Does SFAS 151 Provide Perverse Incentive to Induce Manager's Over-production Behavior?

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Abstract

SFAS 151 stipulates that the cost of idle facilities should be recognized as current-period charges rather than capitalized as product costs when a firm's actual production is lower than its normal level. We find that, in response to this mandatory rule, managers engage in over-production in order to avoid reporting idle facility expenses. We also find that, after the adoption of SFAS 151, stagnant firms have a stronger motivation than growth firms to engage in over-production. Taken together, our evidences imply that SFAS 151 provides perverse incentive to induce manager's over-production behavior. Moreover, SFAS 151 fails to maintain neutral since it more severely distorts stagnant firms' production decisions imposed by external reporting considerations.

Keywords: SFAS 151, Over-production, Firm life cycle stage, Real earnings management activities.

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I. Introduction

This study intends to examine whether SFAS 151 creates an incentive for managers to engage in "allocation management," that is, increasing production during the year and storing the excess finished goods in order to eliminate the idle facility expense. Beginning on June 15, 2005, SFAS 151, an amendment of ARB 43, required that the allocation of fixed production overhead should be based on normal capacity. Any unallocated overhead should be classified as current-period idle facility expenses rather than capitalized as product costs when a firm's actual production is lower than its normal level. We expect that this requirement motives production-level managers to overproduce so as to eliminate such unfavorable idle facility expense, since their compensations are often based in part on production volume variances. This is much more the case for top managers, because their compensation and job retention are typically linked to firm performance, which will be adversely affected by recognition of this idle facility expense[1].

We further predict that after the adoption of SFAS 151, the motivation to engage in over-production becomes greater for stagnant firms than for growth firms. This prediction

[1] If the potential effects of recognizing unallocated overhead as an expense would have a material effect upon a company's net income, or upon a manager's bonus, that manager must trade off inventory holding costs on the excess inventory against the perceived problem of reduced current period income.

can be delineated as follows. First, in contrast to growth firms, firms in the stagnant stage of their life cycle have lower potentials and their revenues and profit margins are shrinking. Farrell and Whidbee (2003) find that boards are more likely to appoint a new CEO that will change firm policies and strategies (i.e., an outsider) when forecasted 5-year EPS growth is low. Consequently, managers may face a greater risk of losing their jobs during the stagnant stage of the life cycle than would be the case for growth firms. Reporting an idle capacity expense is a sign that the firm performs poorly, and this may lower earnings growth forecasts further and in turn reduce job security of CEOs. To prevent from being replaced by those who are better equipped with innovative and entrepreneurial competencies to fulfill recovery and development goals, executives from stagnant firms thus are more reluctant to report expenses of unused capacity. This argument is consistent with Bamber, Jiang, Petroni and Wang's (2010) evidence showing that executives' job security or career concerns affect their financial reporting choices (Bamber, Jiang, Petroni and Wang, 2010).

Second, because observability of managerial actions increases as the proportion of firm value represented by growth opportunities decreases (Smith and Watts, 1992), CEOs of stagnant firms are more likely to be evaluated based on accounting performance relative to market based measures. We can expect that a higher incidence of accounting-based incentive plans among stagnant firms will lead them to be more reluctant to report unallocated overhead. Moreover, firms in stagnation and/or decline prefer to show a higher profitability,

which provides a signal to investors that firms will remain viable longer (Jenkins, Kane and Velury, 2004). Since the change in wording from ARB 43 to SFAS 151 formalizes the link between any unused capacity and lower profitability, stagnant firms may prefer to get rid of unused capacity by over-production.

Third, to prevent from being imposed more stringent debt terms from lenders, stagnant firms would prefer to disguise idle capacity expenses through over-production. With stagnant and declining earnings from existing assets and little potential for earnings growth, it is not surprising that many declining firms face debt burdens that are overwhelming (Damodaran, 2009)[2]. Previous literature suggests that leveraged firms engage in accrual earnings management (Beatty and Weber 2003; Dichev and Skinner 2002; DeFond and Jiambalvo 1994) and real earnings management (Zhang, 2006; Graham et al., 2005) to avoid debt covenant default. Therefore, it stands to reason that managers of stagnant firms are willing to burn "real" cash flows- over-production-for the sake of concealing undesired accounting numbers to minimize the perceived risk of the firm.

The sample used for this study is the US manufacturing firms that appear in the COMPUSTAT and CRSP database between 2003 and 2008. Consistent with our predictions, our major findings include: (1) SFAS 151 provides perverse incentive for managers to engage

[2]Damodaran (2009) suggests that much of this debt was probably acquired when the firm was in a healthier phase of the life cycle and at terms that cannot be matched today. In addition to difficulties these firms face in meeting the obligations that they have committed to meet, they will face additional trouble in refinancing the debt, since lenders will demand more stringent terms.

in over-production and (2) stagnant firms have a stronger motivation than growth firms to engage in over-production after the adoption of SFAS 151.

This study contributes to the literature in several ways. First, the existing studies on managers' over-production mainly focus on how investors explain unexpected inventory growth. This line of academic research is mixed regarding the signal that unexpected inventory growth sends to investors. There is evidence that increases in inventory that outpace increases in sales portend future bad news for a business, because it may indicate the company is stockpiling inventory to switch current-period expenses into future periods (i.e., Lev and Thiagarajan, 1993; Abarbanell and Bushee, 1997), especially for firms with higher fixed cost ratio (Gupta, Seethamraju and Pevzner, 2010). There is also evidence, however, that investors may generally consider growth in inventory a positive signal in that the company expects sales to increase in future periods and is stockpiling inventory to meet demand (i.e., Jiambalvo, Noreen and Shevlin, 1997). In a more recent paper, the findings of Roychowdhury (2006) suggest that managers engage in three types of real earnings management (i.e., sales manipulation, reduction of discretionary expenditures, and over-production) to achieve a zero earnings threshold. Overall, none of the prior studies explicitly address whether SFAS 151 provides additional incentive for firms to engage in over-production behavior. Our study fills the gap by providing evidence for accounting setters to understand if SFAS 151 creates an internal agency problem that leads managers to

exhibit dysfunctional behavior (i.e., excessive production).

Second, accounting rules must be neutral. We find that SFAS 151 more severely distorts stagnant firms' production decisions driven by external reporting considerations; it fails to maintain neutral. Even though the original intention of SFAS 151 is to provide transparent information for investors, managers' dysfunctional behavior may obscure the truth. If SFAS 151 results in some companies producing excess inventory and others increasing current-period expenses[3], it may be more difficult for investors to interpret the results of these firms' financials. Our findings can be used by policymakers to determine whether benefits to investors would accrue after companies were required to apply SFAS 151.

