

Srivastava, Anup; Sunder, Shyam V.; Tse, Senyo

**Article**

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# Timely loss recognition and termination of unprofitable projects



Anup Srivastava<sup>a,\*</sup>, Shyam Sunder<sup>b,1</sup>, Senyo Tse<sup>c,2</sup>

<sup>a</sup> Tuck School of Business, Dartmouth College, United States

<sup>b</sup> University of Arizona, Department of Accounting, United States

<sup>c</sup> Department of Accounting, Mays Business School, Texas A&M University, United States

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## ABSTRACT

Ideally, firms should discontinue projects that become unprofitable. Managers, however, continue to operate such projects because of their limited employment horizons and empire-building motivations (Jensen, 1986; Ball, 2001). Prior studies suggest that timely loss recognition in accounting earnings enables lenders, shareholders, and boards of directors to identify unprofitable projects; thereby, enabling them to force managers to discontinue such projects before large value erosion occurs. However, this conjecture has not been tested empirically. Consistent with this notion, we find that timely loss recognition increases the likelihood of timely closures of unprofitable projects. Moreover, managers, by announcing late discontinuations of such projects, reveal their inability to select good projects and/or to contain losses, when projects turn unprofitable. Accordingly, thereafter, the fund providers and board of directors are likely to demand improved timeliness of loss recognition and stringent scrutiny of firms' capital expenditure plans. Consistently, we find that firms that announce large discontinuation losses reduce capital expenditures and improve timeliness of loss recognition in subsequent years. Our study provides evidence that timely loss reporting affects "real" economic decisions and creates economic benefits.

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\* Corresponding author at: Tuck School of Business, Dartmouth College, 100 Tuck Hall, Hanover, NH 03755-9000, United States. Tel.: +1 603 646 3162.

E-mail addresses: [anup.srivastava@tuck.dartmouth.edu](mailto:anup.srivastava@tuck.dartmouth.edu) (A. Srivastava), [shyamvsunder@email.arizona.edu](mailto:shyamvsunder@email.arizona.edu) (S. Sunder), [stse@mays.tamu.edu](mailto:stse@mays.tamu.edu) (S. Tse).

<sup>1</sup> Address: University of Arizona, Department of Accounting, AZ 85721, United States. Tel.: +1 520 621 4830.

<sup>2</sup> Address: Department of Accounting, Mays Business School, Texas A&M University, 4353 TAMU, TX 77843-4353, United States. Tel.: +1 (979) 845 3784.

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## 1. Introduction

It is inevitable that some capital expenditure projects that firms undertake would later turn out to be unprofitable.<sup>3</sup> Investors would prefer that managers terminate such projects once their losses become apparent. However, managers may inefficiently continue to operate unprofitable projects, thereby magnifying firms' economic losses, rather than terminating them in a timely manner (e.g., Ball, 2001). This behavior stems from managers' limited employment horizons, empire building tendencies, overconfidence, aversion to reporting losses, and the fear of loss of reputation, remuneration, and employment. Prior studies suggest that timely loss recognition in accounting earnings should enable lenders, shareholders, and boards of directors (hereafter referred to as the "principals") to identify unprofitable projects in a timely manner, thus, enabling them to force managers to discontinue such projects before large value erosion (e.g., Ball, 2001; Ball and Shivakumar, 2005; Watts, 2003; LaFond and Roychowdhury, 2008). In this study, we examine whether timely reporting of losses results in timely termination of unprofitable projects, a question that remains unexamined.

In a related study, Ahmed and Duellman (2007, 2011) examine determinants of firms' project selection. They examine whether firms that recognize losses in a timely manner make good investment decisions. Similarly, Francis and Martin (2010) examine whether timely loss recognizers undertake profitable, and hence longer-lived, acquisitions. In addition, they examine whether timely loss recognizers divest acquired companies in a timely manner. Neither study examines companies' ex-post termination of unprofitable projects, however.<sup>4</sup> Firms are likely to initiate and terminate projects more frequently than they acquire and sell other companies. Thus we focus on the decision to discontinue operations since these are likely to represent a more complete picture of managers' investment decisions that turn unprofitable. Discontinued operations reported in the financial statements are important by definition since they are material. Decisions related to such projects create significant agency conflicts because their continuation, on the one hand, increases losses for lenders and shareholders, but on the other hand, may benefit managers. Accordingly, our study examines whether timely loss recognition reduces agency conflicts in the decision to discontinue operations.

We assume that managers are averse to discontinuing any projects, and therefore only terminate unprofitable projects.<sup>5</sup> We conjecture that firms with timely loss recognition are more likely to terminate unprofitable projects. Therefore, we first examine whether project discontinuations are positively associated with timely reporting of losses in the three-year period preceding the discontinuations. Consistent with prior studies (e.g. Francis and Martin, 2010), we use a matched-pair design. We identify a control group of firms that have similar investment opportunities and face similar economic shocks (that make projects unprofitable) as the sample discontinuation firms. The control group firms do not announce termination of unprofitable projects in the sample firm's discontinuation year or in the preceding three years. Accordingly, we examine whether sample firms that announce termination of projects have more effective timely loss recognition in the three preceding years than the control group.

