Accrual Manipulation and Real Earnings Management Activities around Debt Covenant Violation

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ABSTRACT

This paper examines earnings management activities around debt covenant violation. We focus on accruals management and real activities manipulation behavior of managers in the quarters around the covenant violation. We expect covenant restrictions to influence these activities in the quarters surrounding and the quarter of the violation. The evidence is consistent with managers manipulating earnings using accrual-based and real earnings management activities and provides evidence for the debt covenant hypothesis. Cross-sectional analyses reveal that managers appear to manipulate accruals in successive quarters to increase reported earnings. The evidence on the use of real activities suggests that while managers increase reported earnings in the violation quarter, they have limited discretion over the use of real earnings management techniques in the quarters surrounding the violation.

KEYWORDS: Debt covenant violation, Accruals manipulation, Real earnings management

JEL Classification: G14, G32, M4, M41

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1. Introduction

In this paper weexamine both real and accrual-based earnings management activities around the time of debt covenant violations. Positive accounting theory suggests that firms approaching debt covenant violations will make income-increasing choices to loosen their debt constraints (Watts and Zimmerman, 1986). Early research (e.g. Jones, 1991) suggests that managers may rely on cost allocations rather than accruals to manage earnings. DeFond and Jiambalvo (1994) provide evidence that debt covenant restrictions influence accounting choices and managers engage in accruals manipulation in the period preceding and the period of the violation. Their conclusions are however limited to a sample of 94 firms. Managers also have incentives to manipulate real activities during the period to meet certain covenant thresholds. Real activities manipulation affects cash flows and, in some cases, accruals. Earlier studies on earning management through real activities manipulation have focused mainly on investment activities, such as reductions in expenditures on research and development (Baber et al, 1991; Bushee, 1998; Bens et al, 2003).

Recent research shows increased appreciation for the importance of understanding how firms manage earnings through real activities manipulation in addition to accrual-based activities (Zang, 2012). Roychowdhury (2006) finds evidence that managers are providing price discounts to increase salestemporarily, overproducing to report lower costs of goods sold and reducing discretionary expenses. Graham et al (2005) provide evidence suggesting that managers prefer real earnings management to accrual-based earnings management since real earnings management is less likely to be scrutinized by auditors and regulators. Subsequently, Cohen et al (2008) found evidence that managers have shifted away from accrual-based to real earnings management in the post Sarbanes-Oxley Act (SOX) period.

Despite the increasing interest in and importance of real earnings management activities, no study to date has examined whether and how firms engage in real earnings management around covenant violations, and how real and accrual-based earnings management activities vary around the violation period. This paper contributes to the literature on earnings management around covenant violation by presenting evidence on the management of not only accruals but also operational activities.

To capture accrual-based earnings management we follow prior studies[1] that use the cross-sectional model developed by Jones (1991) to estimate abnormal levels of total accruals and working capital accruals. We use working capital accruals in addition to total accruals as the former are more susceptible to management manipulation (DeFond and Jiambalvo, 1994). To capture real earnings management, we follow Roychowdhury (2006) and Cohen and Zarowin (2010) to estimate abnormal levels of discretionary expenses, production costs and cash flow from operations.

The paper makes four contributions to the literature. First, this is the first paper that uses the debt covenant violation quarterly data created by Sufi to provide evidence of earnings management around violation quarters. Second, it provides evidence that managers manipulate accruals to avoid debt covenant violations. Previous studies have attempted to provide evidence of accrual manipulation to avoid covenant violation, but due to the cost of accessing actual debt covenant information, they have generally used a proxy for the existence and tightness of accounting-based covenants. The most frequently used proxy is the debt-equity ratio but, as noted by Watts and Zimmerman (1986), researchers in effect have tested a debt-equity hypothesis.

[1] Sweeney, 1994; DeFond and Jiambalvo, 1994; Subramanyam, 1996.

> Ceteris paribus, the larger a firm's debt/equity ratio, the more likely the firm is to make accounting choices that shift reported earnings from future periods to the current period (p. 216).

This hypothesis is different from the debt covenant hypothesis, which states that managers will choose to shift reported earnings from the future to the current period when a firm is close to violating a debt covenant. The present study is the first to provide evidence on the covenant hypothesis.

Third, it provides evidence on real earnings management around debt covenant violations. Although prior research has focused on accrual-based earnings management, we provide evidence that managers also engage in real earnings management to avoid covenant violations. Fourth, it also provides evidence that accrual-based earning management is concentrated in the quarter prior to, quarter of, and quarter following the violation, and that real earnings management activities are concentrated in the quarter of the violation and the quarter following the violation.

Our approach to examining abnormal accruals (total and working capital) and abnormal real earnings management has at least two advantages. First, we focus my analysis on the quarter prior to, quarter of and quarter following the violation. If covenant restrictions motivate manipulations, it seems likely that the incentives to manipulate are the highest in these periods. Thus, this design offers a powerful test of the covenant hypothesis. Second, the approach does not require a proxy for covenant violation – the firms are ex post known to be in violation.

While this approach has several benefits, it does have two drawbacks. First, successful manipulators, who were able to manage earnings to avoid debt covenant violations, cannot be observed. Second, managers may anticipate the violation and believe that no reasonable amount

of manipulation will enable them to avoid the violation. This limitation would not have a serious effect on the quarter preceding the violation but, potentially, it makes the detection of manipulation in earnings, via accruals-based accounting and real earnings management, in the quarter of the violation, more difficult. In spite of this limitation wewere able to find evidence of earnings manipulation in the quarter of the violation.

The remainder of the paper is organized as follows. The next section describes the sample selection process and the variables used in the analysis. Section 3 provides the estimation models to calculate the normal levels of total accruals, working capital accruals, discretionary expenses, production costs and cash flow from operations. Section 4 develops the hypotheses and Section 5 presents the results. The final section of the study comprises the concluding remarks. The appendix contains the definition of the variables.

2. Data Description and Variables

The study uses two data sets for the analysis that follows. First, it employs the Compustat database to collect the firm-specific financial information used to define the firm characteristics used in the estimation models. The broadest sample of Compustat observations used in this paper consists of 23,148 U.S. firms and 697,064 firm-quarter observations from the first calendar quarter of 1995 to the second fiscal quarter of 2009. Second, it uses the debt covenant violation reporting database constructed by Sufi. The data were constructed using the SEC Edgar website, which contains indices of every filing submitted to the Commission. The Commission made electronic filing mandatory for all SEC-registered firms in the second calendar quarter of 1996. The earliest data point therefore is 1996 since electronic SEC filings were required to find the covenant violation. The entire data set covers the period 1996 – 2008 and includes fiscal quarters

through the fourth quarter of 2008. The sample of violation data observations used in this paper consists of 21,627 U.S. firms and 569,272 firm-quarter observations from the second calendar quarter of 1996 to the fourth fiscal quarter of 2008. For the purpose of this paper we look at only those violations where the company has not reported any violation in at least eight successive quarters leading up to the quarter of violation.

2. A. Data

To construct the sample, we start with the universe of U.S. firms in the Compustat database from 1995 – 2009. This is the broadest sample used in this study since the violation data define the starting and ending year boundaries. First, the violation data are available only from the second calendar quarter of 1996 when electronic filing became mandatory for all SEC-registered firms. Since our earliest analysis starts from five quarters prior to the violation, our sample starts from the first calendar quarter of 1995. Second, the violation data are only available until the fourth quarter of 2008 and we extend my analysis up to the second quarter after the violation quarter. The sample therefore extends to the second quarter of 2009. Subsequently, we merge the two data sets after imposing the quarter-year restrictions to construct the sample to be used in this study.

2. B. Variables

The two different data sets provide details on the variables used in the study. The violations database provides information on the incidence of violations of debt covenants. The data set reports a violation as one if a firm is in violation of a debt covenant in a quarter and zero otherwise. The Compustat database provides information on firm-specific characteristics. *Total*

Accruals (TA) is defined as net income minus operating cash flows following DeFond and Jiambalvo (1994). *Operating Cash Flows* is computed as working capital from operations, minus the sum of changes in accounts receivable, inventory and other current assets, plus the sum of changes in accounts payable, taxes payable and other current liabilities. *Working Capital Accruals (WCA)* is defined as the sum of changes in accounts receivable, inventory and other current assets, minus the sum of changes in accounts payable, taxes payable and other current liabilities. *Discretionary expenses (DISEXP)* is defined as the sum of research and development (R&D) and selling, general and administrative expenses (SG&A). *Production Costs (PROD)* is defined as the sum of costs of goods sold and changes in inventory. *Cash flows from Operations (CFO)* is the operating cash flow for the firm. *Total Assets(A)* is the quarterly assets of the firm. *Change inRevenues (*Δ*REV)* is the change in the revenue of the firm from time t-1 to time t. *Property, Plant and Equipment (PPE)* is the gross quarterly property, plant and equipment of the firm. *Sales (S)* is the total quarterly sales of the firm.

