brackets) of credit spreads across industries, credit ratings, maturities, firm sizes, and leverage ratios. Our sample consists of 77,515 coupon-paying, plain-vanilla corporate bonds of non-financial firms. The data is obtained from the Mergent's FISD database. The sample period covers the years 1994 through 2006. The data for the term structure of interest rates is from Board Governors of Federal Reserve. All accounting data are from annual COMPUSTAT. Earning forecasts are from I/B/E/S database. Governance index is courtesy Professor Metrick's homepage. †denotes credit spread differences between pre-Enron and Interim that are not significant at 10% or lower levels. ‡denotes credit spread differences between post-SOX and Interim that are not significant at 10% or lower levels.

| Categories                     | Pre-Enron<br>(01/94 – 12/2001) |                    | Interim<br>(01/2002 – 07/2002) |       | Post-SOX<br>(08/2002 – 12/2006) |                    |
|--------------------------------|--------------------------------|--------------------|--------------------------------|-------|---------------------------------|--------------------|
|                                | NOBS                           | CSPRD              | NOBS                           | CSPRD | NOBS                            | CSPRD              |
| <i>Panel B. Industry:</i>      |                                |                    |                                |       |                                 |                    |
| Consumer Goods                 | 15742                          | 1.875              | 3120                           | 2.911 | 14064                           | 2.147              |
| Construction                   | 1311                           | 2.673              | 401                            | 3.377 | 1975                            | 2.297              |
| Steel & Metals                 | 565                            | 2.610 <sup>†</sup> | 135                            | 2.646 | 760                             | 2.300              |
| Fabricated Products            | 261                            | 1.691              | 59                             | 2.098 | 277                             | 1.714 <sup>‡</sup> |
| Machinery                      | 3137                           | 1.516              | 651                            | 2.639 | 2626                            | 2.329              |
| Auto & Related                 | 4856                           | 1.750              | 1002                           | 2.428 | 4027                            | 2.744              |
| Utilities                      | 2245                           | 1.787              | 671                            | 3.611 | 3319                            | 2.779              |
| Retailers                      | 3800                           | 2.060              | 874                            | 2.600 | 3872                            | 2.002              |
| Others                         | 3253                           | 2.544              | 772                            | 3.715 | 3467                            | 3.168              |
| <i>Panel C. Credit Rating:</i> |                                |                    |                                |       |                                 |                    |
| AAA, AA+, AA, AA-              | 3523                           | 0.793              | 529                            | 0.923 | 1639                            | 0.611              |
| A+, A, A-                      | 11751                          | 1.156              | 1835                           | 1.405 | 7348                            | 0.955              |
| BBB+, BBB, BBB-                | 12345                          | 1.698              | 3159                           | 2.366 | 14130                           | 1.633              |
| BB+, BB, BB-                   | 4154                           | 3.217              | 1177                           | 4.587 | 6108                            | 3.426              |
| B+, B, B-                      | 3154                           | 4.957              | 878                            | 6.441 | 4148                            | 5.258              |
| CCC+ and less                  | 243                            | 8.115              | 107                            | 9.711 | 1014                            | 8.140              |
| <i>Panel D. Maturity:</i>      |                                |                    |                                |       |                                 |                    |
| Short-term Bonds               | 14936                          | 1.999              | 3900                           | 3.335 | 17260                           | 2.602              |
| Medium-term Bonds              | 9396                           | 2.202              | 1772                           | 3.002 | 9379                            | 2.345              |
| Long-term Bonds                | 10838                          | 1.639              | 2013                           | 2.139 | 7748                            | 1.958              |
| <i>Panel E. Firm Size:</i>     |                                |                    |                                |       |                                 |                    |
| Small Firms                    | 10028                          | 3.120              | 2386                           | 4.422 | 10369                           | 3.823              |
| Medium Firms                   | 12100                          | 1.760              | 2609                           | 2.750 | 11855                           | 2.134              |
| Large Firms                    | 13042                          | 1.225              | 2693                           | 1.840 | 12163                           | 1.419              |
| <i>Panel F. Leverage:</i>      |                                |                    |                                |       |                                 |                    |
| Low Long-term Leverage         | 12776                          | 1.513              | 2784                           | 2.055 | 12514                           | 1.570              |
| Medium Long-term Leverage      | 11516                          | 1.692              | 2217                           | 2.620 | 11276                           | 2.176              |
| High Long-term Leverage        | 10877                          | 2.711              | 2684                           | 4.137 | 10597                           | 3.576              |

**Table IV**  
**Correlation Analysis**

This table reports the Pearson correlations between variables of interest. Our sample consists of 77,515 coupon-paying, plain-vanilla corporate bonds of non-financial firms. The data is obtained from the Mergent's FISD database. The sample period covers the years 1994 through 2006. The data for the term structure of interest rates is from Board Governors of Federal Reserve. All accounting data are from annual COMPUSTAT. Earning forecasts are from I/B/E/S database. Governance index is courtesy Professor Metrick's homepage. \*denotes significance at 10% or lower levels.

|         |          |          |          |          |          |          |          |          |          |          |
|---------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
|         | CRD      | LEVEL    | SLOPE    | EURO     | LogAGE   | LogMAT   | LTDB     | VOLEARN  | ROA      | QUIK     |
| CSPRD   | 0.6617*  | -0.1693* | 0.1416*  | -0.0773* | 0.0079*  | -0.0742* | 0.3960*  | 0.1265*  | -0.3112* | 0.0340*  |
| CRD     |          | -0.1364* | 0.0935*  | -0.0686* | -0.0848* | -0.1389* | 0.4479*  | 0.1493*  | -0.3278* | 0.0239*  |
| LEVEL   |          |          | -0.9295* | 0.6497*  | 0.0433*  | 0.0765*  | 0.0009   | -0.0131* | 0.0945*  | 0.0047   |
| SLOPE   |          |          |          | -0.6916* | -0.0392* | -0.0532* | 0.0004   | 0.0167*  | -0.0843* | -0.0160* |
| EURO    |          |          |          |          | 0.0185*  | 0.0547*  | 0.0212*  | 0.0014   | 0.0454*  | 0.0100*  |
| LogAGE  |          |          |          |          |          | -0.0492* | -0.0757* | -0.0972* | 0.0304*  | -0.0113* |
| LogMAT  |          |          |          |          |          |          | -0.0398* | -0.0155* | 0.0080*  | 0.0244*  |
| LTDB    |          |          |          |          |          |          |          | 0.0601*  | -0.1571* | 0.1854*  |
| VOLEARN |          |          |          |          |          |          |          |          | -0.0164* | -0.0301* |
| ROA     |          |          |          |          |          |          |          |          |          | -0.1168* |
|         | INTCOV   | TD2CAP   | RETVOL   | MKTVOL   | NDTACC   | DTACC    | NDCACC   | DCACC    | DISP     | GINDEX   |
| CSPRD   | -0.2817* | 0.2545*  | 0.6300*  | -0.0272* | 0.0596*  | -0.0835* | -0.0154* | 0.0234*  | 0.3989*  | -0.0694* |
| CRD     | -0.4004* | 0.1426*  | 0.5317*  | -0.0251* | -0.0099* | -0.0149* | -0.0082* | -0.0093* | 0.2676*  | 0.0015   |
| INTCOV  |          | -0.1419* | -0.1868* | 0.0165*  | 0.0009   | -0.0187* | -0.0087* | -0.0475* | -0.1661* | -0.0500* |
| TD2CAP  |          |          | 0.1754*  | -0.0041  | -0.0368* | -0.0029  | 0.0070*  | 0.0275*  | 0.1769*  | -0.1137* |
| RETVOL  |          |          |          | 0.0008   | 0.0342*  | -0.0455* | -0.0161* | 0.0508*  | 0.2496*  | -0.0905* |
| MKTVOL  |          |          |          |          | 0.0494*  | -0.0416* | -0.0084* | -0.0175* | 0.0041   | -0.0600* |
| NDTACC  |          |          |          |          |          | -0.7770* | 0.0541*  | 0.0229*  | 0.0368*  | -0.0267* |
| DTACC   |          |          |          |          |          |          | -0.0092* | 0.0730*  | -0.0405* | -0.0012  |
| NDCACC  |          |          |          |          |          |          |          | -0.2256* | -0.0073* | 0.0242*  |
| DCACC   |          |          |          |          |          |          |          |          | 0.0112*  | 0.0174*  |
| DISP    |          |          |          |          |          |          |          |          |          | -0.0471* |

**Table V**  
**Impact of Sarbanes-Oxley on Credit Spreads**

This table reports results of the regression model of credit spread using different measures of corporate marginal tax rate and a number of control variables. LogAGE and LogMAT are natural logarithms of bond's age and maturity. INTD1, INTD2, INTD3, and INTD4 are censored interest coverage ratios per Blume et al (1998). All other variables are defined in Table I. Robust (heteroskedasticity, autocorrelation, and firm clustering corrected) *t*-statistics are reported in parentheses. Coefficients that are statistically different from zero are marked at 1%, 5% and 10% levels with \*\*\*, \*\*, and \* accordingly.