We need a firm-year specific measure of timeliness of loss recognition to examine our research questions. We do not use measures that require multiple years' data for calculation (for example, Basu (1997) and Ball and Shivakumar (2005) measures) because we assume that firm characteristics can change over time. Accordingly, we use two state-of-the art measures of the timeliness of loss recognition at the firm-year level. Following Francis and Martin (2010), we use CSCORE (Khan and Watts, 2009).<sup>6</sup> We also report results for

<sup>3</sup> In this study, the notion of project "unprofitability" includes instances of (1) current losses; (2) negative present value of future cash flows; or (3) liquidation value exceeding present value of future cash flows. Such instances reduce firm value.

<sup>4</sup> Tan (2013) examines actions lenders initiate after debt covenant violation, resulting in more conservative investment decisions and financial reporting. Biddle et al. (2013) examine changes in financial reporting following increased bankruptcy risk.

<sup>5</sup> Bunsis (1997) and Jaggi et al. (2009) find evidence that shareholders react positively to asset write-downs that involve closing of an unprofitable plant or division.

<sup>6</sup> CSCORE is derived from Basu's (1997) notion of asymmetric timeliness of loss recognition and is a firm-year specific measure of conditional conservatism. Firm-year values of CSCORE can be calculated from cross-sectional returns and earnings data for one year. Similar to Basu's measure, CSCORE is calculated from earnings-return coefficients for firms with positive or negative returns. For our tests, we use the negative-return coefficient (rather than the difference between the coefficients for negative and positive returns) because we are interested in measuring cross-sectional variation in the timeliness of loss recognition. Khan and Watts (2009) label this measure "bad news timeliness" and obtain it by summing CSCORE (difference between timeliness of bad versus good news recognition) and GSCORE (timeliness of good news recognition).

the Conservatism Ratio, proposed by Callen et al. (2010).<sup>7</sup> In our first test, we find firms that the discontinuation firms have higher CSCORE in the three preceding years than the control group.

Our first test above provides preliminary evidence that timely-loss-recognition is positively associated with closures of projects. However, this test ignores the possibility that loss severity may be related to the timeliness of discontinuations. We expect late discontinuations of unprofitable projects to result in higher economic losses than timelier discontinuations. Accordingly, we measure timeliness of project closures by the magnitude of asset-deflated losses announced on discontinuation.<sup>8</sup> Moreover, we expect that firms with late discontinuations have less effective timely loss reporting than those with timely discontinuations. We test this hypothesis by performing three tests using three proxies of late discontinuations. In our first test, we find that the magnitude of discontinuation losses is negatively associated with the CSCORE. In our second test, we divide our sample firms into *small* discontinuation loss and *large* discontinuation loss categories using a loss cutoff of 1% of beginning-of-year assets. The separation helps us to test whether loss projects are discontinued in a timelier manner. We assume that the magnitude of the loss for most timely discontinuances is going to be smaller. We find that *large* discontinuation losses occur less frequently as CSCORE increases. We further partition the sample into four ordered categories comprised of firms with asset-deflated discontinuation losses smaller than 1%, and firms with losses of 1% to 3%, 3% to 5%, and greater than 5%. We find that the likelihood that a firm falls into a higher loss category is negatively associated with CSCORE. Jointly these results suggest that timely loss recognition not only increases the likelihood of termination of unprofitable projects, but it also increases the likelihood that such projects are discontinued in a timelier manner.

Managers of firms that announce large losses on discontinuations signal that they failed to discontinue unprofitable projects in a timely manner. In other words, they signal their inability to select profitable projects and/or to stop value erosion when projects turn unprofitable. After such announcements, we expect investors to demand timelier reporting of losses to prevent those managers from continuing to operate other unprofitable projects.<sup>9</sup> Accordingly, we expect late discontinuations to be followed subsequently by improvement in timeliness of loss recognition. We test this hypothesis by measuring CSCORE two years before and after firms report large discontinuations. We find that the changes in CSCORE are higher for late discontinuation firms than for control firms (i.e. those with no discontinuances) and timely discontinuations firms. Moreover, unless investors can force a change in management,<sup>10</sup> they are likely to more stringently scrutinize proposed projects or restrain those managers from further implementing large capital expenditure plans. Consistent with this conjecture, we find a significant decline in capital expenditures by late discontinuation firms relative to control firms and firms with timely discontinuations.