The remainder of the paper is as follows: Section II reviews the literature related to managers' over-production behavior. Section III presents the hypothesis development, while Section IV describes the data and methodology. Section V disscusses the empirical results, and Section VI concludes this study.

[3] We notice that even when firms have to recognize unused capacity expenses, they prefer not to report them in a line item but aggregate the expenses in the costs of goods sold.

II. Existing Studies on Over-production

A number of empirical studies have demonstrated that managers' intervention in reporting earnings can occur not only via accounting accruals, but also through real activities. In general, managers may prefer accrual-based earnings management to real earnings management activities because real earnings management activities impose greater long-term costs for the company. For example, managers' use of over-production generates excess inventories that have to be sold in subsequent periods, and over-production will also increase greater inventory holding costs for the company. Recently, however, some studies have suggested that accrual-based earnings management becomes potentially more costly to firms than real earnings management activities when firms face with high litigation risks. In particular, there is an obvious trend that managers move from accrual-based earnings management to real earnings management activities after the adoption of SOX (the Sarbanes–Oxley Act) (i.e., Zang, 2007; Cohen, Dey and Lys, 2008). A research work by Graham, Harvey and Rajgopal (2005) also indicates that 78% of CFOs attach a high importance to meeting earnings targets and that CFOs are willing to manipulate earnings through real activities rather than through accruals because they are harder to be detected.

This study focuses on managers' over-production behavior- a type of real earnings management activity. Prior accounting studies have suggested that the external financial reporting requirements on the absorption cost method is one way by which over-production

can be accomplished (Gupta et al., 2010; Horngren et al., 2009; Jiambalvo et al., 1997; Roychowdhury, 2006). Under the absorption costing method, all variable costing and fixed manufacturing overhead are included as inventoried costs. Managers can boost their current-period earnings through allocating fixed manufacturing overhead between ending inventory values on the balance sheets and the cost of goods sold on the income statement. In other words, firms can produce more finished goods than necessary to meet expected demand in order to delay expensing their fixed manufacturing overhead from the current-period into the next-period.

The economic consequences and the economic incentives of over-production have been examined in prior accounting studies. One stream of the literature has focused on how the stock market interprets the information conveyed by over-production. Lev and Thiagarajan (1993) indicate that inventory changes in excess of sales changes are negatively correlated with analyst earnings forecasts and stock returns. They suggest that over-production conveys bad signals because increases in inventory indicate that firms have slow-moving merchandise or obsolete inventory. Consistent with the findings of Lev and Thiagarajan (1993), Abarbanell and Bushee (1997) also find that over-production is negatively associated with future earnings performance. In contrast, Jiambalvo et al. (1997) observe that over-production is positively correlated with current-period stock returns. They argue that over-production might convey favorable information about an increase in market demand for

the firm's products. In a more recent paper, Gupta et al. (2010) find that high fixed costs firms have a stronger motivation to engage in opportunistic over-production. Financial analysts are aware of this phenomenon and appropriately reduce their forecasts of future earnings per share (EPS) for over-production firms with high fixed assets.

Other studies have examined whether managers over-produce to achieve earnings targets. Roychowdhury (2006) find evidence that firms use multiple real earnings management activities in order to avoid reporting small annual losses. In particular, his evidence suggests that managers are providing price discounts to temporarily boost sales, reducing discretionary expenditures in order to improve reported margins, and overproducing to lower the cost of goods sold. Overall, none of above studies has explicitly addressed the influence of expensing unused capacity under SFAS 151. We extend the prior studies by investigating whether managers use over-production to avoid expensing idle facilities after the adoption of SFAS 151.

III. Hypotheses Development

3.1 Managers' use of over-production after the adoption of SFAS 151

The FASB announced SFAS 151 (an amendment of ARB No. 43) beginning on June 15, 2005, to require managers account for unallocated fixed overhead as current-period idle facility expense rather than as a portion of inventory costs. Under SFAS 151, the allocation of fixed production overhead to the costs of conversion is based on normal production capacity, and the unallocated fixed overhead is classified as an idle facility expense when a firm's production volume is lower than its normal level. This regulation is expected to further motivate managers' use of over-production.

Managers choose over-production only when the benefits outweigh the costs of such manipulation. A direct personal pecuniary benefit from over-production for managers is from their compensation. Since top managers' compensation and job retention are linked to firm current earnings performance, they have incentives to engage in over-production for the purpose of eliminating any unfavorable idle facility expense. For production-level managers, compensation is often based in part on production volume variances. Thus, they might increase production in order to mask the unfavorable fixed overhead variances. Doing so costs nothing for production-level managers. Even though the excess production adversely affects inventory turnover or costly inventory write downs if the market value of inventory falls below cost, production-level managers are usually not responsible for these inventory holding

costs (Timothy and Thomas, 2007). Thus, we expect that after the adoption of SFAS 151, managers' incentives to engage in opportunistic of over-production behavior be exacerbated. We propose Hypothesis 1 as follows:

Hypothesis 1: Ceteris paribus, SFAS 151 provides perverse incentive to induce managers' opportunistic behavior of over-production.

3.2 The influence of different life cycle stages on managers' use of over-production after the adoption of SFAS 151

We expect that managers are likely to perceive greater costs for reporting idle facility expenses during a stagnant stage of the life cycle relative to a growth stage. First, managers may face a greater risk of losing their jobs during the stagnant stage of the life cycle than would be the case for growth firms if they receive unfavorable accounting performance. On average, stagnant firm's sales and profit margins continue to decline as a result of competition. Employees flee stagnant firms in search of new opportunities. Competitors push even harder when they sense a firm losing momentum. Thus, stagnant firms are more likely to turn into a takeover prey, and typically, the departing CEOs come from companies that are the targets of acquisition. Even if the stagnant firm survives from the intense merger and acquisition activities, the board of directors is more likely to replace the CEO in order to make changes to firm policies and strategies. Evidences from prior empirical works support this argument.