3. Estimation Models

3. A. Accrual-based earnings management

Weuse a cross-sectional model developed by Jones (1991) to calculate discretionary accruals after removing violating firm-quarters to obtain unbiased normal estimators and estimate the model for every industry for every quarter, where the industry is classified by its 4-digit SIC code. This approach controls for industry-wide changes in economic conditions that affect total accruals and allows for the estimated coefficients to vary across time and industry. All variables in the expectations models for accruals-based and real earnings management are scaled by lagged assets to reduce heteroscedasticity.

The primary model to estimate total accruals is based on the cross-sectional model estimated for each 4 digit SIC-quarter grouping. As proposed by DeFond and Jiambalvo (1994) and Cohen and Zarowin (2010), the model is as follows:

$$TA_{i,t}/A_{i,t-1} = \alpha_0 + \alpha_1 (1/A_{i,t-1}) + \beta_{1,i} (\Delta REV_{i,t}/A_{i,t-1}) + \beta_{2,i} (PPE_{i,t}/A_{i,t-1}) + \varepsilon_{i,t}, \quad (1)$$

where $TA_{i,t}$[2] = total accruals for firm i at time t, $\Delta REV_{i,t}$ = change in revenues for firm i at time t, $PPE_{i,t}$ = gross property, plant and equipment for firm i at time t, $A_{i,t-1}$ = total assets at time t-1 for firm i and $\varepsilon_{i,t}$ = error term for firm i at time t.

The coefficient estimates from Eq. (1) are used to estimate firm-specific normal accruals ($NTA_{i,t}$). Our measure of abnormal total accruals is the difference between the total accruals and the fitted total normal accruals, defined as:

$$\text{Abnormal Total Accruals} = (TA_{i,t}/A_{i,t-1}) - NTA_{i,t}, \quad (2)$$

Working capital accruals are subject to greater manipulation by managers; the estimation model is as follows:

$$WCA_{i,t}/A_{i,t-1} = \alpha_0 + \alpha_1 (1/A_{i,t-1}) + \beta_{1,i} (\Delta REV_{i,t}/A_{i,t-1}) + \varepsilon_{i,t}, \quad (3)$$

where $WCA_{i,t}$[3] = working capital accruals for firm i at time t, $\Delta REV_{i,t}$ = change in revenues for firm i at time t, $PPE_{i,t}$ = gross property, plant and equipment for firm i at time t, $A_{i,t-1}$ = totalassets at time t-1 for firm i and $\varepsilon_{i,t}$ = error term for firm i at time t.

[2]Total Accruals ($TA_{i,t}$) are measured using Compustat data and defined as net income minus operating cash flows. Operating cash flows are defined as: Working capital from operations, minus the change in accounts receivable inventories and other current assets, plus the change in accounts payable, taxes payable and other current liabilities.

[3]Working Capital Accruals ($WCA_{i,t}$) are measured using Compustat data and defined as the sum of the changes in accounts receivable, inventories and other current assets, less the sum of the changes in accounts payable, taxes payable and other current liabilities.

The coefficient estimates from Eq. (3) are used to estimate firm-specific normal working capital accruals ($NWCA_{i,t}$). Abnormal working capital accruals are the difference between working capital accruals and the estimated normal working capital accruals.

$$\text{Abnormal Working Capital Accruals} = (WCA_{i,t}/A_{i,t-1}) - NWCA_{i,t} \quad (4)$$

3. B. Real earnings management

Following Roychowdhury (2006), we focus on manipulation of real earnings and their effects on the abnormal levels of three variables, namely, discretionary expenses, production costs and cash flow from operations. We focus primarily on the following:

a. *Decrease in discretionary expenses:* Reducing expenses will boost earnings in the current period. It could also lead to higher current period cash flows if the firms paid for such expenses in cash. These expenses include Research & Development expense and Selling, General & Administrative expense.

b. *Increasing production to report lower costs of goods sold:* Increasing the number of units produced will spread the fixed overhead costs over a larger number of units, thus lowering total cost per unit as long as the total reduction in fixed cost per unit is not offset by an increase in marginal cost per unit. This will reduce the reported costs of goods sold and increase earnings.

c. *Accelerating timing of sales:* Managers can accelerate the timing of sales to the current period by offering limited period price discounts and providing more lenient credit terms. The additional sales will boost current period earnings. Both of these strategies will result in lower cash flows in the current period. A potential problem with this argument is that

purchasers may want to make use of early payment discounts (if available) and this may lead to higher cash flows in the current period. We acknowledge this drawback, but contend that since the objective of the managers is to increase profits, the credit terms would be designed to accelerate sales (e.g. by extending the payment period) and would not focus on increasing cash flows (e.g. by offering early payment discounts).

The primary model to estimate normal levels of discretionary expenses, production costs and cash flow from operations is based on the cross-sectional model estimated for each 4-digit SIC-quarter grouping. The model for discretionary expenses, from Dechow et al (1998), is as follows:

$$DISEXP_{i,t}/A_{i,t-1} = \alpha_0 + \alpha_1 (1/A_{i,t-1}) + \beta_{1,i} (S_{i,t}/A_{i,t-1}) + \varepsilon_{i,t} \quad (5)$$

Roychowdhury (2006) presents the following problem with this model. If managers manipulate sales upwards to increase reported earnings in any period, they can exhibit unusually low residuals in Eq. (5), even when they do not reduce discretionary expenses. To avoid this problem, discretionary expenses are modelled as a function of lagged sales. Therefore, the following model is used to estimate normal discretionary expenses. The regressions are run for every industry and quarter:

$$DISEXP_{i,t}/A_{i,t-1} = \alpha_0 + \alpha_1 (1/A_{i,t-1}) + \beta_{1,i} (S_{i,t-1}/A_{i,t-1}) + \varepsilon_{i,t} \quad (6)$$

where $DISEXP_{i,t}$[4] = discretionary expenses for firm i at time t; $S_{i,t-1}$= revenues for firm i at time t-1; $A_{i,t-1}$ = total assets at time t-1 for firm i; $\varepsilon_{i,t}$ = error term for firm i at time t.The coefficient estimates from Eq. (6) are used to estimate firm-specific normal discretionary expenses

[4]Discretionary expenses are measured from Compustat data and defined as the sum of Research & Development expenses and Selling, General & Administrative expenses.

($NDISEXP_{i,t}$). Our measure of abnormal discretionary expenses is the difference between the total discretionary expenses and the fitted total normal discretionary expenses, defined as:

$$\text{Abnormal Discretionary Expenses} = (DISEXP_{i,t}/A_{i,t-1}) - NDISEXP_{i,t} \quad (7)$$

Production costs are the sum of costs of goods sold and changes in inventory. Dechow et al (1998) expressed expenses as a linear function of contemporaneous sales. The model for normal COGS is as follows:

$$COGS_{i,t}/A_{i,t-1} = \alpha_0 + \alpha_1 (1/A_{i,t-1}) + \beta_{1,i} (S_{i,t}/A_{i,t-1}) + \varepsilon_{i,t} \quad (8)$$

Similarly, Dechow et al (1998) model the normal inventory growth using the following:

$$\Delta INV_{i,t}/A_{i,t-1} = \alpha_0 + \alpha_1 (1/A_{i,t-1}) + \beta_{1,i} (\Delta S_{i,t}/A_{i,t-1}) + \beta_{2,i} (\Delta S_{i,t-1}/A_{i,t-1}) + \varepsilon_{i,t} \quad (9)$$

To arrive at the model for production costs, we add Eq. (8) and Eq. (9). The model is used to estimate normal production costs and the regressions are run for every industry in every quarter.

$$PROD_{i,t}/A_{i,t-1} = \alpha_0 + \alpha_1 (1/A_{i,t-1}) + \beta_{1,i} (S_{i,t}/A_{i,t-1}) + \beta_{2,i} (\Delta S_{i,t}/A_{i,t-1}) + \beta_{3,i} (\Delta S_{i,t-1}/A_{i,t-1}) + \varepsilon_{i,t}, \quad (10)$$

where $PROD_{i,t}$[5]= production costs for firm i at time t, $S_{i,t}$= revenues for firm i at time t, $\Delta S_{i,t}$ = change in revenues of firm i at time t, $\Delta S_{i,t-1}$ = change in revenues of firm i at time t-1, $A_{i,t-1}$ = total assets at time t-1 for firm i and $\varepsilon_{i,t}$ = error term for firm i at time t.The coefficient estimates from Eq. (10) are used to estimate firm-specific normal production costs ($NPROD_{i,t}$). Our measure of abnormal production costs is the difference between the total production costs and the fitted total normal production costs, defined as:

[5]Production costs are measured using Compustat data and defined as the sum of costs of goods sold and changes in inventory.

$$\text{Abnormal Production Costs} = (PROD_{i,t}/A_{i,t-1}) - NPROD_{i,t} \quad (11)$$

Following Dechow et al (1998), we estimate normal cash flow from operations using a linear model of sales and change in sales in the current period. We run cross-sectional regressions for every industry in every quarter, as follows:

$$CFO_{i,t}/A_{i,t-1} = \alpha_0 + \alpha_1 (1/A_{i,t-1}) + \beta_{1,i} (S_{i,t}/A_{i,t-1}) + \beta_{2,i} (\Delta S_{i,t}/A_{i,t-1}) + \varepsilon_{i,t} \quad (12)$$

where $CFO_{i,t}$[6]= operating cash flows for firm i at time t, $S_{i,t}$= revenues for firm i at time t, $\Delta S_{i,t}$ = change in revenues of firm i at time t, $A_{i,t-1}$ = total assets at time t-1 for firm i and $\varepsilon_{i,t}$ = error term for firm i at time t.The coefficient estimates from Eq. (12) are used to estimate firm-specific normal cash flow from operations ($NCFO_{i,t}$). Our measure of abnormal cash flows from operations is the difference between the total cash flows and the fitted total normal production costs, defined as:

$$\text{Abnormal Cash Flows} = (CFO_{i,t}/A_{i,t-1}) - NCFO_{i,t} \quad (13)$$

4. Hypotheses

Debt covenants are intended to restrict managers from engaging in investment and financing decisions that reduce the value of creditors' claims. These covenants are frequently based on accounting information and violation of these covenants is costly. Managers of firms that are close to violating a debt covenant are likely to make accounting choices that reduce the likelihood of default. Thus, they are inclined to make income increasing choices to avoid such violations. Quarterly financial statements, which report the violation, are issued ex post and managers know whether they violated a covenant in a quarter. We expect to find evidence of manipulation in the

[6] Cash flow from operations is measured using Compustat data and is the operating cash flow of the firm

quarter preceding the violation as managers would implement accounting practices to avoid such events.

H1.A: ***Violating firms exhibit abnormal total accruals that are positive in the quarter preceding the quarter of the debt covenant violation.***

H1.B: ***Violating firms exhibit abnormal working capital accruals that are positive in the quarter preceding the quarter of the debt covenant violation.***

Even if manipulation of accounting information cannot prevent the violation of a covenant, managers are still likely to make income-increasing accounting choices in the hope of improving their bargaining position in case the violation leads to a renegotiation of a debt contract (DeFond and Jiambalvo, 1993)[7]. Managers also face other economic consequences of their accounting choices that induce them to make income increasing rather than income decreasing accounting choices. Healy (1985) indicates that management compensation plans do not motivate managers to make strictly income increasing accounting choices. Instead, the accounting choices depend on the relationship of the earnings figure (before any accounting choice is made) to any upper or lower limits in the executive compensation plan. Jones (1991) suggests that by increasing reported earnings, managers can reduce the restrictiveness of the debt covenants and increase their own compensation through higher bonuses. Managers would also continue with the accounting choice made in the quarter preceding the violation, as a reversal would also have a significant negative impact on earnings. We therefore expect to find a positive abnormal level of accruals in the quarter of the violation as well.

H2.A: ***Violating firms exhibit abnormal total accruals that are positive in the quarter of the debt covenant violation.***

[7] Nini et al (2012) provide evidence that debt contracts are renegotiated after debt covenant violations.

H2.B: ***Violating firms exhibit abnormal working capital accruals that are positive in the quarter of the debt covenant violation.***

Managers would likely try to increase earnings in the quarter following the violation for two reasons. First, they will follow income increasing accounting choices similar to those made in the preceding quarters (Sweeney, 1994). Second, managers will want the firm to get out of the state of covenant violation. We therefore expect managers to make accounting choices that increase the earnings of the firm in the quarter following the violation.

H3.A:***Violating firms exhibit abnormal total accruals that are positive in the quarter following the quarter of the debt covenant violation.***

H3.B: ***Violating firms exhibit abnormal working capital accruals that are positive in the quarter following the quarter of the debt covenant violation.***

Unlike accruals management, where managers can make accounting choices ex post to manipulate earnings, real earnings management has some limitations. First, the extent of real activities manipulation will vary with the flexibility managers have to undertake such activities; for example, overhead cost distribution by means of excess production is easier to accomplish and escape detection when the firm maintains a high level of inventory. Similarly, management has more discretion over research and development expense and selling, general and administrative expenses in firms where such costs are high. Second, management may have more room to manipulate earnings using some real earnings management activities, but not all; for example, management may be able to reduce discretionary expenses for successive quarters, but may not be able to manipulate production costs as that would create high levels of inventory and arouse suspicion. Third, real activities cannot be manipulated ex post. If managers learn about the

violation of a covenant at the end of the quarter, they cannot make any changes in earnings via real earnings management activities.

Managers have the most discretion over discretionary expenses relative to other methods of real activities manipulation. Earlier studies (e.g. by Nini et al) found that firm specific characteristics deteriorate in the quarters leading up to the violation, indicating to managers that a violation is likely to occur. To avoid such an event, managers would decrease discretionary expenses in the quarter leading up to the violation quarter. We would therefore expect to find abnormal discretionary expenses that are negative in the quarter leading up to the violation quarter. Managers have less control over production costs as increasing production costs in the quarter leading up to the violation quarter would mean a reversal in the quarter of the violation. We would therefore not expect to find an increase in production costs in the quarter leading up to the violation quarter. Likewise, managers can accelerate the timing of sales by offering limited period price discounts and providing more lenient credit terms. Both of these strategies would lead to lower cash flows. We do not expect to find evidence of such activities in the quarter leading up to the violation quarter as such activities can only be offered for a very short period of time.

H4.A: ***Violating firms exhibit abnormal discretionary expenses that are negative in the quarter preceding the quarter of the debt covenant violation.***

H4.B: ***Violating firms do not exhibit abnormal positive production costs in the quarter preceding the quarter of the debt covenant violation.***

H4.C: ***Violating firms do not exhibit abnormal operating cash flows that are negative in the quarter preceding the quarter of the debt covenant violation.***

Managers are able to determine whether a violation is likely to occur and will undertake all efforts to avoid such violations. We would therefore expect managers to engage in real earnings management activities in the quarter of the violation. The expectation is to have abnormal negative discretionary expenses in the quarter of the violation as managers would reduce such expenses to increase reported earnings. Production costs are also expected to be high in the quarter of the violation as managers would attempt to spread fixed overhead costs over a large number of units produced. Operating cash flows are also expected to be negative in the quarter of the violation as managers would be likely to offer discounts and lenient credit terms to boost sales.

H5.A: ***Violating firms exhibit abnormal discretionary expenses that are negative in the quarter of the debt covenant violation.***

H5.B: ***Violating firms exhibit abnormal production costs that are positive in the quarter of the debt covenant violation.***

H5.C: ***Violating firms exhibit abnormal operating cash flows that are negative in the quarter of the debt covenant violation.***

In the quarter following the violation quarter, managers still have the incentive to manipulate earnings as they would not want to be in violation of a covenant over a long period of time. They are therefore likely to keep discretionary expenses at a minimum and we expect that abnormal levels of such expenses would be negative in the quarter following the violation quarter. Since management engages in increasing production in the quarter of the violation, so that the stock of inventory will be high, we would expect abnormal production costs to be negative in the quarter following the violation as managers will likely adjust the inventory in order to reduce inventory carrying costs. Managers will likely also have to withdraw limited time

sales and tighten credit terms, so we expect to find abnormal positive levels of operating cash flows in the quarter following the violation.

H6.A: ***Violating firms exhibit abnormal discretionary expenses that are negative in the quarter following the quarter of the debt covenant violation.***

H6.B: ***Violating firms exhibit abnormal production costs that are negative in the quarter following the quarter of the debt covenant violation.***

H6.C: ***Violating firms exhibit abnormal operating cash flows that are positive in the quarter following the quarter of the debt covenant violation.***

5. Results

5. A. Descriptive Statistics

Table 1 presents descriptive statistics comparing the violating firms to the non-violators. The mean total assets ($867 million) of violating firms is smaller than that of non-violating firms ($6.1 billion). Interestingly, the profit margin (Net Income/Sales) is negative for both the violators and non-violators and the losses are greater for non-violating firms. The scaled total accruals (Accruals/$Assets_{t-1}$) are negative for both samples and are significantly lower for the non-violating firms. Scaled working capital accruals (Working Capital Accruals/$Assets_{t-1}$) are positive for violating firms and negative for non-violating firms. The difference is significant at the 1% level. The comparative difference in total and working capital accruals across violators and non-violators provides some evidence of earnings management to improve earnings in the period under study. Scaled discretionary expenses are positive for both samples; however, the magnitude of the mean values is close to zero for violating firms (0.03). Scaled production costs

are positive for the violators and non-violators and higher for violating firms. Operating cash flows are negative for violators and non-violators; however, the magnitude of the means for the non-violators is more than three times that of the violators.