Overall, our study provides evidence that the likelihood of firms' discontinuing unprofitable projects in a timely manner increases with timely loss recognition. Our study provides evidence on the extent to which timely loss reporting affects "real" economic decisions, and whether accounting conservatism provides economic benefits to investors (e.g. Watts and Zimmerman, 1986; Basu, 1997; Ball, 2001; Watts, 2003; Ball and Shivakumar, 2005). In particular, our study complements prior studies that claim that accounting conservatism can improve investment efficiency (e.g., Ball, 2001; Bushman and Piotroski, 2006; Biddle and Hillary, 2006). We also extend studies that examine accounting conservatism as a corporate governance mechanism (e.g., Watts, 2003; Beekes et al., 2004; Ahmed and Duellman, 2007, 2011). The rest of the paper proceeds as follows. Section 2 develops the hypotheses. Section 3 describes the sample, the research design, and the results. Section 4 describes supplementary tests to examine validity of our empirical measures, and Section 5 concludes.

<sup>7</sup> We use CSCORE as our primary measure because Francis and Martin (2010) use this measure to address questions that are closely related to ours. In addition, CSCORE requires less restrictive sampling procedure, preserving almost four times as many discontinuation observations for our tests as the Conservatism Ratio.

<sup>8</sup> Bunsis (1997), Heflin and Warfield (1997), and Elliott and Shaw (1988) find that the short-term return surrounding asset write-downs is negatively associated with the magnitude of write-downs. Heflin and Warfield (1997) conclude that firms with large write-downs delay their decisions by as much as three years.

<sup>9</sup> The late termination of unprofitable projects may indicate that the firm's accounting system does not provide timely information about losses. Auditors and boards of directors may respond by advocating and supporting for more timely loss recognition.

<sup>10</sup> Conyon and Florou (2002) find that corporate performance must fall drastically to force dismissal of senior executives.

## 2. Development of hypothesis

Some projects that managers initiate subsequently turn out to be unprofitable. Managers receive information on changes in expected cash flows from a project before external investors. Closing such unprofitable projects should cut firms' economic losses. However, managers continue to operate unprofitable projects because closing them may lead to reporting of one-time losses which might reduce their wealth via bonus, and lower their employment prospects through retention, promotion or alternative employment (Ball, 2001). Thus, managers delay closures, thus gradually incorporating reduced cash flows in earnings, even though doing so magnifies losses to lenders and shareholders. Similarly, Baumol (1967) and Jensen (1986) suggest that managers build empires rather than abandon unprofitable projects. Therefore, accounting regimes that force prompt loss recognition (that is, within managers' performance assessment periods) are likely to reduce managers' incentives to continue running unprofitable projects (e.g. Watts, 2003; Ball and Shivakumar, 2005). Other studies argue that timely recognition of losses improves corporate governance (e.g., Watts, 2003; Beekes et al., 2004; Ahmed and Duellman, 2007, 2011), reduces agency conflicts (e.g. LaFond and Roychowdhury, 2008), and improves investment efficiency (e.g., Bushman and Piotroski, 2006; Biddle and Hillary, 2006). We assume that managers prefer to continue operating all projects, only terminating unprofitable projects. Accordingly, we examine whether firms that promptly recognize economic losses in accounting earnings are more likely to terminate projects. This discussion leads us to our first hypothesis:

**H1.** Timely loss recognition increases the likelihood of project terminations.

Not all terminations of projects are likely to be timely. Some projects might only be terminated after producing losses that are too large to ignore or that become significant drains on firms' cash flows. Firms that do not recognize losses in a timely manner are more likely to have "late" terminations. Accordingly, we hypothesize the following:

**H2.** Timely loss recognition reduces the likelihood of late termination of unprofitable projects.

Managers of firms that announce late termination of unprofitable projects reveal their inability to select good projects and/or to contain economic losses when external events make projects unprofitable. The investors in firms with late terminations are likely to demand improvement in accounting information systems, specifically, to increase the timeliness of the reporting of economic losses, in order to prevent late discontinuations in future. Furthermore, unless investors can force for a change in the management team, they are likely to impose stringent project selection criteria or restrain managers from implementing large capital expenditure projects. Thus, we hypothesize the following:

**H3a.** Late termination of unprofitable projects is followed by improved timely loss recognition; and

**H3b.** Late termination of unprofitable projects is followed by reduced capital expenditure.

## 3. Sample selection, research design, and results

### 3.1. Sample selection

We describe sample selection procedure in Table 1. We classify all non-zero gains or losses from discontinued operations (Compustat item "DO") as discontinuation events. The "DO" data field contains the sum of (1) total income or loss from operations of a discontinued division and (2) the gain or loss on the disposal of that division. Compustat does not separately report data on those two categories of losses. We use this sum as an indicator of the unprofitability of the project because it provides an estimate of investors' total loss on the project discontinuation. In a later section, we examine the relation between DO and its components using hand collected data. Compustat has 25,668 firm-year observations (representing 8841 distinct firms) with non-zero entry in the "DO" field in the period 1968–2007.