Farrell and Whidbee (2003) find that boards are more likely to appoint a CEO that will change firm policies and strategies (i.e., an outsider) when the forecasted 5-year EPS growth is low. The probability of manager turnover also increases following poor firm performance (i.e., Warner, Watts, and Wruck 1988; Weisbach, 1988; Parrino, 1997). Since the change in wording from ARB 43 to SFAS 151 formalizes the link between any unused capacity and lower profitability, stagnant firms may prefer to get rid of unused capacity by over-production. Reporting an idle capacity expense is a sign that the firm performs poorly, and this may lower earnings growth forecasts further and in turn reduce job security of CEOs. Thus, executives from stagnant firms are more reluctant to report expenses of unused capacity. This argument is consistent with Bamber, Jiang, Petroni and Wang's (2010) evidence showing that executives' job security or career concerns affect their financial reporting choices (Bamber, Jiang, Petroni and Wang, 2010).

Second, since management's actions are unobservable, shareholders offer contracts based on observable performance indicators presumed to be correlated with management's actions. In general, accounting-based performance is less informative with respect to management's actions when investment opportunities are a substantial portion of firm value (Smith and Watts, 1992); therefore, there is a greater reliance on market-based compensation for firms with high growth opportunities (Lambert and Larcker, 1987; Baber, Janakiraman and Kang, 1996; McDonald and McGough, 1999). Gaver and Gaver (1993) also suggest that

stock-based compensation is an optimal compensation arrangement for growth firms, implying it is less than optimal for stagnant firms. On average, stagnant firms seem to have less investment opportunities than typical growth firms because declining innovation has been recognized as a major problem during a stagnant stage (Craig and Harris, 1973). Therefore, managers' compensations of stagnant firms are more likely to link to accounting-based performance. Moreover, Jenkins, Kane and Velury (2004) observe that a shift in the value-relevance of earnings components; that is, from a growth emphasis early in the life cycle to a profitability emphasis later in the life cycle. That is because firms in stagnation and/or decline prefer to show a higher profitability, which provides a signal to investors that firms will remain viable longer and have stronger cash flow, in order to get enough funds to finance the development of new products and services for survival. We can expect that a higher incidence of accounting-based (profitability) incentive plans among stagnant firms will lead them to be more reluctant to report unallocated overhead and thus choose over-production decision.

Third, to prevent having more stringent debt terms from lenders impose on them, stagnant firms will prefer to disguise idle capacity expenses through over-production. With stagnant and declining earnings from existing assets and little potential for earnings growth, it is not surprising that many declining firms face overwhelming debt burdens (Damodaran,

2009)[4]. Previous literature has suggested that leveraged firms engage in accrual earnings management (Dichev and Skinner 2002; DeFond and Jiambalvo 1994) and real earnings management activities (Zhang, 2007; Graham et al., 2005) to avoid debt covenant default. Therefore, it stands to reason that managers of stagnant firms are willing to burn "real" cash flows (over-production) for the sake of concealing undesired accounting numbers for the purpose of minimizing the perceived risk of the firm. Overall, we expect that stagnant firms have a greater motivation than growth firms to engage in over-production after the adoption of SFAS 151. Thus, we propose Hypothesis 2 as follows:

Hypothesis 2: Ceteris paribus, stagnant firms have a stronger motivation than growth firms to follow a policy of over-production after the adoption of SFAS 151.

[4] Damodaran (2009) suggests that much of this debt was probably acquired when the firm was in a healthier phase of the life cycle and at terms that cannot be matched today. In addition to difficulties these firms face in meeting the obligations that they have committed to meet, they will face additional trouble in refinancing the debt, since lenders will demand more stringent terms.

IV. Data and Methodology

4.1 Data

We use the US manufacturing firms that appeared in both the COMPUSTAT and the CRSP databases as the sample. The sample period is from 2003 to 2008. We choose this period because Cohen et al. (2008) observed that managers were more likely to engage in real earnings management activities after the adoption of the Sarbanes-Oxley Act in 2003 and over-production is one of real earnings management activities. The FASB decided that SFAS 151 should be effective for fiscal years beginning after June 15, 2005. Therefore, we separate the research period into two sub-periods—the pre-SFAS 151 period (2003-2005) and the post-SFAS 151 period (2006-2008). In addition, we eliminate 276 firm-years observations with missing variables and winsorize all variables at the 1% and 99% percentile level (240 firm-years observations) to reduce the influence of extreme values. As a result, the final sample consists of 8,111 firm-year observations from 1,440 firms. Table 1 reports sample selection criteria.

Table1 about here

4.2 Regression model

To test Hypothesis 1 and Hypothesis 2, we estimate the following equation (Eq1).

$$Ab\_PROD_{i,t} = \beta_0 + \beta_1 SFAS151 + \beta_2 Cycle_{i,t} + \beta_3 SFAS151 \times Cycle_{i,t} + \beta_4 Suspect\_NI_{i,t} + \beta_5 FAI_{i,t} +$$

$$\beta_6 \Delta Sales_{i,t} + \beta_7 LTD_{i,t} + \beta_8 CFOLO_{i,t} + \beta_9 CFOHI_{i,t} + \beta_{10} MTB_{i,t} + \beta_{11} SIZE_{i,t} +$$

$$\beta_{12} EARN_{i,t} + \sum_{j=1}^{14} \varphi_j Industry_j + \sum_{k=1}^{5} \varphi_k YEAR_k + \delta_{i,t} \qquad \text{(Eq1)}$$

where

$Ab\_PROD_{i,t}$	=	Ab_PROD represents the extent of over-production and is measured by the proxy developed by Roychowdhury (2006).
$SFAS151$	=	SFAS151 is an indicator variable, which has a value of 1 if the sample is in the post-SFAS 151 period, and 0 otherwise.
$Cycle_{i,t}$	=	Cycle is an indicator variable that equals to 1 when a firm is in the stagnant stage and 0 when a firm is in the growth stage
$Suspect\_NI_{i,t}$	=	Suspect_NI is an indicator variable that has a value of 1 if a sample firm's "income before extraordinary items scaled by total assets" is greater than or equal to zero but less than 0.005, and 0 otherwise.
$FAI_{i,t}$	=	FAI measures a firm's cost structure, is defined as the ratio of gross fixed assets to total assets of the firm in year t.
$\Delta Sales_{i,t}$	=	$\Delta Sales$ measures a firm's change in sales.
$LTD_{i,t}$	=	LTD is an indicator variable that is assigned a value of 1 when a firm's long-term debt to total-asset ratio is above the 90^{th} percentile sample value in each of its respective industry-year (in terms of two-digit SIC codes), and 0 otherwise.
$CFOLO_{i,t}$	=	We use changes in cash flow from operations deflated by one year lagged total assets (CFOCHG) to proxy a firm's premanaged earnings. CFOLO identifies firms with relatively low premanaged earnings, which has a value of 1 if a firm has its CFOCHG value below the 10th percentile sample value, and 0 otherwise.
$CFOHI_{i,t}$	=	We use changes in cash flow from operations deflated by one year lagged total assets (CFOCHG) to proxy a firm's premanaged earnings. CFOHI identifies firms with relatively high premanaged earnings, which has a value of 1 if a firm has its CFOCHG value above the 90th percentile sample value, and 0 otherwise.