Table 2 profiles violating firms with respect to total accruals changes, total working capital accruals changes, earnings changes, cash flow changes and revenue changes in the five quarters prior to the violation, the quarter of the violation, and the subsequent two quarters. All changes are computed as the first difference ($X_t - X_{t-1}$) scaled by total assets at time t-1.

Panels A and B present the change in total accruals and working capital accruals scaled by total assets. This change is referred to as a measure of abnormal accruals (DeFond and Jiambalvo, 1994), with normal accruals in period t estimated as realized total accruals in period t-1. However total accruals are assumed to be independently, identically distributed and Dechow et al (1998) document significant negative serial correlation in changes in accruals. Thus, the accrual (total and working capital) changes are presented as descriptive information and not as a measure of abnormal accruals.

As indicated in panel A, the changes in total accruals are generally small in the quarters leading up to the violation. However, in the quarter prior to the violation, the mean (median) change in total accruals is 0.0432 (-0.0128). The change is not significant using a two-tailed t-test, but is significant at the 1% level using a two-tailed Wilcoxon test. In the quarter of the violation the mean (median) change in total accruals is -0.066 (-0.0337). The negative change is significant at the 1% level using a two-tailed t-test and a two-tailed Wilcoxon test. The negative change is likely due to a variety of factors. The presence of negative serial correlation may result in negative accrual changes in the quarter of the violation (Quarter 0) since Quarter -1 is marked by positive total accruals. Manipulation of accruals by managers in the three quarters preceding

the violation quarter needs to be adjusted for, and managers have an incentive to reverse the accruals manipulation in the quarter of the violation. Nini et al (2012) provide evidence that creditors act as governance mechanisms in the event of a debt covenant violation. We suggest that the negative accruals may result because of management changes and increased monitoring by auditors. The mean (median) total accruals changes remain negative and significant in the quarters following the violation, though the significance disappears for the mean value of total accruals in Quarter 2.

Panel B reports the changes in working capital accruals. The general movement of these accruals is the same as observed in the total accruals, with positive accruals leading up to the quarter of the violation and a significant negative working capital accrual change in the quarter of the violation. The major differences in total and working capital accruals are the median values, which are positive and significant (using the two-tailed Wilcoxon test) in the quarters leading up to the violation, and negative and significant in the quarter of the violation. The behaviour of working capital accruals in the quarters following the violation exhibits the same trend as the total accruals in terms of direction and significance.

We also look at economic factors to understand changes in accruals in the quarters surrounding the violation. As indicated in panels C through E, there are significant changes in earnings, cash flows and revenues in the quarters where significant changes in accruals are observed. Changes in accruals may reflect changes in a firm's economic circumstances (Kaplan, 1985) and accruals changes in panels A and B must be interpreted with caution since they may reflect changes in a firm's economic circumstances rather than manipulation. The negative change may also be due to the bias of having only those firms in the sample that violated a debt covenant. That is, we include only those firms that violated a debt covenant and it may be

difficult for such firms to engage in positive manipulation, leading to positive changes in total and working capital accruals. In the tests reported later, we use time-series and cross-sectional models to control for such changes.

Table 3 profiles violating firms with respect to discretionary expense changes, production cost changes and operating cash flow changes in the five quarters prior to the violation, the quarter of the violation, and the subsequent two quarters. All changes are computed as the first difference ($X_t - X_{t-1}$) scaled by total assets at time t-1 to reduce heteroscedasticity.

As indicated in Panel A, changes in discretionary expenses are generally small in the quarters leading up to the violation. The mean (median) change in discretionary expenses in the quarter prior to the violation quarter is 0.0014 (0.0019). The mean change, though positive, is insignificant. In the quarter of the violation, the mean (median) change in the discretionary expenses is -0.006 (0.0035). The change is insignificant using the two-tailed t-test, but is significant at the 1% level using the two-tailed Wilcoxon test. The change in discretionary expenses in the quarter following the violation is negative with a mean (median) of -0.0203 (-0.0004) and is significant at the 1% level. Discretionary expenses stay negative for Quarter 2, but the level of significance drops to the 10% level.

Changes in production costs are small in the quarters leading up to the violation and the quarter of the violation, as shown in Panel B. The mean changes are generally negative in the quarter leading up to the violation, but are insignificant using a two-tailed t-test. The median changes are positive and significant for Quarter -5 through Quarter -2, positive and insignificant for the quarter prior to the violation quarter, and negative and insignificant in the quarter of the violation. Production cost changes have a mean (median) of -0.017 (-0.001) in the quarter following the violation and the violations are significant at the 1% level, using both the two-tailed

t-test and Wilcoxon test. Production costs remain negative in Quarter 2 but the mean change is insignificant and the median change is significant at the 10% level.

Panel C highlights changes in operating cash flows. The changes are generally small in the quarters leading up to the violation. The mean (median) operating cash flows changes are 0.0002 (0.0022) in the quarter prior to the violation quarter. The change is not significant using the two-tailed t-test, but is significant at the 10% level using the two-tailed Wilcoxon test. In the quarter of the violation the mean (median) change is 0.0087 (-0.002). The change is significant using the two-tailed Wilcoxon test. In the quarter following the violation, the mean (median) change is 0.0187 (0.0059) and is significant at the 1% level for both tests. The Quarter 2 changes are insignificant.

While accrual-based earnings management activities are concentrated in the quarter of and quarter following the violation, real earnings management activities are concentrated in the quarters following the violation. Managers have the liberty to manage accruals at the end of the violation quarter and influence earnings changes, but cannot do so with real earnings management as these activities cannot be altered once the quarter has ended. We find evidence of this in the reported results.

5. B. Multivariate Results

5. B. 1. Accrual-Based Earnings Management

Table 4 reports the regression coefficients for some of the key regressions used to estimate normal levels of total and working capital accruals. We estimate these models using the entire

sample of firm-quarters after excluding firm-quarters in which firms report covenant violations. The table reports the mean coefficients and standard errors across industry-quarters.

The coefficients for total accruals are generally as predicted by Jones (1991), with one exception. The average coefficient for property, plant and equipment is positive, albeit insignificant. The expected sign for the coefficient should be negative because property, plant and equipment are related to an income decreasing accrual (i.e. depreciation expense). Jones et al (1988) estimated regression coefficients for four individual components of total accruals (i.e. accounts receivable, inventory, accounts payable and depreciation). The coefficient for depreciation was insignificant in their study as well and may help to explain the coefficient in our sample. The expected sign of the coefficient for revenues is not obvious as a given change in revenue can cause income-increasing changes in some accounts (e.g. increase in accounts receivable) and income-decreasing change in others (e.g. increase in accounts payable). Jones (1988) found that the coefficient was significantly positive for accounts receivables and significantly negative for accounts payable. The coefficient for change in revenues is positive and significant for our sample. The average adjusted R^2 for the regression equation is 0.372 and in line with earlier studies.

The coefficients for working capital accruals are as expected. Working capital accruals are subject to more manipulation by managers and the significance of change in revenues at the 1% level suggests the same. It is noteworthy that the coefficient for change in revenues is positive and significant for both total and working capital accruals. This suggest that managers manipulate credit terms by accelerating receivables (thereby reporting increased earnings) and delaying payments to the creditors of the firm (thereby reducing costs). The average adjusted R^2 for the regression equation for working capital accruals is 0.412.

Table 5 presents the summary statistics for abnormal total accruals and abnormal working capital accruals in the quarter prior to, quarter of, and quarter following the violation. We use the estimates for Eq. (1) and Eq. (3) reported in Table 4. The model assumes the relationship between normal accruals and the explanatory variables is stationary. The estimates are used to calculate normal total and working capital accruals. Abnormal total accruals are defined as:

$$\varepsilon_{i,t} = TA_{i,t}/A_{i,t-1} - [\alpha_1 (1/A_{i,t-1}) + \beta_{1,i} (\Delta REV_{i,t}/A_{i,t-1}) + \beta_{2,i} (PPE_{i,t}/A_{i,t-1})], \quad (14)$$

where $\varepsilon_{i,t}$represents the level of abnormal total accruals at time t.

The abnormal working capital accruals are defined as:

$$\varepsilon_{i,t} = WCA_{i,t}/A_{jt-1} - [\alpha_1 (1/A_{i,t-1}) + \beta_{1,i} (\Delta REV_{i,t}/A_{i,t-1})], \quad (15)$$

where $\varepsilon_{i,t}$represents the level of abnormal working capital accruals at time t.