|                  |                              |                       |                           |                              |                              |                       |                            |                              |
|------------------|------------------------------|-----------------------|---------------------------|------------------------------|------------------------------|-----------------------|----------------------------|------------------------------|
| Constant         | -3.625***<br>(-13.36)        | -4.306***<br>(-15.61) | -4.595***<br>(-16.84)     | -3.319***<br>(-13.96)        | -3.952***<br>(-12.40)        | -4.536***<br>(-14.13) | -4.717***<br>(-14.14)      | -3.483***<br>(-11.23)        |
| <b>POSTSOX</b>   | <b>-0.409***<br/>(-5.25)</b> |                       | <b>-0.158<br/>(-1.46)</b> |                              | <b>-0.364***<br/>(-5.10)</b> |                       | <b>-0.172*<br/>(-1.85)</b> |                              |
| PREENRON         |                              | 0.217**<br>(2.54)     |                           |                              |                              | 0.220***<br>(2.93)    |                            |                              |
| TIMELINE1        |                              |                       | -0.734***<br>(-7.86)      | -0.504***<br>(-5.52)         |                              |                       | -0.718***<br>(-7.82)       | -0.500***<br>(-5.59)         |
| TIMELINE2        |                              |                       | -0.048<br>(-0.51)         | 0.131<br>(1.39)              |                              |                       | -0.013<br>(-0.15)          | 0.155*<br>(1.74)             |
| TIMELINE3        |                              |                       | 0.406***<br>(3.63)        | 0.500***<br>(4.40)           |                              |                       | 0.414***<br>(3.80)         | 0.505***<br>(4.57)           |
| TIMELINE4        |                              |                       | 0.284***<br>(3.30)        | 0.274***<br>(3.30)           |                              |                       | 0.231***<br>(2.69)         | 0.225***<br>(2.69)           |
| TIMELINE5        |                              |                       | 0.253***<br>(2.83)        | 0.216***<br>(2.73)           |                              |                       | 0.192**<br>(2.31)          | 0.159**<br>(2.09)            |
| TIMELINE6        |                              |                       | 0.244**<br>(2.13)         | 0.157<br>(1.61)              |                              |                       | 0.166<br>(1.64)            | 0.089<br>(1.00)              |
| TIMELINE7        |                              |                       | 0.253**<br>(2.34)         | 0.142<br>(1.63)              |                              |                       | 0.172*<br>(1.73)           | 0.072<br>(0.88)              |
| TIMELINE8        |                              |                       |                           | 0.548***<br>(6.14)           |                              |                       |                            | 0.482***<br>(5.93)           |
| <b>TIMELINE9</b> |                              |                       |                           | <b>-0.433***<br/>(-4.22)</b> |                              |                       |                            | <b>-0.435***<br/>(-4.83)</b> |
| CRD              | 0.321***<br>(22.55)          | 0.315***<br>(22.31)   | 0.321***<br>(22.38)       | 0.328***<br>(22.40)          | 0.315***<br>(22.39)          | 0.309***<br>(21.88)   | 0.315***<br>(21.97)        | 0.323***<br>(22.37)          |

|         |                      |                      |                      |                      |                      |                      |                      |                      |
|---------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| LEVEL   | -0.224***<br>(-7.82) | -0.142***<br>(-5.49) | -0.107***<br>(-3.68) | -0.209***<br>(-7.59) | -0.183***<br>(-6.43) | -0.120***<br>(-4.76) | -0.088***<br>(-3.09) | -0.186***<br>(-6.72) |
| SLOPE   | -0.269***<br>(-5.23) | -0.165***<br>(-3.82) | -0.167***<br>(-4.29) | -0.267***<br>(-6.11) | -0.199***<br>(-4.00) | -0.116***<br>(-2.75) | -0.115***<br>(-2.91) | -0.210***<br>(-4.88) |
| EURO    | -0.308***<br>(-4.46) | -0.343***<br>(-5.21) | -0.252***<br>(-3.71) | -0.196***<br>(-2.86) | -0.280***<br>(-4.18) | -0.324***<br>(-4.97) | -0.256***<br>(-3.79) | -0.199***<br>(-2.90) |
| MUNI    | 1.556***<br>(9.70)   | 1.563***<br>(9.80)   | 1.768***<br>(11.42)  | 1.186***<br>(10.23)  | 1.580***<br>(10.36)  | 1.579***<br>(10.45)  | 1.758***<br>(12.02)  | 1.214***<br>(11.04)  |
| LogAGE  | 0.121***<br>(6.08)   | 0.120***<br>(6.01)   | 0.118***<br>(5.91)   | 0.120***<br>(6.04)   | 0.130***<br>(7.85)   | 0.129***<br>(7.75)   | 0.127***<br>(7.59)   | 0.129***<br>(7.75)   |
| LogMAT  | 0.099***<br>(3.71)   | 0.102***<br>(3.81)   | 0.101***<br>(3.76)   | 0.096***<br>(3.53)   | 0.092***<br>(3.88)   | 0.094***<br>(3.97)   | 0.093***<br>(3.91)   | 0.089***<br>(3.68)   |
| RETVOL  | 0.131***<br>(12.17)  | 0.137***<br>(13.24)  | 0.131***<br>(11.84)  | 0.126***<br>(11.12)  | 0.114***<br>(11.53)  | 0.118***<br>(12.40)  | 0.113***<br>(11.17)  | 0.109***<br>(10.50)  |
| LIQ     | -0.259***<br>(-3.67) | -0.280***<br>(-4.09) | -0.268***<br>(-3.84) | -0.246***<br>(-3.51) | -0.298***<br>(-4.33) | -0.317***<br>(-4.77) | -0.304***<br>(-4.48) | -0.280***<br>(-4.11) |
| TD2CAP  |                      |                      |                      |                      | 0.033***<br>(3.69)   | 0.033***<br>(3.73)   | 0.033***<br>(3.68)   | 0.033***<br>(3.63)   |
| LTDB    |                      |                      |                      |                      | 1.237***<br>(5.59)   | 1.304***<br>(5.96)   | 1.233***<br>(5.60)   | 1.130***<br>(5.07)   |
| VOLEARN |                      |                      |                      |                      | 0.028<br>(0.06)      | 0.022<br>(0.05)      | 0.027<br>(0.06)      | -0.001<br>(-0.00)    |
| ROA     |                      |                      |                      |                      | -0.009<br>(-0.69)    | -0.011<br>(-0.80)    | -0.009<br>(-0.68)    | -0.007<br>(-0.52)    |
| QUIK    |                      |                      |                      |                      | -2.569***<br>(-3.94) | -2.651***<br>(-4.05) | -2.525***<br>(-3.90) | -2.399***<br>(-3.70) |
| INTD1   |                      |                      |                      |                      | -0.010<br>(-0.36)    | -0.004<br>(-0.14)    | -0.013<br>(-0.45)    | -0.022<br>(-0.78)    |
| INTD2   |                      |                      |                      |                      | 0.123***<br>(4.61)   | 0.123***<br>(4.65)   | 0.121***<br>(4.52)   | 0.122***<br>(4.42)   |
| INTD3   |                      |                      |                      |                      | 0.012<br>(0.55)      | 0.011<br>(0.51)      | 0.012<br>(0.57)      | 0.014<br>(0.61)      |
| INTD4   |                      |                      |                      |                      | 0.003                | 0.002                | 0.002                | 0.003                |

|   |        |        |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|--------|--------|
|   |        |        |        |        | (0.31) | (0.26) | (0.26) | (0.34) |
| N. Obs.                                   | 77515  | 77515  | 77515  | 77515  | 77515  | 77515  | 77515  | 77515  |
| Adj. RSQ.                                 | 0.5713 | 0.5686 | 0.5746 | 0.5832 | 0.5969 | 0.5949 | 0.5999 | 0.6075 |
| F-stat for Sum of All<br>Time Dummies = 0 |        |        |        |        |        |        |        |        |
| Prob. > F                                 |        |        |        |        |        |        |        |        |

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**Table VI**  
**Impact of Sarbanes-Oxley on Credit Spreads Across Time**

This table reports results of the regression model of credit spread using different measures of corporate marginal tax rate and a number of control variables. LogAGE and LogMAT are natural logarithms of bond's age and maturity. INTD1, INTD2, INTD3, and INTD4 are censored interest coverage ratios per Blume et al (1998). All other variables are defined in Table I. Robust (heteroskedasticity, autocorrelation, and firm clustering corrected) *t*-statistics are reported in parentheses. Coefficients that are statistically different from zero are marked at 1%, 5% and 10% levels with \*\*\*, \*\*, and \* accordingly.