Closing unprofitable projects in a timely manner can limit firms' economic losses and thus, timely discontinuations are likely to result in smaller losses than late discontinuations. We classify discontinuation losses of less than 1% of the firm's beginning-of-year assets as "timely" discontinuations and the others as "late". We deflate discontinuation losses by the firm's assets to measure the significance of discontinued operations to the firm. An alternative measure based on the ratio of the discontinuation losses to the assets of the discontinued operations may provide better assessment of the profitability of the discontinued operations; however, asset values of the discontinued operations are not available in the Compustat database. We test the consistency between measures derived using those two asset deflators (that is, the value of total assets and the value of discontinued assets) using hand-collected data in a later section.

We hypothesize that firms with effective timely-loss-recognition governance report *timely* discontinuations while those with less effective governance report *late* discontinuations. Therefore, we measure timeliness of loss reporting in the three years prior to the reported discontinuations and require that sample firms not report any discontinuation during those three years. We use CSCORE (Khan and Watts, 2009) as our primary firm-year measure of timely loss recognition. Thus, we require that sample firms have data in Compustat to calculate CSCORE (we describe estimation procedure in Appendix A) during those three prior years. These requirements leave us with 3618 firm-year observations (representing 2949 distinct firms) in our sample.

### 3.2. Research design: Control firms matched on industry, size, and time

Consistent with prior literature (e.g. Francis and Martin, 2010), we use a matched-pair design to test our hypotheses.<sup>11</sup> In order to examine the association of timely-loss-recognition-governance and project closures, we compare our sample firms to a group of "matched" firms that face similar investment opportunities and economic shocks as sample firms, but that do not report discontinuations.

As Fig. 1 illustrates, we match sample and control firms by industry and the book value of assets (Compustat item "AT") four years prior to the sample firm's report of discontinuations. Zucca and Campbell (1992) and Strong and Meyer (1987) also use a control group matched on industry and assets size to examine characteristics of firms that write down assets. We require that matched "control" firms do not report any discontinuations in the sample firms' discontinuation years or in the three prior years. Moreover, they should have data in Compustat to calculate CSCORE for those prior years. Of the 3618 discontinuation events above, we are able to find a match for 3523 (97.4%) firm years in the same three-digit SIC code industry and 78 (2.2%) in the same two-digit SIC code industry. This leaves us with 3601 sample firm-year observations for 2949 distinct firms.

In a later sub-section, we summarize the calculation of Conservatism Ratio (Callen et al., 2010), the related sample selection procedure, and our results for this measure. We use CSCORE as our primary measure because Francis and Martin (2010) use it in a similar study, and also because this measure imposes less restrictive sampling constraints, yielding almost four times as many observations as the Conservatism Ratio (3601 versus 997 observations).

### 3.3. Descriptive statistics and univariate tests

We present descriptive statistics for discontinuation firms in Table 1. Panel B shows that more than 80% of our sample firms report discontinuations only once. The remaining 20% firms report up to five discontinuations (reported by five firms) during the study period. Panel C shows that discontinuation firms are widely distributed across industry categories and no single industry category dominates. Nevertheless, the industry categories with the most frequent late discontinuations are Personal and Business Services, Business

<sup>11</sup> An alternative to this ex-post matched-pair design is to use a multivariate prediction model of discontinuations using all firms' data to examine whether lower CSCORE is associated with the likelihood of discontinuations. However, because discontinuations are relatively infrequent (occurring in fewer than 10% of all firm-years in the Compustat database) such a prediction model is likely to be noisy and to result in numerous false-positive errors.

Table 1  
Sample derivation and distribution.

	Distinct firms	Firm-years
<i>Panel A: Sample selection (H1a and H1b)</i>		
Firm years in Compustat with non-zero assets (all years up to 2007)	28,330	364,792
Of the above, firms that report discontinuations	8841	25,668
Of the above, firms that report discontinuations, but do not report discontinuations in the previous three years, and have data to calculate CSCORE in the three years prior to discontinuations	2949	3618
Of the above, firms that have matched firms in control group (firms that do not report any discontinuations, are in similar industry as in sample firms, are closest in asset size four years prior to sample firm's reported discontinuation years, and have data to calculate CSCORE in the prior three years)	2938	3601
<hr/>		
Frequency	Number of distinct firms	
<i>Panel B: Frequency of discontinuations by firms</i>		
1	2409	
2	422	
3	85	
4	17	
5	5	
<hr/>		
Fama French industry number	Industry name	Frequency of discontinuations
<i>Panel C: Distribution of discontinuations by industry</i>		
1	Food Products	130
3	Tobacco Products	7
4	Recreation	101
5	Printing and Publishing	112
6	Consumer Goods	112
7	Apparel	63
8	Healthcare and Medical Equipment	264
9	Chemicals	99
10	Textiles	45
11	Construction and Construction	218
12	Steel Works Etc	86
13	Fabricated Products and Machinery	189
14	Electrical Equipment	140
15	Automobiles and Trucks	81
16	Aircraft, Ships, and railroad	46
17	Precious Metals, Non-Metallic	50
18	Coal	7
19	Petroleum and Natural Gas	159
20	Utilities	161