Abnormal accruals are calculated for the quarter prior to, quarter of, and quarter following the violation for both total and working capital accruals. Since depreciation expense does not enter into the calculation of working capital accruals, we do not include the level of property, plant and equipment in the estimation of the time-series models of normal working capital accruals. Other than this difference, the analyses of total and working capital accruals are identical.

The theory being tested suggests positive manipulation in accruals to increase reported earnings. We run t-tests by firm-quarters and report a summary of the results in Table 5. The first column of Table 5 reports the abnormal total and working capital accruals in the quarter preceding the violation and provides evidence for H1.A and H1.B. The mean (median) abnormal

total accruals of 0.517 (0.460) is significant at the 1% level. A similar result is observed for working capital accruals with a positive mean (median) abnormal working capital accrual of 0.078 (0.092), significant at the 1% level. The significant changes in total accruals and working capital accruals in the quarter prior to the violation suggest that managers manipulated earnings to avoid violation. The second column reports the abnormal total and working capital accruals in the quarter of the violation and provides evidence for H2.A and H2.B. The results are as expected with total accruals having a mean (median) of 0.491 (0.471), significant at the 1% level. The mean (median) for working capital accruals is 0.061 (0.084), with a significance level of 1%. The results are in accordance with conventional wisdom; that is, managers manipulate accruals to avoid violation of debt covenants. The third column reports the level and significance of abnormal total and working capital accruals in the quarter following the violation and provides evidence for H3.A and H3.B. If a firm was in violation in a given period and does not correct for it in the following period, it has to report the violation for both periods. We expected to find evidence of positive manipulation in the quarter following the violation in so far as managers do not want to report the violation in subsequent quarters. The mean (median) abnormal total accruals of 0.531 (0.444) suggest that this is the case and managers manipulate accruals in the quarters following the violation as well. The results are significant at the 1% level. The same is observed for working capital accruals, which has a mean (median) of 0.098 (0.097) and is significant at 1%. The overall results suggest that managers manipulate accruals in the quarter prior to, the quarter of, and the quarter following the violation.

5. B. 2. Real Earnings Management

Table 6 reports the coefficients for the regression used to estimate normal levels of discretionary expenses, production costs and operating cash flows. We estimate these models using the entire sample of firm-quarters. The table reports the mean coefficients and standard errors across industry-quarters.

The coefficients are generally as predicted by Dechow et al (1998), with a few exceptions. First, under the simplifying assumption of Dechow et al, the coefficient of scaled discretionary expenses on scaled lagged sales should be positive, but our results indicate that the coefficient is negative and insignificant. Roychowdhury (2006) estimated the coefficient of scaled production costs on scaled sales and found it to be positive, while we estimate it to be negative and significant. The coefficient for scaled changes in sales is, however, positive and significant in line with Dechow et al and Roychowdhury. The coefficients for operating cash flows are as predicted by Dechow et al. The average adjusted R^2s across industry-quarters are 0.625 for discretionary expenses, 0.439 for production costs and 0.393 for operating cash flows.

Table 7 presents the summary statistics for the abnormal levels of discretionary expenses, production costs and operating cash flows in the quarter prior to, quarter of, and quarter following the violation. We used estimates for Eq. (6), Eq. (10) and Eq. (12) for discretionary expenses, production costs and operating cash flows respectively, as reported in Table 6. The estimates are used to calculate normal levels of discretionary expenses, production costs and operating cash flows. Abnormal discretionary expenses are defined as:

$$\varepsilon_{i,t} = DISEXP_{i,t}/A_{i,t-1} - [\alpha_1 (1/A_{i,t-1}) + \beta_{1,i} (S_{i,t-1}/A_{i,t-1})], \quad (16)$$

where $\varepsilon_{i,t}$ represents the level of abnormal discretionary expenses at time t.

Abnormal production costs are defined as:

$$\varepsilon_{i,t} = PROD_{i,t}/A_{i,t-1} - [\alpha_1 (1/A_{i,t-1}) + \beta_{1,i} (S_{i,t}/A_{i,t-1}) + \beta_{2,i} (\Delta S_{i,t}/A_{i,t-1}) + \beta_{3,i} (\Delta S_{i,t-1}/A_{i,t-1})], \quad (17)$$

where $\varepsilon_{i,t}$ represents the abnormal level of production costs at time t.

Abnormal operating cash flows are defined as:

$$\varepsilon_{i,t} = CFO_{i,t}/A_{i,t-1} - [\alpha_1 (1/A_{i,t-1}) + \beta_{1,i} (S_{i,t}/A_{i,t-1}) + \beta_{2,i} (\Delta S_{i,t}/A_{i,t-1})], \quad (18)$$

where $\varepsilon_{i,t}$ represents the abnormal level of operating cash flows at time t.

Abnormal levels of discretionary expenses, production costs and operating cash flows are calculated for the quarter prior to, quarter of, and quarter following the violation. The expectation is that abnormal discretionary expenses will be negative in the quarters surrounding the violation as managers try to increase earnings to avoid the violation. Abnormal production costs are expected to be positive as managers can produce more goods than are necessary to meet expected demand. With higher production levels, the fixed overhead costs can be spread over a larger number of units, lowering the reported fixed costs per unit. Abnormal operating cash flows are expected to be negative as managers boost sales by offering limited time discounts. The lower margins due to the price discounts will cause production costs as a percentage of sales to be abnormally high. Another way to boost sales temporarily is to offer more lenient credit terms. In general, we expect sales management activities to lead to lower current period operating cash flows and higher production costs than what is normal given sales expectations.

The first column of Table 7 reports abnormal discretionary expenses, abnormal production costs and abnormal operating cash flows in the quarter preceding the violation. The table provides evidence for H4.A, H5.A and H6.A. The mean (median) abnormal discretionary expense of -0.02 (-0.019) is significant at the 1% level. The mean (median) of abnormal production cost is 0.013 (0.014) and is insignificant using the t-test. The mean (median) for operating cash flow is -0.037 (0.052) and is also statistically insignificant. The general result for the quarter prior to the violation is that managers manipulate discretionary expenses more easily as compared to production costs and operating cash flows. This may be one reason why earlier research (e.g. Baber et al, 1991; Bushee, 1998) focused primarily on discretionary expenses. The second column reports the abnormal discretionary expenses, abnormal production costs and abnormal operating cash flows in the quarter of the violation and provides evidence for H4.B, H5.B and H6.B. The results are as expected with discretionary expenses having a mean (median) of -0.021 (-0.013), significant at the 5% level. The mean (median) for production costs is 0.012 (0.014), significant at 1%. The mean (median) for operating cash flows is -0.071 (0.041) and is not significant. We again observe results that suggest it is easier for managers to manipulate discretionary expenses. The evidence also suggests that managers manipulate production costs in the quarter of the violation. The third column reports the level and significance of abnormal discretionary expenses, abnormal production costs and abnormal operating cash flows in the quarter following the violation and provides evidence for H4.C, H5.C and H6.C. We expected to find evidence of manipulation in the quarter following the violation as managers attempt to avoid reporting a covenant violation in subsequent quarters. The mean (median) abnormal discretionary expense of -0.034 (-0.018) suggests that this is the case and managers manipulate discretionary expenses in the quarters following the violation as well. The results are significant at the 1% level. For production costs, a reversal is observed with production costs having a mean (median)

of -0.006 (0.012). The opposing signs of the mean and median suggest that while median (by abnormal production costs) firms have positive abnormal production costs, some firms have extremely low abnormal production costs, which have produced a negative mean. This is also observed in the maximum (15.4) and minimum (-2.59) abnormal production costs. Operating cash flows have also reversed in the quarter following the violation, with a mean (median) of 0.021 (0.053) significant at 1%.

The overall results suggest that managers manipulate discretionary expenses in the quarter prior to, quarter of, and quarter following the violation. However, it is not possible for managers to manipulate production costs over a long period as ending inventories from the violation period will result in lower production costs in the subsequent quarter. Manipulation of operating cash flows is also not sustainable over subsequent periods, as is evidenced by the reversal in the sign of the abnormal operating cash flows in the quarter following the violation.