|                  | 2002 – 2003                      | 2002 – 2004                        | 2002 – 2005                        | 2002 – 2006                        | 2002 – 2003                        | 2002 – 2004                        | 2002 – 2005                        | 2002 – 2006                        |
|------------------|----------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| Constant         | -5.966***<br>(-11.32)            | -4.862***<br>(-11.16)              | -5.396***<br>(-12.62)              | -6.666***<br>(-13.48)              | -2.978***<br>(-5.57)               | -2.573***<br>(-5.96)               | -3.336***<br>(-8.03)               | -4.045***<br>(-9.24)               |
| <b>POSTSOX</b>   | <b>0.253***</b><br><b>(2.94)</b> | <b>-0.693***</b><br><b>(-5.99)</b> | <b>-0.765***</b><br><b>(-6.87)</b> | <b>-0.433***</b><br><b>(-4.80)</b> |                                    |                                    |                                    |                                    |
| TIMELINE6        |                                  |                                    |                                    |                                    | -0.357***<br>(-3.35)               | -0.366***<br>(-2.87)               | -0.366***<br>(-3.00)               | -0.568***<br>(-4.70)               |
| TIMELINE7        |                                  |                                    |                                    |                                    | -0.243***<br>(-2.78)               | -0.307***<br>(-2.87)               | -0.325***<br>(-3.18)               | -0.564***<br>(-5.72)               |
| TIMELINE8        |                                  |                                    |                                    |                                    | -0.400***<br>(-4.14)               | -0.509***<br>(-5.07)               | -0.548***<br>(-5.32)               | -0.353***<br>(-3.58)               |
| <b>TIMELINE9</b> |                                  |                                    |                                    |                                    | <b>-1.235***</b><br><b>(-7.80)</b> | <b>-1.228***</b><br><b>(-8.51)</b> | <b>-1.237***</b><br><b>(-8.58)</b> | <b>-1.171***</b><br><b>(-8.30)</b> |
| CRD              | 0.419***<br>(16.99)              | 0.391***<br>(17.31)                | 0.368***<br>(18.12)                | 0.356***<br>(17.65)                | 0.421***<br>(17.03)                | 0.398***<br>(17.52)                | 0.374***<br>(18.27)                | 0.363***<br>(17.85)                |
| LEVEL            | 0.242**<br>(2.36)                | -0.617***<br>(-7.91)               | -0.578***<br>(-8.93)               | -0.055<br>(-0.89)                  | -0.754***<br>(-7.96)               | -0.758***<br>(-9.40)               | -0.647***<br>(-9.74)               | -0.184***<br>(-3.12)               |
| SLOPE            | -0.937***<br>(-9.55)             | -1.007***<br>(-10.85)              | -0.779***<br>(-9.38)               | -0.220***<br>(-2.71)               | -0.513***<br>(-5.47)               | -0.888***<br>(-9.59)               | -0.779***<br>(-9.11)               | -0.295***<br>(-3.67)               |
| EURO             | -1.136***<br>(-2.65)             | -0.857***<br>(-2.85)               | 0.153<br>(0.71)                    | -0.252<br>(-1.42)                  | -1.746***<br>(-4.01)               | -0.398<br>(-1.46)                  | 0.739***<br>(3.74)                 | 0.230<br>(1.41)                    |
| MUNI             | 3.374***<br>(11.67)              | 4.113***<br>(12.13)                | 4.077***<br>(11.95)                | 3.364***<br>(11.51)                | 2.501***<br>(9.51)                 | 2.713***<br>(10.73)                | 2.890***<br>(10.56)                | 2.153***<br>(9.63)                 |
| LogAGE           | 0.092***<br>(4.34)               | 0.110***<br>(4.65)                 | 0.114***<br>(5.29)                 | 0.114***<br>(5.44)                 | 0.092***<br>(4.32)                 | 0.111***<br>(4.67)                 | 0.114***<br>(5.32)                 | 0.114***<br>(5.48)                 |
| LogMAT           | -0.191***                        | -0.139***                          | -0.052                             | -0.027                             | -0.193***                          | -0.140***                          | -0.053                             | -0.028                             |

|           |           |           |           |           |           |           |           |           |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|           | (-4.44)   | (-3.49)   | (-1.45)   | (-0.75)   | (-4.44)   | (-3.48)   | (-1.46)   | (-0.76)   |
| RETVOL    | 0.104***  | 0.095***  | 0.104***  | 0.108***  | 0.103***  | 0.092***  | 0.101***  | 0.104***  |
|           | (6.75)    | (6.68)    | (7.42)    | (7.91)    | (6.66)    | (6.32)    | (7.09)    | (7.50)    |
| LIQ       | -0.237**  | -0.195**  | -0.168**  | -0.189**  | -0.235**  | -0.197**  | -0.170**  | -0.185**  |
|           | (-2.29)   | (-2.15)   | (-2.08)   | (-2.35)   | (-2.29)   | (-2.21)   | (-2.12)   | (-2.33)   |
| TD2CAP    | 0.039***  | 0.045***  | 0.045***  | 0.045***  | 0.039***  | 0.044***  | 0.045***  | 0.044***  |
|           | (2.65)    | (3.06)    | (3.36)    | (3.34)    | (2.62)    | (3.02)    | (3.32)    | (3.30)    |
| LTDB      | 1.515***  | 1.790***  | 1.683***  | 1.666***  | 1.431***  | 1.629***  | 1.555***  | 1.525***  |
|           | (3.10)    | (4.19)    | (4.50)    | (4.61)    | (2.92)    | (3.78)    | (4.11)    | (4.19)    |
| VOLEARN   | 0.900     | 0.954     | 0.888     | 1.002     | 0.980     | 0.986     | 0.940     | 1.053*    |
|           | (1.17)    | (1.34)    | (1.36)    | (1.58)    | (1.28)    | (1.39)    | (1.45)    | (1.68)    |
| ROA       | -0.016    | -0.020    | -0.007    | -0.004    | -0.015    | -0.018    | -0.005    | -0.001    |
|           | (-0.75)   | (-1.08)   | (-0.44)   | (-0.21)   | (-0.68)   | (-0.94)   | (-0.30)   | (-0.05)   |
| QUIK      | -3.760*** | -4.229*** | -4.265*** | -4.249*** | -3.683*** | -4.026*** | -4.139*** | -4.085*** |
|           | (-2.86)   | (-3.30)   | (-3.90)   | (-4.05)   | (-2.82)   | (-3.14)   | (-3.79)   | (-3.90)   |
| INTD1     | -0.099*   | -0.053    | -0.057    | -0.053    | -0.112**  | -0.070    | -0.068*   | -0.067*   |
|           | (-1.76)   | (-1.11)   | (-1.42)   | (-1.35)   | (-2.01)   | (-1.48)   | (-1.72)   | (-1.72)   |
| INTD2     | 0.168***  | 0.201***  | 0.201***  | 0.198***  | 0.166***  | 0.198***  | 0.199***  | 0.195***  |
|           | (3.22)    | (3.87)    | (4.48)    | (4.72)    | (3.18)    | (3.75)    | (4.35)    | (4.55)    |
| INTD3     | 0.034     | 0.027     | 0.015     | 0.006     | 0.033     | 0.027     | 0.016     | 0.007     |
|           | (0.84)    | (0.71)    | (0.48)    | (0.20)    | (0.79)    | (0.70)    | (0.48)    | (0.23)    |
| INTD4     | 0.016     | 0.020     | 0.024**   | 0.029***  | 0.018     | 0.022     | 0.025**   | 0.030***  |
|           | (0.86)    | (1.46)    | (2.32)    | (3.11)    | (0.93)    | (1.53)    | (2.34)    | (3.16)    |
| N. Obs.   | 20953     | 30413     | 37579     | 40147     | 20953     | 30413     | 37579     | 40147     |
| Adj. RSQ. | 0.6436    | 0.6350    | 0.6372    | 0.6295    | 0.6506    | 0.6444    | 0.6459    | 0.6396    |

**Table VII**  
**Impact of Sarbanes-Oxley on Credit Spreads Across Debt Rating and Maturity**

This table reports results of the robustness regression models of credit spread using post-SOX and pre-Enron time dummies across different credit ratings, debt maturities, firm sizes, and leverages. A bond is denoted as short-term, mid-term, and long-term, if its maturity is, respectively, less than 7 years, between 7 and 12 years, or more than 12 years. A firm is denoted as small-cap, mid-cap, and long-cap, if the ratio of its long-term debt to total assets is, respectively, in the bottom, middle, and top thirds of the COMPUSTAT universe. A firm is denoted as small-cap, mid-cap, and long-cap, if the natural log of the sum of its market value equity plus book value of debt is, respectively, in the bottom, middle, and top thirds of the COMPUSTAT universe. LogAGE and LogMAT are natural logarithms of bond's age and maturity. INTD1, INTD2, INTD3, and INTD4 are censored interest coverage ratios per Blume et al (1998). All other variables are defined in Table I. Robust (heteroskedasticity, autocorrelation, and firm clustering corrected) *t*-statistics are reported in parentheses. Coefficients that are statistically different from zero are marked at 1%, 5% and 10% levels with \*\*\*, \*\*, and \* accordingly.

