

**ASSESSMENT OF THE SARBANES-OXLEY ACT ON THE FIRM
USING A DIFFERENCE-IN-DIFFERENCE ESTIMATOR**

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ABSTRACT

[Will be given after completing the paper]

Keywords: Sarbanes-Oxley Act, Valuation, Financial Reporting

The Sarbanes-Oxley Act (SOX) of 2002 which is also known as the Public Company Accounting Reform and Investor Protection Act promulgates the importance of effective internal control systems after a series of accounting scandals in the early 2000's in which firms misreported their earnings. The main objective for the implementation of SOX is to improve the quality and transparency of financial reports and provide investors more confidence in these financial reports by focusing more on internal controls of financial reporting by firms. More importantly, Sections 302 and 404¹ of this Act require publically traded companies to certify the effectiveness of their internal controls and assessment by its management that the internal controls implemented are adequate. Though the Act has implemented more transparency in financial reporting requirements, many firms contend that these additional compliance requirements provide additional costs on their firms.

The Sarbanes-Oxley Act of 2002 (SOX) mandates management evaluation and independent audits of its financial management practices. Firms contend that the compliance requirements of the Sarbanes-Oxley Act of 2002 are costly to firms, and these costs of compliance could have significant impacts on the valuation of the firm. In fact, before the enactment of the SOX, firms were required to have an adequate system of internal controls and firms were only required to disclose any deficiencies in their reporting requirement if the firm changed its auditor (SEC, 1988). SOX also require all public companies to maintain accurate records pertaining to its financial matters and maintain a system of internal accounting control. Because of these increased compliance requirements, higher costs could be imposed on the firms. In fact, O'Sullivan (2006)

¹ Section 404 requires that an outside auditing firm attests to the management's assessment of the firm's controls. The purpose of this section is to help firms detect fraudulent reporting early and deter financial fraud.

found that public companies have incurred greater than expected costs to comply with section 404 of SOX which showed a 58% increase in fees charged by its external auditors.

The objective of this paper is to analyze the before and after effects of the compliance of SOX on publicly traded firms and the impact of this compliance on the valuation of the firm. The balance of this paper is as follows. Section II will provide the literature review. Section III presents the statistical methodology and the data requirements for these models. Section IV explains the results of the analysis, and section V concludes the paper.

Section II: Related Literature

The framework of the Sarbanes-Oxley Act impacts all positions within the firm: senior executives, board members and auditors to legal counsel and staff employees. The most revolutionary feature of SOX requires the CEOs and CFOs of all public companies, as well as foreign issuers with U.S.-listed securities to certify quarterly and annual reports. Furthermore, these public companies firms also have to report any deficiencies in internal controls to their independent auditors and audit committees. Given these new compliance requirements in financial reporting, these public companies are imposed with more costs, more challenges, and more potential liabilities (Linsley, 2003).

Since the enactment of the Sarbanes-Oxley Act in 2002, the average cost of compliance for companies with under \$1 billion in annual revenue has increased more than \$1.8 million to approximately \$2.9 million, representing a 174% overall increase (Hartman, 2006). Additionally, the implementation of the Sarbanes-Oxley Act of 2002

has resulted in a multitude of criticisms by the leadership at many firms in terms of the costs of compliance. Some of the criticisms focused on the negative impacts of compliance on small public companies, and these negative impacts would have an impact on the valuation of these firms. In fact, the effects of this compliance had more negative impacts on private firms than public firms (DiGabriele, 2007). Some research has shown that the effects of the Sarbanes-Oxley Act had some impact on the firm's market valuation which has ranged from 15% to 34 %. The amount of the increase of the market valuation was contingent on the measure of the board type of the firm (Switzer, 2007).

A few papers have been written to study the market reaction to Sarbanes-Oxley Act using event-study methodology, and the general finding from these papers have been mixed. More specifically, Li et al. (2004), Chhaochharia et al. (2004), and Jain et al. (2005) suggest that SOX is value increasing, while Zhang (2005) suggests that SOX is value decreasing.

Section 404 has been a controversial aspect of SOX for the publicly traded firms since it requires the external auditors to verify that the internal controls on financial reporting are accurate. More specifically, these firms will be required to have their external auditors provide an audit opinion on the effectiveness of internal controls over financial reporting (Securities Exchange Commission, 2004). In fact, the regulators believe that the amelioration of the internal control weaknesses is important because the careful examination of these internal controls will ultimately lead to more reliable financial statements. Moreover, investors and shareholders would be negatively impacted by internal control weaknesses (Nicolaisen 2004, 2005; Niemeier 2005). Many researchers would agree that the amelioration to the internal control weakness problem is

important, and such amelioration could improve confidence by investors in the firms' financial reports by signaling to the market that financial statements are more accurate (Ashbaugh-Skaife et al., 2007). Unlike compliance of the section 302 of Sarbanes-Oxley Act, management is required to evaluate the effectiveness of internal controls on a quarterly basis under Section 302 but the management is not required to audit of the effectiveness of the internal control systems.