$MTB_{i,t}$	=	*MTB* is the ratio of market value divided by book value of equity.
$SIZE_{i,t}$	=	*SIZE* is the logarithm of the market value of equity at the beginning of the year.
$EARN_{i,t}$	=	*EARN* is measured by net income divided by the beginning of the year total assets.
$Industry_j$	=	$Industry_j$ equals one if the firm is in industry j (based on the two-digit SIC codes), and zero otherwise.
$YEAR_k$	=	$Year_k$ equals one if the observation is from year K, and zero otherwise.
$\varepsilon_{i,t}$	=	Error term.

Ab_PROD, the dependent variable, represents the extent of over-production and is measured by the proxy developed by Roychowdhury (2006). Roychowdhury (2006) uses abnormal production cost to measure possible abnormal inventory growth, which Zang (2007) and Cohen et al. (2008) also adopted this method. Following Roychowdhury (2006), this study uses the following industry-year regression to measure abnormal production cost.

$$\frac{PROD_{t,j}}{A_{t-1,j}} = \alpha_0 + \alpha_1(\frac{1}{A_{t-1,j}}) + \alpha_1(\frac{S_{t,j}}{A_{t-1,j}}) + \alpha_2(\frac{\Delta S_{t,j}}{A_{t-1,j}}) + \alpha_3(\frac{\Delta S_{t-1,j}}{A_{t-1,j}}) + \varepsilon_{t,j},$$

where A_{t-1} represents the total assets at the beginning of the year; *PROD* represents the current year's cost of goods sold plus the difference in the current year's inventory; S_t represents the current year's net sales; S_{t-1} represents the prior year's net sales; ΔS_t represents the change of net sales in the current year, and ΔS_{t-1} represents the change of net sales in the prior year. We use A_{t-1} as a deflator to mitigate the problem of omitted size variable (Rochowdury, 2006). The error term of the production cost regression is the abnormal production cost (*Ab_PROD*). We require at least 15 observations for each industry-year to

estimate the abnormal production cost. The main analyses presented below are the results using Rochowdury's measure of the abnormal production cost. Alternatively, Jiambalvo et al. (1997) use "Change in Percentage of Production Added to Inventory (*CPAI*)" to measure the difference in earnings between absorption costing and variable costing. For robustness check, we also report the results using the *CPAI* as developed by Jiambalvo et al. (1997).

SFAS151 is an indicator variable, which has a value of 1 if the sample is in the post-SFAS 151 period, and 0 otherwise. Following Anthony and Ramesh (1992) and Black (1998), we use four classification variables: (1) annual dividend as a percentage of income (*DP*), (2) percent sales growth (*SG*), (3) capital expenditure as a percentage of total value of the firm (*CEV*), and (4) age of the firm[5](*AGE*). For each firm-year, median values of the four life cycle descriptors (i.e., *MDP*, *MSG*, *MCEV* and *MAGE*) are computed using the prior five years' data. We then rank firms on each of the four life cycle descriptors and is trisected and assigned a score of 0, 1, or 2 for bottom-, middle-, or upper-section respectively. The sum of the individual scores arrives at a composite score with values from zero to eight for each firm-year. A firm is classified as being at a "GROWTH" stage if its composite score is between 0 and 2. A firm is classified as being at a "MATURE" stage if its composite score is between 3 and 5. A firm is classified as being at a "STAGNANT" stage

[5] Firm age is defined as the total years since the firm first appeared on CRSP (Denis, Denis and Sarin, 1997; Linck, Netter and Yang, 2008).

if its composite score is between 6 and 8[6]. *Cycle* is an indicator variable that equals to 1 when a firm is in the stagnant stage and 0 when a firm is in the growth stage. Hypothesis 1 predicts $\beta_1 > 0$, indicating that managers' use of over-production is exacerbated after the adoption of SFAS 151. Hypothesis 2 predicts that the coefficient on $SFAS151 \times Cycle$ (β_3) is positive, indicating that stagnant firms have a stronger motivation than growth firms to engage in over-production behavior after the adoption of SFAS 151.

This study also includes proxies that measure managers' motivations to engage in over-production (i.e., *Suspect_NI, FAI* and $\Delta Sales$). First, sample firms that have positive earnings in the interval closely near to zero are assumed to have strong incentives to manage their earnings through over-production. *Suspect_NI* is an indicator variable that has a value of 1 if a sample firm's "income before extraordinary items scaled by total assets" is greater than or equal to zero but less than 0.005, and 0 otherwise. Second, according to Gupta et al. (2010), firms with a high fixed cost structure will have a higher motivation to conduct over-production because they can make a big difference in earnings by allocating higher amount of fixed costs to ending inventories. "Fixed Asset Intensity (*FAI*)", measuring a firm's cost structure, is defined as the ratio of gross fixed assets to total assets of the firm in year t. Finally, this study also includes change in sales ($\Delta Sales$) to control for the effects of

[6] In order to safeguard the internal validity, the current study also compare the composite score to its prior year's and find that 72.85% (53.77%, 47.84%) of firms remain in the same life cycle group compared to the prior year (three years and five years). The finding is similar to Anthony and Ramesh (1992).

a change in demand on over-production (Gupta et al., 2010). We expect that $\Delta Sales$ is positively associated with over-production.

Following Jiambalvo et al. (1997), this study includes the following three control variables: *LTD*, *CFOHI* and *CFOLO*. First, firms with higher debts have a greater motivation to engage in over-production to relieve the risk of violating debt covenants. *LTD* is an indicator variable that is assigned a value of 1 when a firm's long-term debt to total-asset ratio is above the 90^{th} percentile sample value in each of its respective industry-year (in terms of two-digit SIC codes), and 0 otherwise. Second, firms with relatively high or low *premanaged* earnings have motivations to smooth *reported* earnings. We use changes in cash flow from operations deflated by one year lagged total assets (*CFOCHG*) to proxy a firm's *premanaged* earnings. *CFOHI* (*CFOLO*) identifies firms with relatively high (low) *premanaged* earnings, which has a value of 1 if a firm has its *CFOCHG* value above the 90^{th} percentile (below the 10^{th} percentile) sample value, and 0 otherwise.