|                 | AAA – AA<br>Rated    | A – BBB<br>Rated     | BB – C<br>Rated      | Short-term<br>Debt   | Mid-term<br>Debt     | Long-term<br>Debt    |
|-----------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| NOBS            | 5682                 | 50455                | 20917                | 36029                | 20470                | 20555                |
| <i>Panel A.</i> |                      |                      |                      |                      |                      |                      |
| POSTSOX         | -0.262***<br>(-5.64) | -0.361***<br>(-7.15) | -0.759***<br>(-5.14) | -0.432***<br>(-5.15) | -0.465***<br>(-5.41) | -0.162**<br>(-2.08)  |
| Adj. RSQ        | 0.2950               | 0.3603               | 0.4835               | 0.6198               | 0.6356               | 0.5014               |
| <i>Panel B.</i> |                      |                      |                      |                      |                      |                      |
| PREENRON        | 0.188***<br>(2.76)   | 0.122**<br>(2.41)    | 0.564***<br>(3.73)   | 0.358***<br>(3.92)   | 0.152*<br>(1.79)     | 0.003<br>(0.03)      |
| Adj. RSQ        | 0.2854               | 0.3518               | 0.4787               | 0.6182               | 0.6315               | 0.5002               |
|                 | Small-Cap<br>Firms   | Mid-Cap<br>Firms     | Large-Cap<br>Firms   | Low<br>Leverage      | Medium<br>Leverage   | High<br>Leverage     |
| NOBS            | 22261                | 26507                | 27858                | 28016                | 24947                | 24090                |
| <i>Panel C.</i> |                      |                      |                      |                      |                      |                      |
| POSTSOX         | -0.714***<br>(-7.86) | -0.286**<br>(-1.98)  | -0.120<br>(-1.30)    | -0.360***<br>(-4.39) | -0.261**<br>(-2.49)  | -0.535***<br>(-3.68) |
| Adj. RSQ        | 0.5764               | 0.5729               | 0.4950               | 0.5141               | 0.5328               | 0.6091               |
| <i>Panel D.</i> |                      |                      |                      |                      |                      |                      |
| PREENRON        | 0.756***<br>(7.30)   | 0.079<br>(0.63)      | -0.196<br>(-1.63)    | 0.210**<br>(2.47)    | 0.231**<br>(2.25)    | 0.299*<br>(1.94)     |
| Adj. RSQ        | 0.5739               | 0.5713               | 0.4954               | 0.5101               | 0.5319               | 0.6063               |

**Table VIII**  
**Robustness Regressions for Credit Spreads and Sarbanes-Oxley Act**

This table reports results of the robustness regression models of credit spread. In these regressions, the impact of industry, firm, and bond fixed effects are controlled for, using a series of dummy variables. The panel regression results with Newey-West t-statistics are also reported. The cross-sectional regressions results based on the time-series averages of 4568 bonds are also reported. For brevity, the coefficients on control variables, and industry, firm and bond dummy variables are not reported. LogAGE and LogMAT are natural logarithms of bond's age and maturity. INTD1, INTD2, INTD3, and INTD4 are censored interest coverage ratios per Blume et al (1998). All other variables are defined in Table I. Robust (heteroskedasticity, autocorrelation, and firm clustering corrected) *t*-statistics are reported in parentheses. Coefficients that are statistically different from zero are marked at 1%, 5% and 10% levels with \*\*\*, \*\*, and \* accordingly.

|                  | Industry<br>Fixed Effects | Firm &<br>Industry<br>Fixed Effects | Bond &<br>Industry Fixed<br>Effects | Newey-West<br>Standard Errors | Cross-Sectional<br>Regression |
|------------------|---------------------------|-------------------------------------|-------------------------------------|-------------------------------|-------------------------------|
| NOBS             | 77515                     | 77515                               | 77515                               | 77536                         | 4568                          |
| Industry Dummies | Yes                       | Yes                                 | Yes                                 | -                             | -                             |
| Firm Dummies     | -                         | Yes                                 | -                                   | -                             | -                             |
| Bond Dummies     | -                         | -                                   | Yes                                 | -                             | -                             |
| <i>Panel A.</i>  |                           |                                     |                                     |                               |                               |
| POSTSOX          | -0.364***<br>(-5.12)      | -0.380***<br>(-5.40)                | -0.226***<br>(-2.87)                | -0.364***<br>(-17.06)         | -0.391***<br>(-3.94)          |
| Adj RSQ          | 0.5985                    | 0.7288                              | 0.7597                              | 0.5969                        | 0.6878                        |
| <i>Panel B.</i>  |                           |                                     |                                     |                               |                               |
| PREENRON         | 0.216***<br>(2.94)        | 0.213***<br>(3.45)                  | -0.006<br>(-0.08)                   | 0.220***<br>(8.80)            | 0.050<br>(0.38)               |
| Adj RSQ          | 0.5966                    | 0.7270                              | 0.7591                              | 0.5950                        | 0.6867                        |
| <i>Panel C.</i>  |                           |                                     |                                     |                               |                               |
| TIMELINE1        | -0.504***<br>(-5.62)      | -0.456***<br>(-5.37)                | -0.435***<br>(-4.67)                | -0.505***<br>(-11.77)         | -0.117<br>(-0.36)             |
| TIMELINE2        | 0.145<br>(1.64)           | 0.120<br>(1.56)                     | 0.128<br>(1.50)                     | 0.153***<br>(3.83)            | 1.298***<br>(6.16)            |
| TIMELINE3        | 0.496***<br>(4.47)        | 0.515***<br>(4.69)                  | 0.518***<br>(4.35)                  | 0.506***<br>(10.69)           | 0.378<br>(1.21)               |
| TIMELINE4        | 0.221***<br>(2.62)        | 0.241***<br>(3.05)                  | 0.209**<br>(2.29)                   | 0.227***<br>(5.82)            | 0.448*<br>(1.86)              |
| TIMELINE5        | 0.161**<br>(2.13)         | 0.153**<br>(2.19)                   | 0.116<br>(1.38)                     | 0.159***<br>(4.22)            | 0.852***<br>(3.82)            |
| TIMELINE6        | 0.090<br>(1.03)           | 0.046<br>(0.61)                     | -0.006<br>(-0.08)                   | 0.089*<br>(1.72)              | 1.095***<br>(2.80)            |
| TIMELINE7        | 0.074<br>(0.91)           | 0.009<br>(0.13)                     | -0.055<br>(-0.78)                   | 0.072**<br>(1.97)             | 0.606**<br>(2.36)             |
| TIMELINE8        | 0.484***<br>(5.88)        | 0.350***<br>(4.99)                  | 0.338***<br>(4.42)                  | 0.482***<br>(9.98)            | 0.912***<br>(2.93)            |
| TIMELINE9        | -0.436***<br>(-4.90)      | -0.527***<br>(-6.07)                | -0.560***<br>(-5.28)                | -0.435***<br>(-15.20)         | 0.055<br>(0.39)               |
| Adj RSQ          | 0.6091                    | 0.7387                              | 0.7690                              | 0.6075                        | 0.6921                        |

**Table IX**  
**Impacts of Sarbanes-Oxley, Information Asymmetry, Equity Agency Cost on Credit Spreads**

This table reports results of the robustness regression models of credit spread controlling for earning forecast dispersion, accrual management, insider trading, corporate governance, and auditor's change. LogAGE and LogMAT are natural logarithms of bond's age and maturity. INTD1, INTD2, INTD3, and INTD4 are censored interest coverage ratios per Blume et al (1998). All other variables are defined in Table I. Robust (heteroskedasticity, autocorrelation, and firm clustering corrected) *t*-statistics are reported in parentheses. Coefficients that are statistically different from zero are marked at 1%, 5% and 10% levels with \*\*\*, \*\*, and \* accordingly.