6. Conclusion

Existing literature on the debt covenant hypothesis has attempted to provide evidence on the manipulation of accruals in the period surrounding the period of violation. However, these studies have generally relied either on a proxy of covenant violation (debt-equity ratio) or have provided evidence for a small sample. This paper complements the existing literature on earnings management around the period of violation in several ways. First, the study details the empirical methodology to detect not only accrual-based earnings management but also real earnings management. The prior literature on the covenant hypothesis has focused mainly on the accounting choices available to the managers to avoid covenant violation. The present study is the first to focus on real activities manipulation to test for the debt covenant hypothesis. Second,

we find evidence that managers increase reported earnings through accruals management and real activities management. Our findings suggest that abnormal total and working capital accruals are positive in the quarter of and quarters surrounding the covenant violation. Our results also suggest that managers decrease abnormal discretionary expenses in the quarter of and quarters surrounding the violation. The results for production costs suggest an increase in abnormal production costs in the quarter of the violation and a subsequent reversal (decrease) in abnormal production costs in the quarter following the violation. The results also display a decrease in abnormal operating cash flows in the quarter of the violation and an increase in abnormal operating cash flows in the quarter following the violation. Third, this study details the difference in accrual-based and real earnings management activities in the quarter of and the quarters surrounding that of the violation. While managers actively engage in accruals management in the quarters surrounding the violation, the opportunities for manipulating real activities may be limited. We find that managers decrease discretionary expenses in the quarter prior to, quarter of and quarter following the violation. However, it is not practicable to manipulate production costs as such activities will overload inventory stocks, and we observe a reversal in abnormal production costs in the quarter following the violation. We observe the same trend in abnormal operating cash flows as managers withdraw limited time discounts and tighten credit terms. Overall, our results suggest that managers actively engage in accrual-based and real activities manipulation in order to avoid violation of debt covenants.

References

Baber, W., P. Fairfield and J. Haggard (1991): The effect of concern about reported income on discretionary spending decisions: the case of research and development, *Accounting Review* 66, pp. 818-829

Bens,D., V. Nagar, D.J. Skinner and M.H.F. Wong (2003): Employee stock options, EPS dilution and stock repurchases, *Journal of Accounting and Economics* 36, pp. 51-90

Bushee, B. (1998): The influence of institutional investors on myopic R&D investment behaviour, *Accounting Review* 80, pp. 441-476

Cohen, D.A., and P. Zarowin (2010): Accrual based and real earnings management activities around seasoned equity offerings, *Journal of Accounting and Economics* 50, pp. 2-19

Cohen, D.A., A. Dey and T. Lys (2008): Real and accrual based earnings management in the Pre and Post Sarbanes Oxley period, *Accounting Review* 83, pp. 757-787

Dechow, P.M., S.P. Kothari and R. Watts (1998): The relation between earnings and cash flows, *Journal of Accounting and Economics* 17, pp. 145-176

DeFond, M.L., and J. Jiambalvo (1993): Factors related to auditor-client disagreement over income-increasing accounting methods, *Contemporary Accounting Research* 9, pp. 411-431

DeFond, M.L., and J. Jiambalvo (1994): Debt Covenant Violation and Manipulation of Accruals, *Journal of Accounting and Economics* 17, pp. 145-176

Graham, J.R., C.R. Harvey and S. Rajgopal (2005): The economic implications of corporate financial reporting, *Journal of Accounting and Economics* 40, pp. 3-73

Healy, P (1985): The Impact of Bonus Schemes on the Selection of Accounting Principles, *Journal of Accounting and Economics* 7, pp. 85-107

Jones J., Michael Bradley and Michael W. Maher (1988): The Effect of Foreign Trade Regulation on Accounting Choices, and Production and Investment Decisions, University of MichiganPress, Ann Arbor, Michigan

Jones J. (1991): Earnings management during import relief investigations, *Journal of Accounting Research* 29, pp. 193-228

Kaplan, R. (1985): Comments on Paul Healy: Evidence on the effect of bonus schemes on accounting procedure and accrual decision, *Journal of Accounting and Economics* 7, pp. 207-218

Nini, Greg, David C. Smith and Amir Sufi (2012): Creditor Control Rights, Corporate Governance, and Firm Value, *Review of Financial Studies* 25, pp. 1713-1761

Roychowdhury, S. (2006): Earnings management through real activities manipulation, *Journal of Accounting and Economics* 42, pp. 335-370

Subramanyam, K.R. (1996): The pricing of discretionary accruals, *Journal of Accounting and Economics* 22, pp. 249-282

Sweeney, A.P. (1994): Debt-covenant violations and managers' accounting responses, *Journal of Accounting and Economics* 17, pp. 281-308

Watts, R.L. and J.L. Zimmerman (1986): Positive Accounting Theory, Englewood Cliffs, NJ: Prentice Hall

Zang, A. Y. (2012). Evidence on the trade-off between real activities manipulation and accrualbasedearnings management,*Accounting Review*87, pp. 675-703

Table 1

Summary Statistics

	Violating Firms		Non-Violating Firms		Difference in	
	Mean	Median	Mean	Median	Means[a]	Medians[b]
Total Assets ($ million)	866.920	93.695	6,053.385	180.062	-5186.46***	-86.37***
Sales ($ million)	194.304	24.890	498.211	20.854	-303.91***	4.04***
Net Income / Sales (%)	-1.986	0.008	-4.294	0.040	2.31***	-0.03***
Sales / Total Assets	0.432	0.281	0.297	0.147	0.14***	0.13***
Total Accruals ($ million)	-29.728	-0.786	-63.237	-0.661	33.51***	-0.13***
Total Accruals / Assets $_{t-1}$	-0.011	-0.019	-0.645	-0.019	0.63***	-0.0002***
Working Capital Accruals ($ million)	0.292	0.058	16.436	0.012	-16.14***	0.05***
Working Capital Accruals / Assets $_{t-1}$	0.053	0.002	-0.049	0.001	0.10***	0.00***
Discretionary Expenses ($ million)	38.742	7.386	148.395	9.545	-109.65***	-2.16***
Discretionary Expenses / Assets $_{t-1}$	0.030	0.002	0.638	0.002	0.61***	-0.0003***
Production Costs ($ million)	148.383	16.456	313.322	11.865	-164.94***	4.59***
Production Costs / Assets $_{t-1}$	0.005	0.002	0.002	0.001	-0.01***	0.00***
Operating Cash Flows ($ million)	33.701	0.610	137.118	1.616	-103.42***	-1.01***
Operating Cash Flows / Assets $_{t-1}$	-0.050	0.012	-0.168	0.015	0.12***	-0.0027***

[a] The difference in means is tested using two-tailed t tests
[b] The difference in median is tested using two-tailed Wilcoxon tests
*** p<0.01, ** p<0.05, * p<0.1

Table 2

Scaled total accrual changes, working capital accrual changes, earnings changes, cash flow changes and revenue changes on a quarterly basis, where Quarter 0 is the violation quarter, for firms reporting debt covenant violations in the period 1996-2008[a]

	Quarter -5	Quarter -4	Quarter -3	Quarter -2	Quarter -1	Quarter 0	Quarter 1	Quarter 2
Panel A: Total Accrual Changes[b]								
Mean	-0.0038	-0.0144	0.0017	0.0181	0.0432	-0.0666	-0.0374	-0.9506
t-statistic	-0.33	-1.22	0.04	0.10	0.80	-7.49***	-2.30**	-1.08
Median	-0.0101	-0.0087	-0.0130	-0.0066	-0.0128	-0.0337	-0.0299	-0.0272
z-statistic for Wilcoxon signed-rank test	-2.64***	-2.09**	-3.23***	-2.99***	-4.38***	-10.92***	-12.10***	-10.53***
N	1,880	1,898	1,933	1,995	2,030	1,487	1,995	1,900
Panel B: Working Capital Accrual Changes[c]								
Mean	0.0012	0.0012	-0.0029	0.0876	0.0055	-0.0272	-0.0127	-0.3651
t-statistic	0.422	0.334	-0.127	0.908	0.942	-8.60***	-2.46**	-1.14
Median	0.0040	0.0040	0.0034	0.0050	0.0024	-0.0098	-0.0043	-0.0036
z-statistic for Wilcoxon signed-rank test	3.57***	4.84***	4.17***	4.54***	2.21**	-9.61***	-5.67***	-4.29***
N	1,904	1,923	1,965	2,013	2,052	1,499	2,008	1,919
Panel C: Earnings Changes[d]								
Mean	0.0002	-0.0033	0.0176	0.0158	-0.0093	-0.0387	0.0113	0.0179
t-statistic	0.0103	-0.3798	0.5105	0.967	-1.1012	-5.536***	2.16**	1.74*
Median	0.0002	0.0000	-0.0002	-0.0014	-0.0011	-0.0101	0.0018	0.0005
z-statistic for Wilcoxon signed-rank test	-1.047	-2.16**	-2.20**	-5.42***	-4.58***	-14.66***	4.45***	0.52
N	2,252	2,287	2,302	2,331	2,367	1,708	2,305	2,194