This study also includes three control variables (i.e., *MTB, SIZE* and *EARN*) suggested by Roychowdhury (2006). *MTB* is the ratio of market value divided by book value of equity, which controls for the effects of corporate growth opportunities. *Size* is the logarithm of the market value of equity at the beginning of the year, which controls for any effects on abnormal production costs arise from firm size. According to the findings of Roychowdhury (2006), both *MTB* and *SIZE* are expected to be negatively associated with

over-production. *EARN* is measured by net income divided by the beginning of the year total assets, which controls for the effects of firm performance on over-production. Poor firm performance induces managers to manipulate earnings (Guay, Kothari and Watts, 1996) and therefore we predict the coefficient on *Earn* to have a negative sign. To control for omitted time- and industry- specific effects, we permit the regression intercept to vary across years and industries. Specifically, $Year_k$ equals one if the observation is from year K, and zero otherwise, and $Industry_j$ equals one if the firm is in industry j (based on the two-digit SIC codes), and zero otherwise.

V. Empirical Results

5.1 Descriptive statistics

Table 2 provides descriptive statistics of the research variables for the pre- and post-adoption of SFAS 151, respectively. The mean over-production for the post-adoption period is higher than the mean over-production for the pre-adoption period (0.063 vs. 0.045 with a t-statistic of 1.91, which is significant at a ten-percent confidence level). The results suggest that managers' over-production behavior is more pronounced after the adoption of SFAS 151. The mean of *Cycle* for the post-adoption period is significantly lower compared to that of the pre-adoption period (0.371 vs. 0.478 with a t-statistic of -7.09 which is significant at a one-percent confidence level). The mean *Suspect_NI* is 0.013 (0.017) for the post-adoption (pre-adoption) period, indicating that about 1.5% of the observations are identified to have pressures to meet the zero earnings threshold. The mean *FAI* is 0.440 for the post-adoption of SFAS 151, and the mean *FAI* is 0.450 for the pre-adoption of SFAS 151.

Table 2 about here

The Pearson correlations for the variables are summarized in Table 3. *Ab_PROD* is positively correlated with *SFAS151* (coefficient =0.021, $p< 0.1$), suggesting that firms are more likely to engage in over-production behavior after the adoption of SFAS 151. Whether

SFAS 151 provides substantive incentive for managers to engage in over-production is investigated in the subsequent multivariate analysis. As expected, *Ab_PROD* is significantly and positively correlated with most of the control variables. In addition, the highest correlation is between *SIZE* and *EARN*, with a value for 0.245, which is lower than 0.8 (Gujarati, 1995), a threshold concerning multicollinearity problem.

Table 3 about here

5.2 Main Analyses

As reported in Table 4, *SFAS151* is significantly and positively associated with *Ab_PROD* (coefficient = 0.0384 and p-value< 0.01). This result is consistent with the prediction of Hypothesis 1 that SFAS 151 provides perverse incentive for firms to engage in over-production. In addition to evaluating the statistical significance of our results, we can use the coefficients from the regression to calculate economic effects. Using the estimates in Table 4, we compute that the predicted abnormal production costs of a median firm (i.e., holding all other explanatory variables at their medians) is 59.2% of total assets (abnormal production cost is 150.52 million US dollars) in the pre-SFAS 151 period, and 63.0% of total assets (abnormal production cost is 160.18 million US dollars) in the post-SFAS 151 period.

The coefficient of *Suspect_NI* is 0.0797, which is significant at the five-percent level.

This result is consistent with the findings of Roychowdhury (2006), suggesting that firms are more likely to engage in over-production when they attempt to avoid reporting small annual losses. As to the effects of cost structure, the coefficient of *FAI* is 0.0738 and is significant at the one-percent level, indicating that firms with higher fixed overhead structure are more likely to engage in over-production. The coefficient on $\Delta Sales$ is positive (0.0039) and significant at the one-percent level, implying that firms with higher future demand are more likely to engage in over-production.

Similar to the findings of Jiambalvo et al (1997), the coefficient on *CFOHI* is negative and significant (coefficient = -0.0916 and p-value <0.01), indicating that firms who have high-premanaged earnings intends to reduce production and "consume" their the cumulated inventories so as to smooth earnings. The coefficient on *CFOLO* is negative and significant (coefficient = -0.0609 and p-value <0.01), implying taking-a-big-bath behavior but not the earnings smoothing behavior we originally predict.

Consistent with the evidence in Roychowdhury (2006), both *SIZE* and *EARN* have negative and significant coefficients (coefficients = -0.0078 and -0.0872 respectively; both p-values <0.01). Moreover, a significant and positive relationship between *LTD* and *Ab_PROD* (coefficient =0.0782, p-value <0.01) is demonstrated. This finding is similar to the findings of Jiambalvo et al (1997), indicating that firms who have higher debts have a higher motivation to produce excessive inventories.

Table 4 about here

Panel A of Table 5 reports the univariate comparisons of abnormal production cost around the adoption of SFAS 151 conditional on firms' life cycle stages. For the subsample of 914 stagnant firms, the mean over-production significantly increases from 0.0261 in the pre-SFAS 151 period to 0.0888 in the post-SFAS 151 period ($p < 0.01$). Alternative, this is not the case for the subsample of 989 growth firms (0.0836 vs. 0.0877). The statistics result suggests that SFAS 151 has a more severe effect on stagnant firms regarding the production decision.

Panel B of Table 5 reports that the coefficient of *SFAS151* remains to be significantly and positively associated with *Ab_PROD* (coefficient =0.0762, p-value <0.01). The finding is consistent with previous finding, indicating that SFAS 151 creates perverse incentives for firms to engage in over-production. The coefficient on the interaction term between *SFAS151* and *Cycle* is positive and significant (coefficient = 0.0613 and p-value <0.05). The finding aligns with the expectation of Hypothesis 2, which posits that stagnant firms have a stronger motivation than growth firms to follow a policy of over-production after the adoption of SFAS 151. As predicted, the findings of control variables are similar to Table 4. For robustness check, we also exclude sample observations from 2008, when the global financial crisis erupted that have thrown economies around the world into recession. Our results

remain unaffected after excluding the observations from 2008.