|                  |                                    |                                  |                                    |                                    |                                  |                                    |
|------------------|------------------------------------|----------------------------------|------------------------------------|------------------------------------|----------------------------------|------------------------------------|
| Constant         | -3.412***<br>(-7.62)               | -4.207***<br>(-9.37)             | -2.953***<br>(-6.99)               | -3.705***<br>(-6.83)               | -4.489***<br>(-8.47)             | -3.692***<br>(-7.03)               |
| <b>POSTSOX</b>   | <b>-0.485***</b><br><b>(-6.20)</b> |                                  |                                    | <b>-0.462***</b><br><b>(-5.23)</b> |                                  |                                    |
| <b>PREENRON</b>  |                                    | <b>0.370***</b><br><b>(4.46)</b> |                                    |                                    | <b>0.326***</b><br><b>(3.43)</b> |                                    |
| TIMELINE1        |                                    |                                  | -0.349***<br>(-4.22)               |                                    |                                  | -1.165***<br>(-5.84)               |
| TIMELINE2        |                                    |                                  | 0.086<br>(1.08)                    |                                    |                                  | -0.691***<br>(-3.57)               |
| TIMELINE3        |                                    |                                  | 0.480***<br>(3.98)                 |                                    |                                  | -0.181<br>(-0.97)                  |
| TIMELINE4        |                                    |                                  | 0.232**<br>(2.54)                  |                                    |                                  | -0.306**<br>(-2.01)                |
| TIMELINE5        |                                    |                                  | 0.079<br>(0.91)                    |                                    |                                  | -0.355***<br>(-2.60)               |
| TIMELINE6        |                                    |                                  | -0.003<br>(-0.04)                  |                                    |                                  | -0.417***<br>(-3.34)               |
| TIMELINE7        |                                    |                                  | -0.028<br>(-0.35)                  |                                    |                                  | -0.437***<br>(-4.32)               |
| TIMELINE8        |                                    |                                  | 0.182**<br>(2.08)                  |                                    |                                  | -0.203**<br>(-2.10)                |
| <b>TIMELINE9</b> |                                    |                                  | <b>-0.563***</b><br><b>(-5.67)</b> |                                    |                                  | <b>-0.898***</b><br><b>(-6.65)</b> |
| DISP             | 1.411***<br>(6.91)                 | 1.396***<br>(6.87)               | 1.400***<br>(6.87)                 | 1.465***<br>(7.14)                 | 1.450***<br>(7.14)               | 1.437***<br>(6.95)                 |
| DTACC            | -0.259***<br>(-3.96)               | -0.289***<br>(-4.21)             | -0.213***<br>(-3.36)               | -0.254***<br>(-3.68)               | -0.280***<br>(-3.87)             | -0.199***<br>(-3.01)               |
| DCACC            | -0.002<br>(-0.01)                  | 0.005<br>(0.02)                  | -0.036<br>(-0.18)                  | 0.004<br>(0.02)                    | 0.004<br>(0.02)                  | -0.001<br>(-0.00)                  |
| CEOSHRS          | 0.034***<br>(5.37)                 | 0.033***<br>(5.62)               | 0.036***<br>(5.43)                 | 0.027***<br>(4.59)                 | 0.026***<br>(4.60)               | 0.031***<br>(4.98)                 |
| PINDDIR          | -0.076<br>(-0.34)                  | -0.113<br>(-0.49)                | -0.046<br>(-0.20)                  | -0.085<br>(-0.33)                  | -0.128<br>(-0.49)                | -0.062<br>(-0.24)                  |
| PAUDDIR          | -0.063<br>(-0.21)                  | -0.077<br>(-0.25)                | -0.029<br>(-0.09)                  | -0.200<br>(-0.57)                  | -0.202<br>(-0.58)                | -0.158<br>(-0.45)                  |
| AUDCHG           |                                    |                                  |                                    | 0.304**<br>(2.25)                  | 0.364***<br>(2.61)               | 0.187<br>(1.38)                    |
| CRD              | 0.297***<br>(17.43)                | 0.291***<br>(16.91)              | 0.306***<br>(17.29)                | 0.306***<br>(16.08)                | 0.299***<br>(15.85)              | 0.312***<br>(15.74)                |

|          |                      |                      |                      |                      |                      |                      |
|----------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| LEVEL    | -0.361***<br>(-8.35) | -0.231***<br>(-5.85) | -0.332***<br>(-8.55) | -0.347***<br>(-6.30) | -0.183***<br>(-3.84) | -0.154***<br>(-2.76) |
| SLOPE    | -0.501***<br>(-7.73) | -0.300***<br>(-5.10) | -0.438***<br>(-7.29) | -0.485***<br>(-5.93) | -0.260***<br>(-3.63) | -0.255***<br>(-3.34) |
| EURO     | -0.112<br>(-1.37)    | -0.265***<br>(-2.94) | -0.034<br>(-0.50)    | 0.018<br>(0.21)      | -0.333***<br>(-2.88) | 0.090<br>(1.12)      |
| MUNI     | 1.895***<br>(9.29)   | 1.744***<br>(9.27)   | 1.399***<br>(8.14)   | 2.077***<br>(8.09)   | 1.873***<br>(8.27)   | 1.732***<br>(8.46)   |
| LogAGE   | 0.082***<br>(6.41)   | 0.081***<br>(6.30)   | 0.081***<br>(6.29)   | 0.074***<br>(5.38)   | 0.074***<br>(5.28)   | 0.071***<br>(5.11)   |
| LogMAT   | 0.049*<br>(1.77)     | 0.052*<br>(1.87)     | 0.046<br>(1.63)      | -0.000<br>(-0.00)    | 0.002<br>(0.07)      | -0.002<br>(-0.07)    |
| RETVOL   | 0.106***<br>(7.80)   | 0.111***<br>(8.13)   | 0.100***<br>(7.13)   | 0.107***<br>(7.29)   | 0.112***<br>(7.68)   | 0.103***<br>(6.76)   |
| LIQ      | -0.245***<br>(-4.08) | -0.273***<br>(-4.71) | -0.232***<br>(-3.90) | -0.223***<br>(-3.54) | -0.248***<br>(-4.05) | -0.216***<br>(-3.48) |
| TD2CAP   | 0.062***<br>(2.85)   | 0.063***<br>(3.01)   | 0.062***<br>(2.82)   | 0.062**<br>(2.52)    | 0.062***<br>(2.65)   | 0.063**<br>(2.54)    |
| LTDB     | 1.304***<br>(4.27)   | 1.379***<br>(4.58)   | 1.190***<br>(3.84)   | 1.447***<br>(4.03)   | 1.523***<br>(4.33)   | 1.332***<br>(3.67)   |
| VOLEARN  | -0.208<br>(-0.35)    | -0.227<br>(-0.37)    | -0.204<br>(-0.35)    | -0.004<br>(-0.01)    | -0.021<br>(-0.04)    | 0.027<br>(0.05)      |
| ROA      | -0.023<br>(-1.58)    | -0.025*<br>(-1.74)   | -0.021<br>(-1.39)    | -0.030*<br>(-1.81)   | -0.032*<br>(-1.95)   | -0.028*<br>(-1.69)   |
| QUIK     | -1.763***<br>(-2.90) | -1.878***<br>(-3.09) | -1.574***<br>(-2.60) | -2.226***<br>(-3.36) | -2.335***<br>(-3.53) | -1.981***<br>(-2.99) |
| INTD1    | 0.007<br>(0.18)      | 0.015<br>(0.40)      | -0.005<br>(-0.14)    | 0.002<br>(0.05)      | 0.011<br>(0.24)      | -0.012<br>(-0.28)    |
| INTD2    | 0.112***<br>(4.34)   | 0.113***<br>(4.46)   | 0.110***<br>(4.08)   | 0.126***<br>(4.27)   | 0.126***<br>(4.36)   | 0.120***<br>(3.88)   |
| INTD3    | 0.029<br>(1.39)      | 0.029<br>(1.38)      | 0.032<br>(1.44)      | 0.028<br>(1.18)      | 0.027<br>(1.17)      | 0.031<br>(1.25)      |
| INTD4    | 0.012*<br>(1.67)     | 0.011<br>(1.58)      | 0.012*<br>(1.66)     | 0.013*<br>(1.69)     | 0.012<br>(1.63)      | 0.013*<br>(1.67)     |
| NOBS     | 51602                | 51602                | 51602                | 42721                | 42721                | 42721                |
| Adj. RSQ | 0.6158               | 0.6125               | 0.6262               | 0.6280               | 0.6251               | 0.6391               |

**Table X**  
**Impact of Sarbanes-Oxley on Credit Spreads Across Discretionary Accruals,  
Earning Forecast Dispersion, and Gompers' Governance Index**

This table reports results of the robustness regression models of credit spread using post-SOX and pre-Enron time dummies. A firm is denoted as low-, mid-, and high-total (current) discretionary accruals when its total (current) discretionary accruals, per Teoh, Welch, Wong (1998) definition is, respectively, in the bottom, middle, and top thirds of the COMPUSTAT universe. A firm is denoted as low-, mid-, and high-earning dispersion when its analysts' forecasts' dispersion is, respectively, in the bottom, middle, and top thirds of the COMPUSTAT universe. A firm is denoted as democratic, medium, and dictatorship governance when its Gompers' index is, respectively, in the bottom, middle, and top thirds of the Gompers et al (2003) universe. LogAGE and LogMAT are natural logarithms of bond's age and maturity. INTD1, INTD2, INTD3, and INTD4 are censored interest coverage ratios per Blume et al (1998). All other variables are defined in Table I. Robust (heteroskedasticity, autocorrelation, and firm clustering corrected) *t*-statistics are reported in parentheses. Coefficients that are statistically different from zero are marked at 1%, 5% and 10% levels with \*\*\*, \*\*, and \* accordingly.