21	Communication	111
22	Personal and Business Services	360
23	Business Equipment	258
24	Business Supplies and Shipping	92
25	Transportation	97
26	Wholesale	203
27	Retail	213
28	Restaurants, Hotels, Motels	68
30	Other	129
	<b>Total</b>	<b>3601</b>

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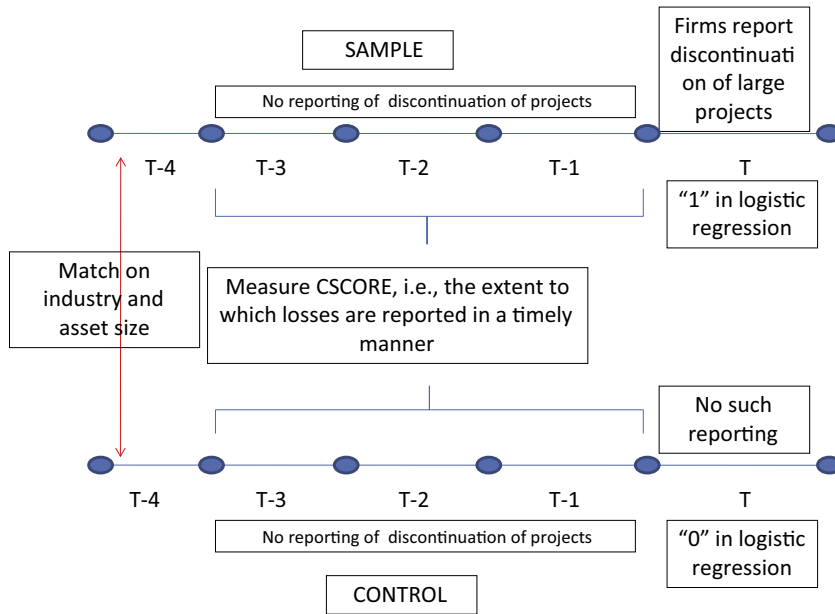


Figure 1a. Sample and control firms.

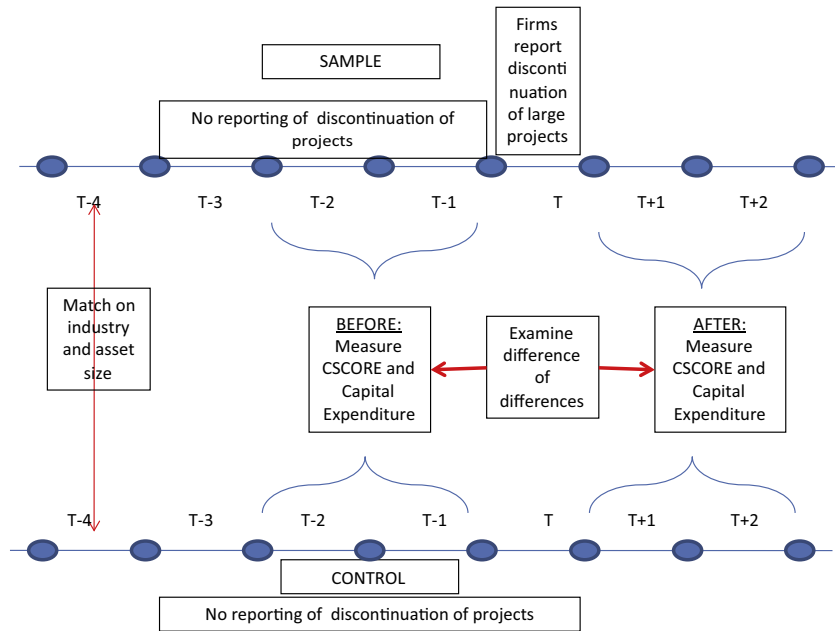


Figure 1b. Change in firm characteristics upon reporting of late discontinuations.

Equipment, and Healthcare and Medical Equipment industries. Fig. 2 shows that the reporting of discontinuations is distributed widely over the sample period from 1971 to 2007, but there is a distinct drop in the early