Table 5 about here

5.3 Additional analyses

We further conduct robustness tests to enhance internal validity. First, firms may pursue an overall earnings management strategy, which they may engage in both accrual-based earnings management and real earnings management activities. Thus, we also use a cross-sectional modified-Jones model along with lagged return-on-assets to assess accrual-based earnings management (Wilson, 2009). Then, the sample-firms observations are dividend into five sections based on each quintile of over-production. Panel A of Table 6 reports that the mean difference of accruals between the highest quintile and lowest quintile is significant at a one-percent confidence level (coefficient = 0.876 and p-value < 0.01)[7], indicating manufacturing firms not only engage in over-production behavior but also engage in accrual-based earnings management. Moreover, Panel B of Table 6 indicates the empirical results by using a seemingly unrelated regression[8]. We find that the coefficient of *SFAS151* is significantly and positively associated with *Ab_PROD* (coefficient = 0.0284 and p-value <0.01) and the coefficient on the interaction term between *SFAS151* and *Cycle* is

[7] There is also a positive and significant Pearson correlation between *Ab_PROD* and *Accruals* (coefficient = 0.036 and p-value = 0.011).

[8] There may be a correlation between the error term in the over-production regression and the error term in the accrual-based regression.

positive and significant (coefficient = 0.0926 and p-value <0.01), which is consistent with the previous findings.

Second, over-production behavior may also reflect a firm's estimate of an increase in future demand (Jiambalvo et al., 1997). Order backlog is commonly used to reflect a change in demand and the firm's ability to match its production with the change in demand (Lev and Thiagarajan, 1993; Rajgopal et al., 2003). Thus, we include an optimistic indicator variable and it is equal to 1 if the change in order backlog is greater than zero and equal to 0 if the change in order backlog is less than zero. After controlling this optimistic indicator variable, Panel C of Table 6 indicates that the coefficient of *SFAS151* is significantly and positively associated with *Ab_PROD* (coefficient = 0.0278 and p-value <0.05) and the interaction term between *SFAS151* and *Cycle* is positive and significant (coefficient = 0.1676 and p-value <0.05), which do not influence our prior conclusions.

Third, the alternative measure of over-production is *CPAI*[9] (Jiambalvo et al., 1997). Thus, we re-run prior regression results by using *CPAI.* Panel D of Table 6 reports that the coefficient of *SFAS151* remains to be significantly and positively associated with *CPAI* (coefficient = 0.0290 and p-value <0.01) and the interaction term between *SFAS151* and *Cycle* is also significantly and positively associated with *CPAI* (coefficient = 0.0107 and p-value <0.05).

[9] It presents a change in the percent of production added to inventory

Finally, our early tests assume that managers maximize their rewards by selecting income-increasing strategy (i.e., over-production behavior). Alternative, managers may select income smoothing strategy (i.e., under-production behavior) to reduce earnings fluctuations around some level considered normal in order to (1) safeguard their position with the firm (Weisbach, 1988), (2) convey their expectations concerning the persistence of future earnings to investors (Hand, 1989) or (3) reduce the firm's borrowing costs (Trueman and Titman, 1988). Thus, we re-run the regression results by (1) eliminating the potential under-production (i.e., we eliminate sample-firms observations with negative value of *Ab_PROD*) and (2) including the potential income-smoothing (*SMOOTH*) control variable in the regression model. Both Panel E and F of Table 6 reports that the coefficients of *SFAS151* remain to be significantly and positively associated with *Ab_PROD* (coefficient = 0.8978 and p-value <0.01, coefficient =0.0248 and p-value <0.05) and the interaction terms between *SFAS151* and *Cycle* are also significantly and positively associated with *Ab_PROD* (coefficient =1.4359 and p-value <0.01, coefficient =0.0854 and p-value <0.05).

Table 6 about here

VI. Conclusions

This study expands the prior over-production studies and finds that managers have a strong motivation to over-produce inventories after the adoption of SFAS 151. Based on the finding, the adoption of SFAS 151 has the effect of increasing a company's motivation to buildup inventories level in order to defer the recognition of idle facility expenses. Hence, our study provides a link between management accounting and financial accounting research by explicitly indicating that SFAS 151 has the potential to inject production-level concerns into external reporting decisions. In addition, we also find that after the adoption of SFAS 151, stagnant firms have a stronger motivation than growth firms to follow a policy of over-production. Even though the use of over-production enables stagnant firms to meet a short-run earnings target, it also imposes considerable inventory holding costs on the company for the subsequent periods, and this misleading picture of company performance will ultimately result in a reduction in long-term firm value. Nevertheless, in highly competitive markets, stagnant firms' production strategy should instead focus on minimizing production costs. Thus, it seems reasonable to suggest that stagnant firms should avoid engaging in over-production behavior and they should place more emphasis on production efficiency.

Our evidences also form an important consideration in the debate on the costs and benefits of this new accounting standard. If SFAS 151 induces some managers to engage in

producing excess inventory, it will impose considerable difficulty for investors to correctly understand and interpret a firm's financial results because this type of earnings manipulation is less easy to be detected by investors than other accounting manipulations and frauds. The inflated earnings by over-production may mislead investors to make non-optimal investment decisions after the adoption period of SFAS 151. This will ultimately results in inefficient allocation of resources among firms.

Our research has major limitation that offers suggestions for future research in this area. This study is that the sample firms are drawn from US manufacture firms. Hence, the conclusions of the present study may not fully generalize to other countries without replication in different countries, even though International Accounting Standards in dealing with the allocation issue of fixed production overhead is in compliance with U.S. GAAP. This study also raises some interesting questions that future studies might explore this issue. For example, future studies might investigate the relationship between the effectiveness of corporate governance and managers' over-production behavior after the adoption of SFAS 151.

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Table 1: Sample Selection Criteria

Criteria	Observations
Observations with sufficient US manufactory firms that appeared in both the COMPUSTAT and the CRSP databases between 2003-2008	8,627
Less: 1. Observations that lack sufficient financial variables data.	276
2. We winsorizes all variables at the 1% and 99% percentile level to reduce the influence of extreme values.	240
Final observations	8,111

Table 2: Descriptive Statistics

Variables	Pre-adoption of SFAS 151			Post-adoption of SFAS 151			Difference	
	N	Mean	Std Dev	N	Mean	Std Dev	Diff	t-stat
Ab_PROD	4,097	0.045	0.356	4,014	0.063	0.522	0.019	1.91*
Cycle	1,043	0.478	0.480	860	0.371	0.477	-0.106	-7.09***
Suspect_NI	4,097	0.017	0.129	4,014	0.013	0.113	-0.004	-1.54
FAI	4,097	0.450	0.210	4,014	0.440	0.214	-0.009	-1.95*
Δ*Sales*	4,097	-0.879	5.272	4,014	-0.047	2.108	0.831	9.82***
LTD	4,097	0.050	0.218	4,014	0.046	0.209	-0.004	-0.87
CFOLO	4,097	0.092	0.288	4,014	0.092	0.289	0.001	0.08
CFOHI	4,097	0.080	0.271	4,014	0.092	0.290	0.013	2.00**
MTB	4,097	5.052	42.659	4,014	7.365	114.491	2.312	1.12
SIZE	4,097	5.697	2.994	4,014	5.985	2.339	0.288	5.39***
EARN	4,097	-0.047	0.354	4,014	-0.062	0.450	-0.014	-2.81***