|                 | Low Total<br>Discretionary<br>Accruals | Mid Total<br>Discretionary<br>Accruals | High Total<br>Discretionary<br>Accruals | Low Current<br>Discretionary<br>Accruals | Mid Current<br>Discretionary<br>Accruals | High Current<br>Discretionary<br>Accruals |
|-----------------|--|--|---|--|--|---|
| NOBS            | 26447                                  | 24548                                  | 26520                                   | 26592                                    | 25903                                    | 25020                                     |
| <i>Panel A.</i> |  |  |   |  |  |   |
| POSTSOX         | -0.577***<br>(-5.87)                   | -0.444***<br>(-4.52)                   | -0.109<br>(-0.96)                       | -0.490***<br>(-4.98)                     | -0.199<br>(-1.60)                        | -0.418***<br>(-4.03)                      |
| Adj. RSQ        | 0.6156                                 | 0.5572                                 | 0.6175                                  | 0.5952                                   | 0.6113                                   | 0.5952                                    |
| <i>Panel B.</i> |  |  |   |  |  |   |
| PREENRON        | 0.149<br>(1.26)                        | 0.263**<br>(2.41)                      | 0.298***<br>(2.65)                      | 0.319***<br>(2.75)                       | 0.075<br>(0.69)                          | 0.303**<br>(2.53)                         |
| Adj. RSQ        | 0.6107                                 | 0.5538                                 | 0.6182                                  | 0.5919                                   | 0.6106                                   | 0.5929                                    |
|                 | Low Earning<br>Dispersion              | Mid Earning<br>Dispersion              | High Earning<br>Dispersion              | Democratic<br>Governance                 | Medium<br>Governance                     | Dictatorship<br>Governance                |
| NOBS            | 20014                                  | 20847                                  | 20594                                   | 51379                                    | 20290                                    | 5846                                      |
| <i>Panel C.</i> |  |  |   |  |  |   |
| POSTSOX         | -0.301***<br>(-5.29)                   | -0.359***<br>(-4.88)                   | -0.346**<br>(-2.11)                     | -0.502***<br>(-6.29)                     | -0.164<br>(-1.64)                        | -0.336***<br>(-3.17)                      |
| Adj. RSQ        | 0.5235                                 | 0.5355                                 | 0.6173                                  | 0.6138                                   | 0.6056                                   | 0.5139                                    |
| <i>Panel D.</i> |  |  |   |  |  |   |
| PREENRON        | 0.210***<br>(4.26)                     | 0.198**<br>(2.39)                      | 0.196<br>(1.28)                         | 0.324***<br>(3.31)                       | 0.067<br>(0.48)                          | 0.043<br>(0.25)                           |
| Adj. RSQ        | 0.5181                                 | 0.5300                                 | 0.6160                                  | 0.6110                                   | 0.6050                                   | 0.5094                                    |

**Table XI**  
**Impact of Sarbanes-Oxley on Credit Spreads Across Discretionary Accruals,**  
**Earning Forecast Dispersion, and Gompers' Governance Index**

This table reports results of the robustness regression models of credit spread using post-SOX and pre-Enron time dummies. A firm is denoted as low-, mid-, and high-board independence when the fraction of independent board members is, respectively, in the bottom, middle, and top thirds of the universe. A firm is denoted as few, mid, and several auditors on board when the fraction of auditor board members is, respectively, in the bottom, middle, and top thirds of the universe. A firm is denoted as few, mid, and several independent auditors on board when the fraction of independent auditor board members is, respectively, in the bottom, middle, and top thirds of the universe. A firm is denoted as few, mid, and several independent auditors when the fraction of independent auditor board members to total auditor board members is, respectively, in the bottom, middle, and top thirds of the universe. LogAGE and LogMAT are natural logarithms of bond's age and maturity. INTD1, INTD2, INTD3, and INTD4 are censored interest coverage ratios per Blume et al (1998). All other variables are defined in Table I. Robust (heteroskedasticity, autocorrelation, and firm clustering corrected) *t*-statistics are reported in parentheses. Coefficients that are statistically different from zero are marked at 1%, 5% and 10% levels with \*\*\*, \*\*, and \* accordingly.

|                 | Low Board<br>Independence                 | Mid Board<br>Independence                 | High Board<br>Independence                    | Few Auditor<br>on Board       | Mid Auditor<br>on Board       | Several<br>Auditor on<br>Board    |
|-----------------|---|---|---|-------------------------------|-------------------------------|-----------------------------------|
| NOBS            | 15598                                     | 18944                                     | 25585   | 22881                         | 15829                         | 14559                             |
| <i>Panel A.</i> |   |   |   |                               |                               |                                   |
| POSTSOX         | -0.566***<br>(-4.20)                      | -0.235**<br>(-2.01)                       | -0.348***<br>(-2.91)                          | -0.344***<br>(-2.82)          | -0.524***<br>(-3.76)          | -0.693***<br>(-4.37)              |
| Adj. RSQ        | 0.6364                                    | 0.5929                                    | 0.5599  | 0.5975                        | 0.6038                        | 0.5928                            |
| <i>Panel B.</i> |   |   |   |                               |                               |                                   |
| PREENRON        | 0.322**<br>(2.36)                         | 0.241*<br>(1.74)                          | 0.183<br>(1.60)                               | 0.137<br>(1.10)               | 0.387***<br>(2.80)            | 0.537***<br>(3.85)                |
| Adj. RSQ        | 0.6314                                    | 0.5924                                    | 0.5576  | 0.5949                        | 0.6006                        | 0.5869                            |
|                 | Few<br>Independent<br>Auditor on<br>Board | Mid<br>Independent<br>Auditor on<br>Board | Several<br>Independent<br>Auditor on<br>Board | Few<br>Independent<br>Auditor | Mid<br>Independent<br>Auditor | Several<br>Independent<br>Auditor |
| NOBS            | 20060                                     | 18075                                     | 15134   | 13378                         | 31791                         | 8083                              |
| <i>Panel C.</i> |   |   |   |                               |                               |                                   |
| POSTSOX         | -0.547***<br>(-4.41)                      | -0.437***<br>(-3.57)                      | -0.483***<br>(-3.31)                          | -0.589***<br>(-5.52)          | -0.425***<br>(-4.40)          | N/A                               |
| Adj. RSQ        | 0.6110                                    | 0.5795                                    | 0.5993  | 0.6285                        | 0.6109                        |                                   |
| <i>Panel D.</i> |   |   |   |                               |                               |                                   |
| PREENRON        | 0.329***<br>(2.88)                        | 0.263*<br>(1.81)                          | 0.340***<br>(2.60)                            | 0.441***<br>(3.63)            | 0.115<br>(0.96)               | 0.480<br>(1.58)                   |
| Adj. RSQ        | 0.6056                                    | 0.5763                                    | 0.5964  | 0.6239                        | 0.6075                        | 0.4960                            |

**Table XII**  
**Impact of Sarbanes-Oxley on Credit Spreads Across Insider Stock and Option Trading,  
Auditor Change, and SOX 302 Compliance**

This table reports results of the robustness regression models of credit spread using post-SOX and pre-Enron time dummies. Total ownership refers to the CEO's stocks and option shareholding where as stock ownership refers to the CEO's stock shareholding. LogAGE and LogMAT are natural logarithms of bond's age and maturity. INTD1, INTD2, INTD3, and INTD4 are censored interest coverage ratios per Blume et al (1998). All other variables are defined in Table I. Robust (heteroskedasticity, autocorrelation, and firm clustering corrected) *t*-statistics are reported in parentheses. Coefficients that are statistically different from zero are marked at 1%, 5% and 10% levels with \*\*\*, \*\*, and \* accordingly.

|                 | Increased in<br>Total<br>Ownership | Decreased<br>less than<br>50% in Total<br>Ownership | Decreased<br>more than<br>50% in Total<br>Ownership | Increased in<br>Stock<br>Ownership | Decreased<br>less than<br>50% in Stock<br>Ownership | Decreased<br>more than<br>50% in Stock<br>Ownership |
|-----------------|------------------------------------|---|---|------------------------------------|---|---|
| NOBS            | 37953                              | 20920   | 7556  | 38261                              | 18861   | 9307  |
| <i>Panel A.</i> |                                    |   |   |                                    |   |   |
| POSTSOX         | -0.191*<br>(-1.95)                 | -0.322***<br>(-2.87)                                | -0.708***<br>(-4.28)                                | -0.206**<br>(-1.99)                | -0.315***<br>(-2.61)                                | -0.709***<br>(-4.53)                                |
| Adj. RSQ        | 0.5887                             | 0.6226  | 0.6436  | 0.6073                             | 0.5728  | 0.6533  |
| <i>Panel B.</i> |                                    |   |   |                                    |   |   |
| PREENRON        | 0.124<br>(1.19)                    | 0.170<br>(1.27)                                     | 0.641***<br>(3.88)                                  | 0.134<br>(1.29)                    | 0.245**<br>(2.20)                                   | 0.482**<br>(2.55)                                   |
| Adj. RSQ        | 0.5881                             | 0.6208  | 0.6394  | 0.6066                             | 0.5710  | 0.6466  |
|                 | Auditor<br>Same                    | Auditor<br>Changed                                  | Auditor<br>Same                                     | Auditor<br>Changed                 | SOX 302 is<br>not met                               | SOX 302 is<br>met                                   |
| POSTSOX         | -0.561***<br>(-6.71)               | -0.078<br>(-0.32)                                   |   |                                    | -0.447***<br>(-4.76)                                | -1.316**<br>(-2.33)                                 |
| PREENRON        |                                    |   | 0.310***<br>(3.63)                                  | 0.358<br>(0.35)                    |   |   |
| NOBS            | 49940                              | 3145  | 13382   | 1661                               | 36841   | 1609  |
| Adj. RSQ        | 0.6016                             | 0.6401  | 0.5977  | 0.6403                             | 0.6258  | 0.6285  |