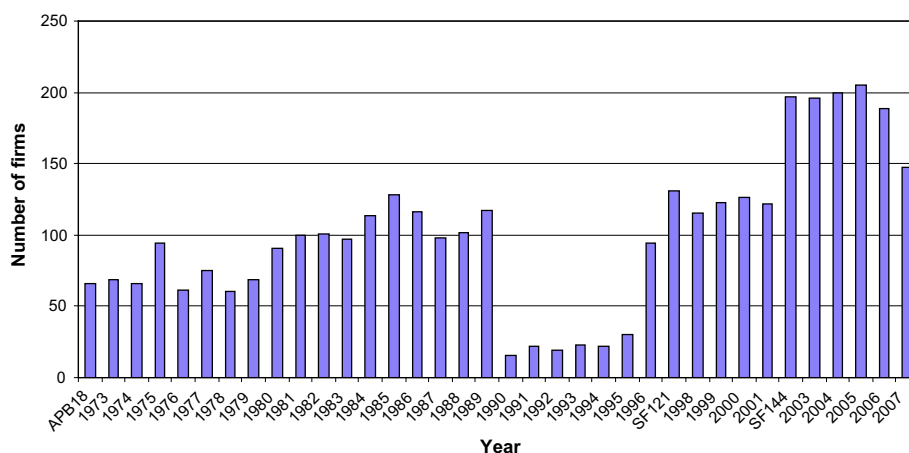


Figure 2. Number of firms reporting discontinued operations.

1990s, and large increases after 1995 and 2001, i.e., at about the time SFAS 121 (FASB, 1995) and SFAS 144 (FASB, 2001) respectively, became effective.<sup>12</sup>

Table 2 Panel A provides descriptive statistics of sample and control firms in the match year. The average size (total assets), market to book value ratio [measured as market value of equity {Price (PRCC\_F) × Number of shares outstanding (CSHO)} divided by book value of equity (CEQ)], net profits (IB), capital expenditures (CAPX), and capital expenditure to total assets ratio are not statistically different for control and sample firms. This shows that the two groups of firms incurred similar capital expenditures in the matching year. While sample firms had statistically significant lower return on assets [ROA: Operating Income After Depreciation (OIADP)/Beginning-of-the-year Assets (AT)], the difference is not economically significant.<sup>13</sup> The mean difference in ROA is approximately 2%, and the median difference is 1%. Importantly, similarity in levels of capital expenditures and market to book ratio indicate that both groups of firms had similar investment opportunity sets.

Table 2 Panel B provides descriptive statistics on sample and control firms for the three years before the discontinuation year. The aggregate capital expenditure is not statistically different for the two groups, suggesting that sample and control firms had similar levels of investment firms leading up to the discontinuation. The return on assets for the sample firms continues to be lower than the control group. This table also shows that the average CSCORE in the three prior years is higher for sample firms than for the control firms, suggesting that the discontinuation firms on average had more effective prior timely-loss-reporting governance.

Table 2 Panel C provides descriptive statistics on the two groups of firms in the pre-discontinuation year. As in the preceding years, there continues to be no significant difference between the capital expenditures of sample and control firms, but the profitability gap widens significantly. The mean difference in ROA reaches approximately 6%. The mean ROA for sample firms becomes negative. Moreover, their cash balance (industry- and year-adjusted cash balance [CHE] inverse quartile rank) becomes significantly lower, which could drive managers' decisions to close unprofitable project in the following year. In other words, cash deficiency could act as an alternate governance mechanism (Jensen, 1986). Thus, based on evidence so far, it is unclear whether the project closures that sample firms would announce in the following year are timely or late.

<sup>12</sup> Accounting regulations APB 30, SFAS 121, and SFAS 144 governed reporting of gains/losses from discontinued operations during our study period. APB 30 required reporting of losses related to a “segment of a business”, including a separate line of business or a separate class of customer. While APB 30 required reporting of estimates of expected disposal losses from discontinued divisions, it did not require firms to report impairment losses of assets they did not plan to dispose of. SFAS 121 established accounting standards for the impairment of long-lived assets and required firms to recognize an impairment loss if the carrying amount of the asset exceeds the undiscounted sum of the expected future cash flows. SFAS 144 consolidated provisions of APB 30 and SFAS 121 and expanded the definition of asset groups under APB 30 to include any segment, unit, subsidiary, or asset group whose cash flows can be identified separately.

<sup>13</sup> Strong and Meyer (1987), Elliott and Shaw (1988), Zucca and Campbell (1992), and Heflin and Warfield (1997) find that asset write-down firms underperform their industry peers.

Table 2  
Descriptive statistics.