Note: *Ab_PROD* represents the extent of over-production and is measured by the proxy developed by Roychowdhury (2006). *SFAS151* is an indicator variable, which has a value of 1 if the sample is in the post-SFAS 151 period, and 0 otherwise. *Cycle* is an indicator variable that equals to 1 when a firm is in the stagnant stage and 0 when a firm is in the growth stage. *Suspect_NI* is an indicator variable that has a value of 1 if a sample firm's "income before extraordinary items scaled by total assets" is greater than or equal to zero but less than 0.005, and 0 otherwise. *FAI* measures a firm's cost structure, is defined as the ratio of gross fixed assets to total assets of the firm in year t. Δ*Sales* measures a firm's change in sales. *LTD* is an indicator variable that is assigned a value of 1 when a firm's long-term debt to total-asset ratio is above the 90th percentile sample value in each of its respective industry-year (in terms of two-digit SIC codes), and 0 otherwise. We use changes in cash flow from operations deflated by one year lagged total assets (*CFOCHG*) to proxy a firm's premanaged earnings. *CFOLO* identifies firms with relatively low premanaged earnings, which has a value of 1 if a firm has its *CFOCHG* value below the 10th percentile sample value, and 0 otherwise. We use changes in cash flow from operations deflated by one year lagged total assets (*CFOCHG*) to proxy a firm's premanaged earnings. *CFOHI* identifies firms with relatively high premanaged earnings, which has a value of 1 if a firm has its *CFOCHG* value above the 90th percentile sample value, and 0 otherwise. *MTB* is the ratio of market value divided by book value of equity. *SIZE* is the logarithm of the market value of equity at the beginning of the year. *EARN* is measured by net income divided by the beginning of the year total assets. We use Satterthwaite t-statistics to test the means for unequal variances, and the pooled t-test otherwise.

Table 3: Correlations among Variables

Variables	Ab_PROD	SFAS151	Cycle	Suspect_NI	FAI	$\Delta Sales$	LTD	CFOLO	CFOHI	MTB	SIZE	EARN
Ab_PROD	1	0.021	-0.034	0.033	0.003	0.031	0.036	0.081	0.022	0.056	-0.104	-0.055
		(0.057)	(0.14)	(<0.01)	(0.80)	(0.01)	(<0.01)	(<0.01)	(0.12)	(<0.01)	(<0.01)	(<0.01)
SFAS151		1	-0.293	-0.024	-0.011	0.095	-0.004	0.005	-0.064	-0.020	-0.059	-0.069
			(<0.01)	(0.06)	(0.35)	(<0.01)	(0.73)	(0.67)	(<0.01)	(0.11)	(<0.01)	(<0.01)
Cycle			1	-0.027	0.032	-0.060	-0.099	0.080	-0.063	-0.028	0.314	0.096
				(0.24)	(0.17)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(0.21)	(<0.01)	(<0.01)
Suspect_NI				1	0.029	0.009	0.022	0.008	-0.037	-0.007	-0.032	0.013
					(0.02)	(0.46)	(0.07)	(0.48)	(<0.01)	(0.61)	(<0.01)	(0.27)
FAI					1	0.071	0.111	0.124	0.010	-0.024	0.350	0.082
						(<0.01)	(<0.01)	(<0.01)	(0.41)	(0.06)	(<0.01)	(<0.01)
$\Delta Sales$						1	0.001	-0.009	-0.020	0.001	0.148	0.096
							(0.96)	(0.47)	(0.11)	(0.95)	(<0.01)	(<0.01)
LTD							1	0.008	0.059	0.082	-0.030	-0.056
								(0.53)	(<0.01)	(<0.01)	(0.02)	(<0.01)
CFOLO								1	-0.092	0.025	-0.023	-0.067
									(<0.01)	(0.05)	(0.07)	(<0.01)
CFOHI										-0.002	-0.075	-0.075
										(0.89)	(<0.01)	(<-0.01)
MTB										1	-0.018	-0.046
											(0.15)	(<0.01)
SIZE											1	0.245
												(<0.01)
EARN												1

Note: Definition of each variable refers to Table 2.

Table 4: The Effects of SFAS 151 on Over-production

$$Ab\_PROD_{i,t} = \beta_0 + \beta_1 SFAS151 + \beta_2 Suspect\_NI_{i,t} + \beta_3 FAI_{i,t} + \beta_4 \Delta Sales_{i,t} + \beta_5 LTD_{i,t} + \beta_6 CFOLO_{i,t} + \beta_7 CFOHI_{i,t} + \beta_8 MTB_{i,t} + \beta_9 SIZE_{i,t} + \beta_{10} EARN_{i,t} + \sum_{j=1}^{14} \varphi_j Industry_j + \sum_{k=1}^{5} \varphi_k YEAR_k + \varepsilon_{i,t}$$

Dependent variable: *Ab_PROD*

Independent variables	Predict Sign	Parameter Estimates	Standard Error	t-value	p-value	VIF
Intercept	?	-0.0073	0.0166	-0.44	0.66	—
SFAS151	+	0.0384***	0.0094	4.10	<0.01	1.030
Suspect_NI	+	0.0797**	0.0372	2.15	0.03	1.007
FAI	+	0.0738***	0.0261	2.83	<0.01	1.471
Δ*Sales*	+	0.0039***	0.0011	3.62	<0.01	1.034
LTD	+	0.0782***	0.0216	3.62	<0.01	1.035
CFOLO	+	-0.0609***	0.0166	-3.67	<0.01	1.039
CFOHI	−	-0.0916***	0.0159	-5.75	<0.01	1.023
MTB	−	-0.0001	0.0001	-1.37	0.17	1.011
SIZE	−	-0.0078***	0.0022	-3.57	<0.01	1.305
EARN	−	-0.0872***	0.0121	-7.23	<0.01	1.106
Adjusted R^2=10.39%, F-statistic (p-value)=41.88 (p<0.01), N=8,111						

Note: The t-statistics are adjusted for White's (1980) correction for heteroskedasticity. The definition of each variable is referred to in Table 2. The fixed effect of industry and year is not the major point of this paper, so this study does not include this in the table. Levels of significance for two tailed are indicated by ***, **, and * for 1%, 5%, 10%, respectively.