**Table XIII**  
**Changes of Credit Spreads and Sarbanes-Oxley Act**

This table reports results of the regression models of annual changes in credit spreads. In these regressions, the impact of year, industry, firm, and bond fixed effects are controlled for, using a series of dummy variables. The panel regression results with Newey-West t-statistics are also reported. The cross-sectional regressions results based on the time-series averages of 3859 bonds are also reported. For brevity, the coefficients on year, industry, firm and bond dummy variables are not reported. LogAGE and LogMAT are natural logarithms of bond's age and maturity. All other variables are defined in Table I. Robust (heteroskedasticity, autocorrelation, and firm clustering corrected) *t*-statistics are reported in parentheses. Coefficients that are statistically different from zero are marked at 1%, 5% and 10% levels with \*\*\*, \*\*, and \* accordingly.

|                  |                              | Industry<br>Fixed Effects    | Firm &<br>Industry<br>Fixed Effects | Bond &<br>Industry<br>Fixed Effects | Newey-West<br>Standard<br>Errors | Cross-<br>Sectional<br>Regression |
|------------------|------------------------------|------------------------------|-------------------------------------|-------------------------------------|----------------------------------|-----------------------------------|
| Constant         | 0.782***<br>(5.33)           | 0.771***<br>(5.47)           | 0.739***<br>(5.05)                  | 0.482**<br>(1.98)                   | 0.773***<br>(6.13)               | 1.496***<br>(8.24)                |
| <b>POSTSOX</b>   | <b>-0.361***<br/>(-3.96)</b> | <b>-0.355***<br/>(-3.80)</b> | <b>-0.371***<br/>(-2.93)</b>        | <b>-0.481***<br/>(-2.91)</b>        | <b>-0.360***<br/>(-7.51)</b>     | <b>-0.258***<br/>(-3.78)</b>      |
| ΔCRD             | 0.448***<br>(8.77)           | 0.443***<br>(9.31)           | 0.436***<br>(8.09)                  | 0.402***<br>(8.11)                  | 0.446***<br>(17.61)              | 0.531***<br>(23.50)               |
| ΔLEVEL           | -0.299***<br>(-4.14)         | -0.295***<br>(-4.18)         | -0.298***<br>(-4.12)                | -0.270***<br>(-4.32)                | -0.299***<br>(-8.06)             | -0.407***<br>(-5.93)              |
| ΔSLOPE           | -0.418***<br>(-4.79)         | -0.414***<br>(-4.75)         | -0.414***<br>(-4.45)                | -0.484***<br>(-4.25)                | -0.420***<br>(-6.67)             | -0.128<br>(-1.04)                 |
| ΔEURO            | -0.661***<br>(-4.51)         | -0.665***<br>(-4.47)         | -0.525***<br>(-3.11)                | -0.417***<br>(-2.66)                | -0.662***<br>(-5.72)             | -0.891***<br>(-4.85)              |
| ΔMUNI            | 1.745***<br>(5.81)           | 1.730***<br>(5.83)           | 1.742***<br>(5.69)                  | 1.413***<br>(5.78)                  | 1.737***<br>(11.47)              | 2.924***<br>(12.40)               |
| ΔLogAGE          | 0.041***<br>(2.83)           | 0.048***<br>(3.44)           | 0.046**<br>(2.21)                   | -0.007<br>(-0.21)                   | 0.041***<br>(3.58)               | 0.060**<br>(2.49)                 |
| ΔLogMAT          | -0.606<br>(-1.37)            | -0.632<br>(-1.43)            | -0.576<br>(-1.24)                   | -0.703*<br>(-1.79)                  | -0.627***<br>(-3.23)             | -0.935***<br>(-6.10)              |
| ΔRETVOL          | 0.051***<br>(3.44)           | 0.051***<br>(3.50)           | 0.045***<br>(2.84)                  | 0.035**<br>(2.18)                   | 0.051***<br>(6.50)               | 0.080***<br>(10.71)               |
| ΔVIX             | 0.024***<br>(3.45)           | 0.024***<br>(3.58)           | 0.023***<br>(3.33)                  | 0.031***<br>(3.64)                  | 0.024***<br>(4.21)               | -0.004<br>(-0.47)                 |
| ΔJUMP            | -0.262<br>(-1.44)            | -0.275<br>(-1.48)            | -0.288<br>(-1.46)                   | -0.107<br>(-0.56)                   | -0.261*<br>(-1.68)               | -0.670**<br>(-2.56)               |
| MKTVOL           | -0.158***<br>(-3.49)         | -0.157***<br>(-3.50)         | -0.178***<br>(-3.94)                | -0.100**<br>(-2.48)                 | -0.157***<br>(-5.33)             | -0.345***<br>(-9.40)              |
| Industry Dummies | -                            | Yes                          | Yes                                 | Yes                                 | -                                | -                                 |
| Firm Dummies     | -                            | -                            | Yes                                 | -                                   | -                                | -                                 |
| Bond Dummies     | -                            | -                            | -                                   | Yes                                 | -                                | -                                 |
| Adj RSQ          | 11454                        | 11454                        | 11454                               | 11454                               | 11459                            | 3556                              |
| Nobs             | 0.2218                       | 0.2248                       | 0.2774                              | 0.1896                              | 0.2218                           | 0.3570                            |
| Constant         | 0.756***<br>(4.26)           | 0.747***<br>(4.36)           | 0.719***<br>(4.07)                  | 0.463*<br>(1.96)                    | 0.748***<br>(5.63)               | 1.540***<br>(8.51)                |
| TIMELINE1        | -0.073                       | -0.054                       | -0.096                              | -0.179                              | -0.075                           | -0.013                            |

|                  |                              |                              |                            |                            |                              |                             |
|------------------|------------------------------|------------------------------|----------------------------|----------------------------|------------------------------|-----------------------------|
|                  | (-0.52)                      | (-0.38)                      | (-0.59)                    | (-1.03)                    | (-0.70)                      | (-0.06)                     |
| TIMELINE2        | 0.674***<br>(4.46)           | 0.665***<br>(4.49)           | 0.551***<br>(3.33)         | 0.453**<br>(2.58)          | 0.673***<br>(6.55)           | 1.260***<br>(7.21)          |
| TIMELINE3        | 0.646***<br>(3.33)           | 0.640***<br>(3.27)           | 0.804***<br>(3.79)         | 0.925***<br>(3.39)         | 0.650***<br>(3.95)           | -0.981***<br>(-3.91)        |
| TIMELINE4        | 0.583**<br>(2.34)            | 0.611***<br>(2.58)           | 0.672***<br>(3.20)         | 0.612**<br>(2.41)          | 0.592***<br>(3.82)           | 0.418**<br>(2.04)           |
| TIMELINE5        | 0.215<br>(0.81)              | 0.198<br>(0.74)              | 0.278<br>(1.14)            | 0.266<br>(1.17)            | 0.214<br>(1.31)              | 0.164<br>(0.68)             |
| TIMELINE6        | 0.491*<br>(1.92)             | 0.487*<br>(1.85)             | 0.246<br>(0.84)            | 0.230<br>(0.67)            | 0.483**<br>(2.53)            | 0.464**<br>(2.13)           |
| TIMELINE7        | 0.108<br>(0.58)              | 0.115<br>(0.62)              | 0.203<br>(0.95)            | 0.074<br>(0.26)            | 0.112<br>(0.74)              | 0.005<br>(0.03)             |
| TIMELINE8        | 0.252<br>(1.12)              | 0.266<br>(1.19)              | 0.490**<br>(2.08)          | 0.343<br>(1.09)            | 0.255<br>(1.38)              | 0.068<br>(0.21)             |
| <b>TIMELINE9</b> | <b>-0.234***<br/>(-2.81)</b> | <b>-0.226***<br/>(-2.63)</b> | <b>-0.198*<br/>(-1.67)</b> | <b>-0.287*<br/>(-1.71)</b> | <b>-0.232***<br/>(-5.03)</b> | <b>-0.160**<br/>(-2.21)</b> |
| ΔCRD             | 0.440***<br>(8.30)           | 0.434***<br>(8.83)           | 0.427***<br>(7.90)         | 0.401***<br>(8.11)         | 0.438***<br>(17.06)          | 0.528***<br>(23.40)         |
| ΔLEVEL           | -0.320***<br>(-2.91)         | -0.317***<br>(-2.98)         | -0.292***<br>(-2.77)       | -0.256***<br>(-3.87)       | -0.319***<br>(-6.20)         | -0.475***<br>(-6.27)        |
| ΔSLOPE           | -0.446***<br>(-4.80)         | -0.442***<br>(-4.80)         | -0.422***<br>(-4.34)       | -0.481***<br>(-4.15)       | -0.446***<br>(-6.84)         | -0.153<br>(-1.22)           |
| ΔEURO            | -0.338**<br>(-2.09)          | -0.343**<br>(-2.09)          | -0.238<br>(-1.39)          | -0.203<br>(-1.30)          | -0.339**<br>(-2.57)          | -0.564***<br>(-2.69)        |
| ΔMUNI            | 1.662***<br>(7.98)           | 1.650***<br>(7.84)           | 1.740***<br>(7.83)         | 1.456***<br>(6.24)         | 1.657***<br>(11.01)          | 2.587***<br>(9.90)          |
| ΔLogAGE          | 0.051***<br>(3.36)           | 0.057***<br>(4.07)           | 0.059***<br>(2.80)         | 0.027<br>(0.86)            | 0.051***<br>(4.42)           | 0.062**<br>(2.56)           |
| ΔLogMAT          | -0.575<br>(-1.31)            | -0.600<br>(-1.36)            | -0.511<br>(-1.11)          | -0.421<br>(-1.16)          | -0.597***<br>(-3.06)         | -0.901***<br>(-5.90)        |
| ΔRETVOL          | 0.054***<br>(3.69)           | 0.054***<br>(3.73)           | 0.049***<br>(2.98)         | 0.035**<br>(2.00)          | 0.054***<br>(6.55)           | 0.083***<br>(10.89)         |
| ΔVIX             | 0.022***<br>(3.36)           | 0.023***<br>(3.45)           | 0.019***<br>(2.85)         | 0.028***<br>(3.45)         | 0.022***<br>(3.88)           | -0.003<br>(-0.39)           |
| ΔJUMP            | -0.326*<br>(-1.71)           | -0.337*<br>(-1.73)           | -0.368*<br>(-1.79)         | -0.216<br>(-1.12)          | -0.325**<br>(-2.09)          | -0.570**<br>(-2.17)         |
| MKTVOL           | -0.189***<br>(-3.61)         | -0.189***<br>(-3.62)         | -0.207***<br>(-3.70)       | -0.121***<br>(-3.11)       | -0.188***<br>(-5.99)         | -0.380***<br>(-10.18)       |
| Industry Dummies | -                            | Yes                          | Yes                        | Yes                        | -                            | -                           |
| Firm Dummies     | -                            | -                            | Yes                        | -                          | -                            | -                           |
| Bond Dummies     | -                            | -                            | -                          | Yes                        | -                            | -                           |
| Adj RSQ          | 11454                        | 11454                        | 11454                      | 11454                      | 11459                        | 3556                        |
| Nobs             | 0.2318                       | 0.2348                       | 0.2872                     | 0.1997                     | 0.2320                       | 0.3693                      |