Table 2
Continued

Panel D: Cash Flow Changes[e]								
Mean.....	-0.0482	-0.0377	-0.1042	-0.1733	-0.1083	-0.0281	-0.0383	0.8783
t-statistic.....	-3.95***	-5.89***	-2.49**	-1.16	-2.02**	-4.24***	-2.25**	1.00
Median.....	0.0019	-0.0009	0.0021	-0.0042	-0.0033	-0.0002	0.0078	0.0077
z-statistic for Wilcoxon signed-rank test.....	-1.39	-2.95***	-2.15**	-3.88***	-3.83***	-1.88*	0.97	0.62
N.....	1,886	1,907	1,944	1,998	2,038	1,492	1,996	1,906
Panel E: Revenue Changes								
Mean.....	-0.0005	-0.0031	0.0233	-0.0782	-0.0196	0.0016	-0.0093	-0.0051
t-statistic.....	-0.08	-0.289	1.07	-0.742	-1.17	0.411	-3.37***	-2.01**
Median.....	0.0062	0.0071	0.0043	0.0035	0.0027	-0.0001	0.0013	0.0002
z-statistic for Wilcoxon signed-rank test.....	8.02***	9.49***	5.11***	3.97***	2.05**	-1.39	0.53	-0.44
N.....	2,244	2,280	2,298	2,327	2,363	1,707	2,304	2,188

[a]The scaled changes in the variables were computed as the first difference of the variables (X_t - X_{t-1}) divided by total assets at time t-1

[b] Total accruals are computed using Compustat data and defined as net income minus operating cash flows. Operating cash flows are defined as: Working capital from operations, minus the change in accounts receivable,inventories, and other current assets, plus the change in accounts payable, taxes payable, and other current liabilities.

[c]Working Capital Accruals are computed using Compustat data and defined as the sum of the changes in accounts receivable, inventories and other current assets, less the sum of the changes in accounts payable, taxes payable and other current liabilities.

[d] Earnings are defined as net income

[e] Cash Flow Changes are computed using Compustat data and defined as the sum of the changes in accounts receivable, inventories and other current assets, less the sum of the changes in accounts payable, taxes payable and other current liabilities

*** p<0.01, ** p<0.05, * p<0.1

Table 3

Scaled cash flow from operations, discretionary expenses and production costs on a quarterly basis, where Quarter 0 is the violation quarter, for firms reporting debt covenant violations in the period 1996-2008[a]

	Quarter -5	Quarter -4	Quarter -3	Quarter -2	Quarter -1	Quarter 0	Quarter 1	Quarter 2
Panel A: Discretionary Expenses Changes[a]								
Mean	0.0088	0.0061	0.0012	-0.0062	0.0014	-0.0060	-0.0203	-0.0061
t-statistic	1.12	2.69***	0.17	-0.56	0.31	-0.94	-2.77***	-1.80*
Median	0.0027	0.0029	0.0021	0.0026	0.0019	0.0035	-0.0004	-0.0005
z-statistic for Wilcoxon signed-rank test	4.97***	7.29***	4.57***	5.19***	4.08***	5.16***	-2.96***	-1.66*
N	868	884	889	903	925	665	897	849
Panel B: Production Costs Changes[c]								
Mean	0.0037	-0.0079	0.0016	-0.1056	-0.0116	-0.0033	-0.0177	-0.4454
t-statistic	0.78	-0.78	0.063	-0.85	-0.96	-0.89	-5.86***	-0.99
Median	0.0035	0.0040	0.0017	0.0021	0.0011	-0.0008	-0.0010	-0.0002
z-statistic for Wilcoxon signed-rank test	5.92***	6.71***	2.34**	2.47**	0.79	-0.35	-4.20***	-1.89*
N	2,067	2,112	2,130	2,178	2,237	1,616	2,220	2,117
Panel C: Operating Cash Flow Changes[d]								
Mean	-0.0131	-0.0001	-0.0199	0.0157	0.0002	0.0087	0.0187	0.3069
t-statistic	-0.903	-0.03	-1.19	0.39	0.027	0.79	1.99**	1.01
Median	0.0066	0.0028	0.0040	0.0016	0.0022	-0.0020	0.0059	0.0028
z-statistic for Wilcoxon signed-rank test	1.33	-1.37	0.56	-2.90	-1.94*	-3.55***	2.58***	0.43
N	2,173	2,219	2,256	2,289	2,337	1,691	2,298	2,184

[a]The scaled changes in the variables were computed as the first difference of the variables (X_t - X_{t-1}) divided by total assets at time t-1

[b] Discretionary expenses changes are calculated using Compustat data and defined as the sum of research and development expenses and selling, general and administrative expenses

[c] Production costs changes are calculated using Compustat data and defined as the sum of cost of goods sold and changes in inventory during the period

[d] Operating cash flow changes are calculated using Compustat data and defined as cash flow from operations as reported in the statement of cash flows

*** p<0.01, ** p<0.05, * p<0.1

Table 4
This table presents the mean values of the coefficients of the model parameters used to estimate the normal levels of total and working capital accruals.

	[a]$TA_{i,t}/Ai_{,t-1}$	[b]$WCA_{i,t}/Ai_{,t-1}$
$1/A_{t-1}$	0.033	0.087
	(0.083)	(0.091)
$\Delta Rev_t/A_{t-1}$	0.79**	0.16***
	(0.421)	(0.037)
PPE_t/A_{t-1}	0.019	—
	(0.177)	—
Constant	-0.35**	-0.11*
N	334,656	357,398
R-Squared	0.372	0.412

Regressions are computed by industry and quarter using time-series estimates of the following model of total accruals

$$TA_{i,t}/A_{jt-1} = \alpha_0 + \alpha_1(1/A_{i,t-1}) + \beta_{1,i}(\Delta REV_{i,t}/A_{i,t-1}) + \beta_{2,i}(PPE_{i,t}/A_{i,t-1}) + \varepsilon_{i,t},$$

where $TA_{i,t}$ = total accruals for firm i at time t; $\Delta REV_{i,t}$ = change in revenues for firm i at time t; $PPE_{i,t}$ = gross property, plant and equipment for firm i at time t; $A_{i,t-1}$ = total assets at time t-1 for firm i; $\varepsilon_{i,t}$ = error term for firm i at time t. The model for working capital accruals excludes the PPE term.

[a] Total Accruals ($TA_{i,t}$) are computed using Compustat data and defined as net income, minus operating cash flows. Operating cash flows are defined as: Working capital from operations, minus the change in accounts receivable,inventory, and other current asset, plus the change in accounts payable, taxes payable, and other current liabilities.

[b] Working Capital Accruals ($WCA_{i,t}$) are computed using Compustat data and are defined as the sum of the changes in accounts receivables, inventories and other current assets, less the sum of the changes in accounts payable, taxes payable and other current liabilities.

*** p<0.01, ** p<0.05, * p<0.1

Table 5

Abnormal total accruals and abnormal working capital accruals in the quarter preceding, the quarter of, and the quarter following the violation from time-series model estimates of total and working capital accruals for firms reporting a covenant violation in the period 1996-2008

	Quarter - 1[a]	Quarter 0[a]	Quarter 1[a]
	Abnormal Total Accruals[c]		
Mean	0.517	0.491	0.531
Median	0.460	0.471	0.444
Standard Deviation	2.38	0.322	0.221
Minimum	-16.52	-6.11	-3.89
Maximum	107.65	2.65	2.55
Parametric p-value[b]	0.000	0.000	0.000
	Abnormal Working Capital Accruals[d]		
Mean	0.078	0.061	0.098
Median	0.092	0.084	0.097
Standard Deviation	0.321	0.129	0.158
Minimum	-7.423	-2.21	-3.7
Maximum	9.328	1.164	4.19
Parametric p-value[b]	0.000	0.000	0.000

[a]Abnormal total accruals are computed using time-series estimates of the following model of total accruals:

$$TA_{i,t}/A_{jt-1} = \alpha_0 + \alpha_1(1/A_{i,t-1}) + \beta_{1,i}(\Delta REV_{i,t}/A_{i,t-1}) + \beta_{2,i}(PPE_{i,t}/A_{i,t-1}) + \varepsilon_{i,t},$$

where $TA_{i,t}$ = total accruals for firm j at time t, $\Delta REV_{i,t}$ = change in revenues for firm i at time t, $PPE_{i,t}$ = gross property, plant and equipment for firm i at time t, $A_{i,t-1}$ = total assets at time t-1 for firm i and $\varepsilon_{i,t}$ = error term for firm i at time t. The model for working capital accruals excludes the PPE term.

Abnormal total and working capital accruals are the differences between predicted and actual accruals.

[b] The parametric p-values are two-tailed t tests

[c] Total Accruals are computed using Compustat data and are defined as net income minus operating cash flows. Operating cash flows are defined as: Working capital from operations, minus the change in accounts receivable,inventories, and other current assets, plus the change in accounts payable, taxes payable and other current liabilities.