Table 5: Life Cycle Stages and the Effects of SFAS 151 on Over-production

Panel A: Ab_PROD around the SFAS 151 conditional on life cycle.

Variable: Ab_PROD	Pre-SFAS 151 (N=1,043)	Post-SFAS 151 (N=860)	
Stagnant (N=914)	0.0261	0.0888	0.0627***
Growth (N=989)	0.0836	0.0877	0.0041
	-0.0575**	0.0011	0.0586*

Panel B: Regressions results

$$Ab\_PROD_{i,t} = \beta_0 + \beta_1 SFAS151 + \beta_2 Cycle_{i,t} + \beta_3 SFAS151 \times Cycle_{i,t} + \beta_4 Suspect\_NI_{i,t} + \beta_5 FAI_{i,t} + \beta_6 \Delta Sales_{i,t} + \beta_7 LTD_{i,t} + \beta_8 CFOLO_{i,t} + \beta_9 CFOHI_{i,t} + \beta_{10} MTB_{i,t} + \beta_{11} SIZE_{i,t} + \beta_{12} EARN_{i,t} + \sum_{j=1}^{14} \varphi_j Industry_j + \sum_{k=1}^{5} \varphi_k YEAR_k + \delta_{i,t}$$

Dependent variable: *Ab_PROD*

Independent variables	Predict Sign	Parameter Estimates	Standard Error	t-value	p-value	VIF
Intercept	?	-0.0337	0.0292	-1.16	0.25	—
SFAS151	+	0.0762***	0.0211	3.61	<0.01	2.331
Cycle	?	0.0134	0.0226	0.59	0.55	2.682
SFAS151×Cycle	+	0.0613**	0.0295	2.08	0.04	2.832
Suspect_NI	+	0.2568***	0.0678	3.78	<0.01	1.009
FAI	+	0.0962**	0.0395	2.43	0.02	1.475
$\Delta Sales$	+	0.0004	0.0060	0.07	0.94	1.043
LTD	+	0.0097	0.0271	0.36	0.72	1.060
CFOLO	+	-0.0094	0.0263	-0.36	0.72	1.040
CFOHI	−	-0.0395	0.0252	-1.57	0.12	1.039
MTB	−	-0.0002**	0.0001	-2.33	0.02	1.018
SIZE	−	-0.0142***	0.0034	-4.21	<0.01	1.430
EARN	−	-0.0263***	0.0058	-4.52	<0.01	1.058
Adjusted R^2=23.03%, F-statistic (p-value)=23.78 (p<0.01), N=1,903						

Note: The t-statistics are adjusted for White's (1980) correction for heteroskedasticity. The definition of each variable is referred to in Table 2. The fixed effect of industry and year is not the major point of this paper, so this study does not include this in the table. Levels of significance for two tailed are indicated by ***, **, and * for 1%, 5%, 10%, respectively.

Table 6: Additional Tests

Panel A: The relationship between over-production and accruals (N=8,111)

Variables	Each quintile of over-production					Difference
Quintiles	Smallest	Quartile 2	Quartile 3	Quartile 4	Largest	Largest - Smallest
Mean Accruals	-0.389	-0.138	-0.032	0.071	0.487	0.876***

Panel B: Seeming Unrelated Regressions

Independent variables	Predict Sign	Dependent variables			
		Ab_PROD (N=8,111)	*Accurals* (N=8,111)	*Ab_PROD* (N=1,903)	*Accurals* (N=1,903)
SFAS151	+	0.0284***	0.0794***	0.0392*	0.1533***
SFAS151×Cycle	+			0.0926***	-0.936*
Adjusted R^2		24.49%	8.52%	16.24%	13.86%

Panel C: The estimation results by including the potentially future demand

Independent variables	Predict Sign	Dependent variables	
		Ab_PROD (N=2,110)	*Ab_PROD* (N=767)
SFAS151	+	0.0278**	0.0202
SFAS151×Cycle	+		0.1676**
Optimistic	+	0.0257*	0.0492
Adjusted R^2		5.34%	6.97%

Panel D: The estimation results by using the CPAI scales

Independent variables	Predict Sign	Dependent variables	
		CPAI (N=8,903)	*CPAI* (N=1,903)
SFAS151	+	0.0290***	0.0451***
SFAS151×Cycle	+		0.0107**
Adjusted R^2		22.59%	26.57%

Panel E: The estimation results by eliminating the potentially underproduction

Independent variables	Predict Sign	Dependent variables	
		Ab_PROD (N=4,385)	*Ab_PROD* (N=1,334)
SFAS151	+	0.8978***	1.0631***
SFAS151×Cycle	+		1.4359***
Adjusted R^2		30.98%	8.87%

Panel F: The estimation results by including the potentially income smoothing

Independent variables	Predict Sign	Dependent variables

		Ab_PROD (N=6,231)	*Ab_PROD* (N=1,325)
SFAS151	+	0.0248**	0.0788***
SFAS151×Cycle	+		0.0854**
SMOOTH	−	-0.0004***	0.0002
Adjusted R^2		12.45%	20.74%

Note: The definition of each variable is referred to in Table 2. Optimistic is an indicator variable and equal to 1 when the difference in order backlog is greater than zero and equal to 0 for others. *SMOOTH* is the proxy for "big bath" reporting, equal to the change in firm i's pre-write-off earnings from t-1 to t, divided by total assets at the end of t-1, when this change is below the median of non-zero negative values of this variable, and 0 otherwise. We define residual production costs (i.e., over-production) for a particular firm-year as the residual to control *SIZE*, *MTB* and *EARN* suggested by Roychowdhury (2006). $CPAI = \frac{\Delta INV_{abs_t}}{\Delta INV_{abs_t} + CGS_{abs_t}} - \frac{\Delta INV_{abs_{t-1}}}{\Delta INV_{abs_{t-1}} + CGS_{abs_{t-1}}}$ where ΔINV represents annual inventory change in years *t* and *t-1*, respectively, calculated based on total (absorption-costing based) inventory value, and *CGS* represents a firm's cost of goods sold. We only report the major variables empirical results and the effect of control variables and the fixed effect of industry and year do not include this in the table. Levels of significance for two tailed are indicated by ***, **, and * for 1%, 5%, 10%, respectively.