As stated earlier in this paper, the implementation of the Sarbanes-Oxley Act has provided much criticism to correct account and business practices.² To assess the impacts of these changes of SOX, Chang et al (2009) attempts a response to these criticisms by investigating changes in productive efficiency using the Malmquist productivity index for 62 of the largest US public accounting firms between the periods (2000–2001) and (2003–2004)—the periods before and after enactment of SOX in July of 2002. Contrary to many of the criticisms levied by businesses, their empirical results indicated that accounting firms have exhibited significant post SOX growth in productive efficiency which is better than pre-SOX performances.

Chang et al (2009a) investigates productivity growth, technical progress, and efficiency using the data envelopment analysis to calculate the Malmquist productivity index change for a group of the 56 largest CPA firms in the US from the period 1996–1999 through the period 2003–2006, where the former preceded, and the latter followed, enactment of the Sarbanes–Oxley Act (SOX). As with the Chang et al (2008a), Chang (2009b) utilized the data envelopment analysis (DEA) is used to calculate the Malmquist

² The prospect of prohibiting simultaneous provision of accounting-audit services and the more profitable MAS (management advisory services) was a concern to the accounting industry. Because of these concerns, they conducted a campaign against this legislation. Given the scandals of Enron and Worldcom, these accounting firms place their concerns aside. Asare et al. (2005) used a designed experiment to test these conflicting claims and found that their results were consistent with the claim of the accounting industry that this practice was not associated with higher risks.

productivity index of three measures of interest: productivity growth, technical progress, and efficiency change. Their results indicate that CPA firms, on average, experienced a productivity growth of approx. 17% from the pre- to post-SOX period. These latter results are consistent with the results obtained by Banker et al (2005). Additionally, Chang et al (2009b) and Banker et al (2005) reveal that this productivity gain can be attributed primarily to technical progress rather than a change in relative efficiency.

The implications of the Sarbanes-Oxley Act have impacted all facets of the public accounting practices. Some additional impacts have also been examined in the accounting and finance literature. Some studies have focused on how this Act affects auditor independence (Lai, 2003) as well as the impact on the audit fees [(Asthana et al. (2004); Griffin and Lont (2005); Raghunandan and Rama (2006)].

Section III: Methodology and Data Sources

In this analysis, the differences-in-differences estimator (DID) will be used to assess the changes of Sarbanes Oxley Act on the valuation of the firm before and after the implementation of this Act. We could just compare the treatments before and after the Sarbanes-Oxley Act but we could pickup other effects that changed at the time of the implementation of the Act. As a remedy, a control group is used to difference out these confounding factors and to isolate the treatment effect. Put in another way, the control group's "valuation after" minus "valuation before" represents what would have happened to the treatment group, if only they had not received the treatment. The difference in difference estimator is defined as the difference in average outcome in the treatment group before and after treatment minus the difference in average outcome in the control group before and after treatment. The general form of this estimator is given as

$$(1) \quad \text{Treatment_Effect} = \bar{y}_1^t - \bar{y}_0^t - (\bar{y}_1^c - \bar{y}_0^c)$$

where t represents the treatment group and c is the control group and the subscript 0 denotes the pretreatment period and 1 denotes the post-treatment period. Additionally, (1) states that the average change in outcome (pre and post treatment) for the treatment group minus the average change in the control group. A more general specification for this regression can be generalized as

$$(2) \quad y_{it} = \beta_0 + \beta_1 \text{Treated}_i + \beta_2 \text{Post}_t + \beta_3 \text{Treated}_i * \text{Post}_t + \varepsilon_{it}$$

β_0 is the intercept or constant term; and ε_{it} is the error term in which $\varepsilon_{it} \sim WN(0, \sigma^2)$. Also : i indexes the firms and t the month; y_{it} is the dependent variable for valuation of the firm; Treated is treat = 1 if in treatment group, = 0 if in control group; after = 1 if after treatment, = 0 if before treatment; and Post refers to time periods after the implementation of Sarbanes-Oxley Act in 2002. Hence, β_3 gives the difference-in-difference estimate concerning the implementation of the Sarbanes-Oxley Act. The use of the differences-in-differences estimator (DID) reveals two advantages which can be revealed by OLS methods. First, the group effects which capture differences across groups that are constant over time and the year effects which capture differences over time that is common to all groups in the analysis.

Since these results from the differences-in-differences are not the result of a randomized experiment, there are other variable we need to control for other factors that might affect the outcomes. These other variables would include book value of equity (BV), earnings before extraordinary items divided by total number of shares outstanding (EPS), capital expenditures/sales (CAS), industry competition (INDUSTRY) and R and

D/Assets (*RD*). Given the inclusion of these other regressors, the difference-in-difference regression model can be generalized as

$$(3) \quad y_{i,t} = X_{i,t}\beta + \delta * treated_i + \varphi Post_t + \theta Treated_i * Post_t + \varepsilon_{i,t}$$

where $X_{i,t}\beta$ represents the matrix of other regressors and coefficients for this difference-in-difference regression and $\varepsilon_{it} \sim WN(0, \sigma^2)$. From equation (3), the coefficient of θ gives the difference-in-difference estimate concerning the implementation of the Sarbanes-Oxley Act.

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