[d] Working Capital Accruals are computed using Compustat data and are defined as the sum of the changes in accounts receivables, inventories and other current assets, less the sum of the changes in accounts payable, taxes payable and other current liabilities

*** p<0.01, ** p<0.05, * p<0.1

Table 6

This table presents the mean values of the coefficients of the model parameters used to estimate the normal levels of discretionary expenses, production costs and cash flows.

	[a] $DISEXP_{i,t}/A_{i,t-1}$	[b] $PROD_{i,t}/A_{i,t-1}$	[c] $CFO_{i,t}/A_{i,t-1}$
$1/A_{t-1}$	0.064**	0.003	-0.07***
	(0.033)	(0.004)	(0.012)
$Sales_{t-1}/A_{t-1}$	-0.058	—	—
	(0.239)	—	—
$Sales_t/A_{t-1}$	—	-0.13*	0.064**
	—	(0.073)	(0.037)
$\Delta Sales_t/A_{t-1}$	—	0.65***	-0.4**
	—	(0.177)	(0.123)
$\Delta Sales_{t-1}/A_{t-1}$	—	0.030	—
	—	(0.583)	—
Constant	0.014*	0.019	-0.06***
N	132,058	432,088	424,861
R-Squared	0.625	0.439	0.393

Table 6

Continued

Regressions are computed by industry and quarter using time-series estimates of the following model of

1) Discretionary Expenses

$$DISEXP_{i,t}/A_{i,t-1} = \alpha_0 + \alpha_1(1/A_{i,t-1}) + \beta_{1,i}(S_{i,t-1}/A_{i,t-1}) + \varepsilon_{i,t},$$

where $DISEXP_{i,t}$ = discretionary expenses for firm i at time t, $S_{i,t-1}$= revenues for firm i at time t-1, $A_{i,t-1}$ = total assets at time t-1 for firm i and $\varepsilon_{i,t}$ = error term for firm i at time t.

2) Production Costs

$$PROD_{i,t}/A_{i,t-1} = \alpha_0 + \alpha_1(1/A_{i,t-1}) + \beta_{1,i}(S_{i,t}/A_{i,t-1}) + \beta_{2,i}(\Delta S_{i,t}/A_{i,t-1}) + \beta_{3,i}(\Delta S_{i,t-1}/A_{i,t-1}) + \varepsilon_{i,t},$$

where $PROD_{i,t}$= production costs for firm i at time t, $S_{i,t}$= revenues for firm i at time t, $\Delta S_{i,t}$ = change in revenues of firm i at time t, $\Delta S_{i,t-1}$ = change in revenues of firm i at time t-1, $A_{i,t-1}$ = total assets at time t-1 for firm i and $\varepsilon_{i,t}$ = error term for firm i at time t.

3) Operating Cash Flows

$$CFO_{i,t}/A_{i,t-1} = \alpha_0 + \alpha_1(1/A_{i,t-1}) + \beta_{1,i}(S_{i,t}/A_{i,t-1}) + \beta_{2,i}(\Delta S_{i,t}/A_{i,t-1}) + \varepsilon_{i,t},$$

where $CFO_{i,t}$= operating cash flows for firm i at time t, $S_{i,t}$= revenues for firm i at time t, $\Delta S_{i,t}$ = change in revenues of firm i at time t, $A_{i,t-1}$ = total assets at time t-1 for firm i and $\varepsilon_{i,t}$ = error term for firm i at time t.

[a] Discretionary expenses are computed using Compustat data and defined as the sum ofresearch and development expenses and selling, general and administrative expenses

[b] Production cost changes are computed using Compustat data and defined as the sum of costs of goods sold and changes in inventory during the period

[c] Operating cash flow are computed using Compustat data and defined as cash flow from operations as reported in the statement of cash flows

*** p<0.01, ** p<0.05, * p<0.1

Table 7
Abnormal discretionary expenses, abnormal production costs and abnormal operating cash flows in the quarter preceding, the quarter of and the quarter following the violation from time-series model estimates of discretionary expenses, production costs and operating cash flows for firms reporting a covenant violation in the period 1996-2008

	Quarter - 1[a]	Quarter 0[a]	Quarter 1[a]
	Abnormal Discretionary Expenses[a,c]		
Mean	-0.02	-0.021	-0.034
Median	-0.019	-0.013	-0.018
Standard Deviation	0.10	0.209	0.191
Minimum	-1.31	-1.94	-3.77
Maximum	1.07	2.93	0.783
Parametric p-value[b]	0.000	0.017	0.000
	Abnormal Production Costs[a,d]		
Mean	0.013	0.012	-0.006
Median	0.014	0.014	0.012
Standard Deviation	0.844	0.151	0.154
Minimum	-25.49	-3.58	-2.59
Maximum	33.50	2.82	1.51
Parametric p-value[b]	0.504	0.007	0.102
	Abnormal Operating Cash Flows[a,e]		
Mean	-0.037	-0.071	0.021
Median	0.052	0.041	0.053
Standard Deviation	2.11	3.21	0.11
Minimum	-98.34	-124.62	-1.62
Maximum	1.92	5.85	1.01
Parametric p-value[b]	0.375	0.277	0.000

Table 7

Continued

[a]Abnormal levels are computed using time-series estimates of the following model of

1) Discretionary Expenses

$$DISEXP_{i,t}/A_{i,t-1} = \alpha_0 + \alpha_1(1/A_{i,t-1}) + \beta_{1,i}(S_{i,t-1}/A_{i,t-1}) + \varepsilon_{i,t},$$

where $DISEXP_{i,t}$ = discretionary expenses for firm i at time t, $S_{i,t-1}$= revenues for firm i at time t-1, $A_{i,t-1}$ = total assets at time t-1 for firm i and $\varepsilon_{i,t}$ = error term for firm i at time t.

2) Production Costs

$$PROD_{i,t}/A_{i,t-1} = \alpha_0 + \alpha_1(1/A_{i,t-1}) + \beta_{1,i}(S_{i,t}/A_{i,t-1}) + \beta_{2,i}(\Delta S_{i,t}/A_{i,t-1}) + \beta_{3,i}(\Delta S_{i,t-1}/A_{i,t-1}) + \varepsilon_{i,t},$$

where $PROD_{i,t}$= production costs for firm i at time t, $S_{i,t}$= revenues for firm i at time t, $\Delta S_{i,t}$ = change in revenues of firm i at time t, $\Delta S_{i,t-1}$ = change in revenues of firm i at time t-1, $A_{i,t-1}$ = total assets at time t-1 for firm i and $\varepsilon_{i,t}$ = error term for firm i at time t.

3) Operating Cash Flows

$$CFO_{i,t}/A_{i,t-1} = \alpha_0 + \alpha_1(1/A_{i,t-1}) + \beta_{1,i}(S_{i,t}/A_{i,t-1}) + \beta_{2,i}(\Delta S_{i,t}/A_{i,t-1}) + \varepsilon_{i,t},$$

where $CFO_{i,t}$= operating cash flows for firm i at time t, $S_{i,t}$= revenues for firm i at time t, $\Delta S_{i,t}$ = change in revenues of firm i at time t, $A_{i,t-1}$ = total assets at time t-1 for firm i and $\varepsilon_{i,t}$ = error term for firm i at time t.

Abnormal discretionary expenses, production costs and operating cash flows are the differences between predicted and actual values.

[b] The parametric p-values are two-tailed t tests

[c] Discretionary expenses are computed using Compustat data and defined as the sum of research and development expenses and selling, general and administrative expenses

[d] Production cost are computed using Compustat data and defined as the sum of costs of goods sold and changes in inventory during the period

[e] Operating cash flow are computed using from Compustat data and defined as cash flow from operations as reported in the statement of cash flows

Appendix

Definition of variables

- Total Accruals (TA): Net income minus operating cash flows
- Operating Cash Flows:Working capital from operations, minus the sum of changes in accounts receivable, inventory and other current assets, plus the sum of changes in accounts payable, taxes payable and other current liabilities.
- Working Capital Accruals (WCA): Sum of changes in accounts receivable, inventory and other current assets, minus the sum of changes in accounts payable, taxes payable and other current liabilities.
- Discretionary expenses (DISEXP): Sum of research and development (R&D) and selling, general and administrative expenses (SG&A).
- Production Costs (PROD): Sum of costs of goods sold and changes in inventory.
- Cash flows from Operations (CFO): Operating cash flow for the firm.
- Total Assets (A):Quarterly assets of the firm.
- Change in Revenues (ΔREV): Change in the revenue of the firm from time t-1 to time t.
- Property, Plant and Equipment (PPE): Gross quarterly property, plant and equipment of the firm.
- Sales (S): Total quarterly sales of the firm.