Firm demographics in \$ M	Mean			Q1		Median		Q3	
	Control	Sample	Difference	Control	Sample	Control	Sample	Control	Sample
<i>Panel A: Descriptive statistics for sample and control firms in the match year (four years before sample firms report discontinuations)</i>									
Total Assets	2062	2512	450	46	53	171	199	782	1021
Revenue	1664	2061	397**	54	63	209	238	869	1075
Market Value of Equity	2350	2156	−194	31	34	137	153	741	829
Net Income	80	74	−6	1	1	8	7	40	42
Capital Expenditure	139	161	22	2	2	10	11	48	63
Capital expenditure to lagged assets ratio	0.09	0.09	0.00	0.03	0.03	0.06	0.06	0.11	0.11
Asset turnover ratio	1.36	1.32	−0.04	0.77	0.76	1.20	1.19	1.69	1.65
ROE	0.09	0.07	−0.02***	0.06	0.05	0.12	0.11	0.17	0.16
ROA	0.06	0.04	−0.02***	0.03	0.02	0.06	0.05	0.11	0.09
Market to Book	2.39	2.38	−0.01	0.97	0.93	1.63	1.53	2.72	2.53
<i>Panel B: Descriptive statistics for sample and control firms in the three years before sample firms report discontinuations</i>									
Aggregate capital expenditure to lagged assets	0.082	0.076	0.006	0.036	0.035	0.062	0.060	0.104	0.096
Average ROA	0.059	0.037	−0.022***	0.028	0.013	0.058	0.043	0.096	0.076
Aggregate CSCORE (Loss coefficient)	0.139	0.151	0.012***	0.087	0.095	0.133	0.143	0.184	0.200
<i>Panel C: Descriptive statistics for sample and control firms in the year before sample firms report discontinuations</i>									
Total Assets	2624	3328	704*	65	76	246	280	1109	1423
Revenue	2260	2767	507*	77	90	297	328	1165	1478
Market Value of Equity	2926	2690	−236	42	38	190	173	1014	933
Net Income	145	127	−18	2	0	10	7	55	52
Aggregate capital expenditure to lagged assets ratio	0.08	0.08	0.00	0.03	0.03	0.06	0.05	0.10	0.09
Asset Turnover	1.56	1.50	−0.06	0.76	0.78	1.17	1.19	1.66	1.65
ROE	0.08	−0.20	−0.28	0.05	0.01	0.11	0.09	0.16	0.14
ROA	0.05	−0.01	−0.06*	0.03	0.00	0.06	0.04	0.10	0.07
Market to Book	2.18	3.55	1.37	0.96	0.86	1.55	1.37	2.57	2.24
Industry and year adjusted cash-deficiency quartile rank	2.47	2.60	0.13***	2	2	2	3	3	3
					Mean	Q1	Median	Q3	
<i>Panel D: Descriptive statistics for sample firms in discontinuation years</i>									
Gains/Losses from discontinued operations in \$ M					0.23	−6.84	−0.81	2.15	
Absolute value of Gains/Losses from discontinued operations as % of lagged assets					4.42%	0.52%	1.56%	4.57%	
Gains/Losses from discontinued operations as % of lagged assets					−0.78%	−2.68%	−0.52%	0.54%	
Percent of firms that announce late discontinuations					40.9%				

\* Significant at  $p$ -level of 0.10.

\*\* Significant at  $p$ -level of 0.05.

\*\*\* Significant at  $p$ -level of 0.01.

Table 2 Panel D provides descriptive statistics of gains/losses on discontinued operations for sample firms. The mean unsigned effect of discontinuation event on income amounts to 4.4% of beginning-of-the-year assets and the median is 1.5%, indicating a significant impact on firm's reported assets and income. The mean signed effect is −0.78% and the median is −0.52%. About 40% of the sample firms announce late discontinuations (that is, report discontinuation losses greater than 1%).

### 3.4. Testing Hypothesis H1

To investigate determinants of project discontinuations, we use a multivariate logistic regression model to explain the firm's membership in the treatment versus control groups. We use the following equation:

$$\begin{aligned}
 \text{LogLikelihood}(\text{DiscontinuedOp})_t = & \beta_1 + \beta_2 \times \sum_{i=1}^3 \text{CSCORE}_{t-i} + \beta_3 \times \text{MarketToBook}_{t-1} \\
 & + \beta_4 \times \text{LogSize}_{t-1} + \beta_5 \times \text{CashDeficiencyQuartileRank}_{t-1} \\
 & + \beta_6 \times \sum_{i=1}^3 \text{ROA}_{t-i} + \beta_7 \times \text{Dummy\_APB30\_year}_t \\
 & + \beta_8 \times \text{Dummy\_SFAS121\_year}_t + \beta_9 \times \text{Dummy\_SFAS144\_year}_t + \varepsilon_t, \quad (1)
 \end{aligned}$$

We code *DiscontinuedOp* as 1 if the firm reports a discontinued operation in year *t* and zero otherwise. The coefficient of interest is  $\beta_2$ , the coefficient on aggregate CSCORE in the three years prior to discontinuation year. We expect firms that report discontinuations to have higher CSCORE than other firms, so we expect  $\beta_2$  to be positive. We control for factors that might affect the likelihood of project discontinuation, in particular, the firm’s investment opportunities set (proxied by market to book ratio) and firm size (natural log of firm’s assets). We also control for cash deficiency because it could affect discontinuation decisions for two reasons. First, a cash surplus firm can forego external funding for its projects and thereby avoid the increased monitoring from external fund providers. Second, a cash-deficient firm is more likely to shelve unprofitable projects to conserve resources. We also control for firm performance in the three prior years because high overall profitability could reduce pressure on firms to terminate unprofitable operations. Finally, we control for the fixed effects of applicable accounting regulation (APB 30 (1973), SAFS 121, and SFAS 144) that could affect the reporting of discontinued operations (as shown in Fig. 2).