Figure 1. This figure plots the weekly credit spreads for Moody’s AAA-rated (thick black line, or DWAAA), BAA-rated (thick gray line, DWBAA) corporate bonds and composite index of 20-year maturity state and local government bonds (the think black line, or DWSL20) over the period of Jan 2, 1998 – Dec 25, 2006. Corporate credit spreads are defined as the risky bond’s yield minus Treasury 20-year constant maturity bond’s yield. Municipal credit spreads are defined as the risky bond’s yield minus Treasury 20-year constant maturity bond’s after tax yield. All data is from Board of Governors of the Federal Reserve system.

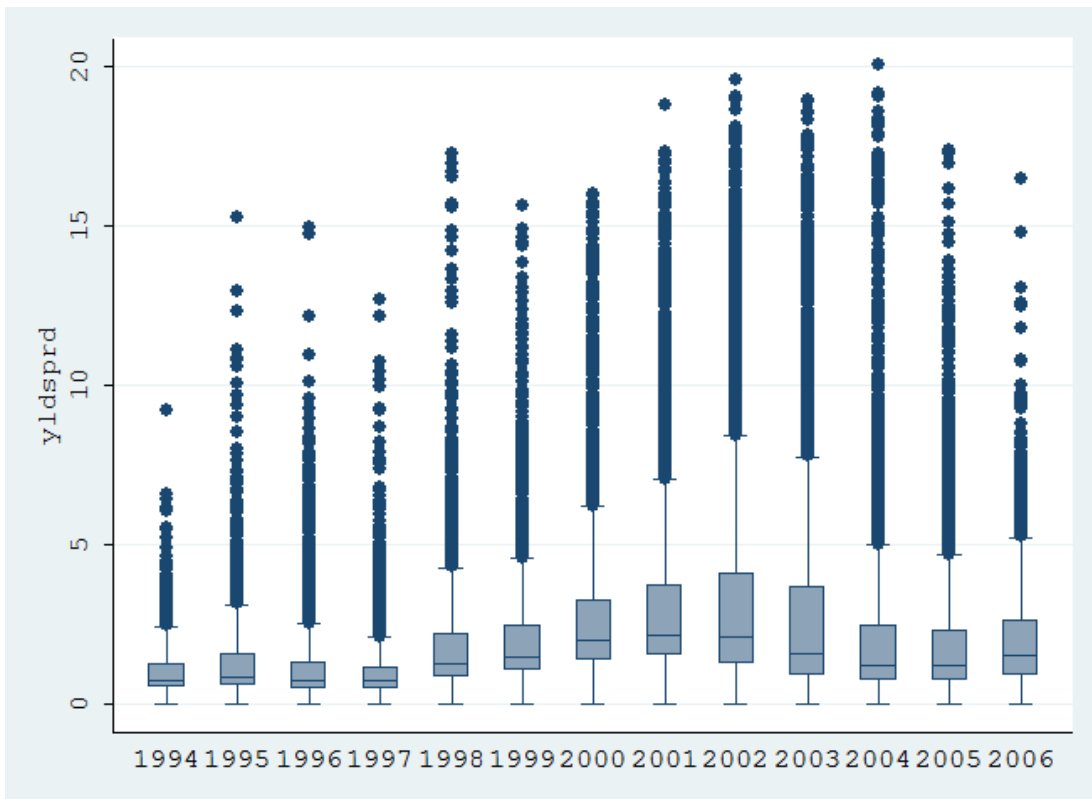


Figure 2. This figure plots the credit spreads over the period of 1994 – 2006.

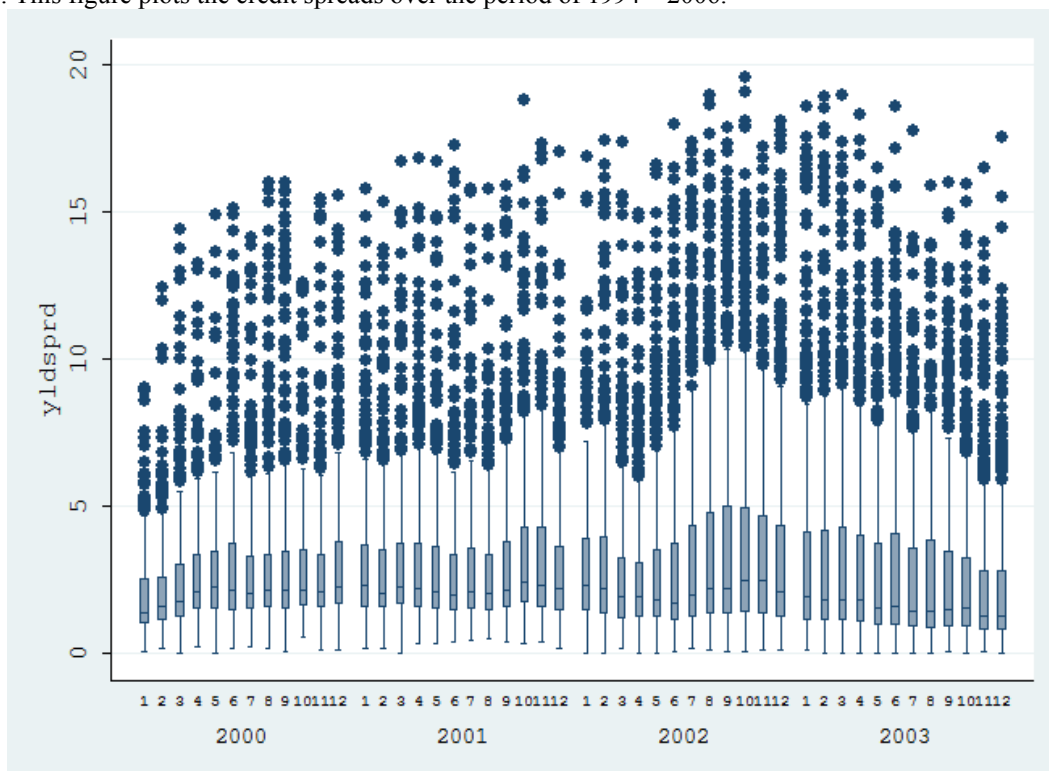


Figure 3. This figure plots the monthly distribution of credit spreads over the period of 2000 – 2003.