### 3.5. Results for Hypothesis H1

We present results in Table 3. We find that the coefficient on prior aggregate CSCORE is positive. Consistent with Hypothesis H1, this shows that on average, effective timely-loss-recognition governance

Table 3  
Project discontinuations and prior timeliness of loss recognition. **Panel A:** Test to examine whether discontinuations are associated with higher CSCORE (dichotomous logistic regression model).\*

$$\begin{aligned}
 \text{LogLikelihood}_t = & \beta_1 + \beta_2 \times \sum_{i=1}^3 \text{CSCORE}_{t-i}/3 + \beta_3 \times \text{MarketToBook}_{t-1} + \beta_4 \times \text{LogSize}_{t-1} + \beta_5 \times \text{CashDeficiencyQuartileRank}_{t-1} \\
 & + \beta_6 \times \sum_{i=1}^3 \text{ROA}_{t-i}/3 + \beta_7 \times \text{Dummy\_APB30\_year}_t + \beta_8 \times \text{Dummy\_SFAS121\_year}_t + \beta_9 \times \text{Dummy\_SFAS144\_year}_t + \varepsilon_t.
 \end{aligned}$$

Variable	Predicted sign	Model 1	
		Estimate	p-value**
Intercept 1		-0.440	0.006
CSCORE		1.969	<0.001
MarketToBook	?	-0.059	<0.001
LogSize	?	0.110	<0.001
CashDeficiencyQuartileRank	+	0.077	0.009
Profitability	-	-4.259	<0.001
Controls for fixed-effects for APB 30, SFAS 121, and SFAS 144			Yes
N			7202
Model chi-square			244.1
Probability			<0.001
Percent Concordant			60.8%
Pseudo R-squared			0.044

\* Dichotomous dependent variable that equals one for firms that report discontinuations and zero for matched control firms.

\*\* One-tailed test for directional hypotheses.

increases the likelihood of shelving projects. The coefficient on the market to book ratio is negative, which suggests that firms with smaller investment opportunities are more likely to discontinue projects. The coefficient on the cash deficiency variable is positive, which suggests that cash-deficient firms are more likely to close projects.

### 3.6. Testing Hypothesis H2

The dichotomous logistic model described above treats all late discontinuations as having equal severity. As we note above, some of the reported discontinuations could potentially represent *timely* closures, while the others represent *late* closures. We expect *timely* closures to be associated with more effective timely-loss-recognition governance than *late* closures. The more timely a firm's loss recognition, the smaller the loss on discontinued operations should be. We first examine this conjecture by estimating the relation between the loss on discontinued operations and CSCORE while controlling for other determinants of discontinued operations and the related losses. The model is

$$\begin{aligned} LossOnDiscontinuation_t = & \beta_1 + \beta_2 \times \sum_{i=1}^3 CSCORE_{t-i} + \beta_3 \times MarketToBook_{t-1} \\ & + \beta_4 \times LogSize_{t-1} + \beta_5 \times CashDeficiencyQuartileRank_{t-1} \\ & + \beta_6 \times \sum_{i=1}^3 ROA_{t-i} + \beta_7 \times Dummy\_APB30\_year_t \\ & + \beta_8 \times Dummy\_SFAS121\_year_t + \beta_9 \times Dummy\_SFAS144\_year_t + \varepsilon_t, \end{aligned} \quad (2)$$

where *LossOnDiscontinuation* is the loss on discontinued operations deflated by beginning of year assets.

We eliminate observations with gains on discontinued operations and only estimate model (2) on firms with losses on discontinued operation – a sample comprised of 2278 observations. We expect the coefficient of CSCORE,  $\beta_2$ , to be negative, reflecting a negative relation between conservatism and losses on discontinued operations.

Next, we estimate two logistic model specifications on the entire sample of discontinued-operations firms. The logistic regression model is

$$\begin{aligned} LogLikelihood(LateDiscontinuation)_t = & \beta_1 + \beta_2 \times \sum_{i=1}^3 CSCORE_{t-i} + \beta_3 \times MarketToBook_{t-1} \\ & + \beta_4 \times LogSize_{t-1} + \beta_5 \times CashDeficiencyQuartileRank_{t-1} \\ & + \beta_6 \times \sum_{i=1}^3 ROA_{t-i} + \beta_7 \times Dummy\_APB30\_year_t \\ & + \beta_8 \times Dummy\_SFAS121\_year_t \\ & + \beta_9 \times Dummy\_SFAS144\_year_t + \varepsilon_t. \end{aligned} \quad (3)$$

In the first specification, we use a dichotomous dependent variable that takes the value of one for *late* closures and zero for *timely* closures. We classify firms with losses on discontinuation smaller than 1% of beginning-of-the-year assets and firms with gains on discontinuation as *timely* discontinuations and other firms as *late* discontinuations. In the second specification, we use an ordered dependent variable that incorporates discontinuation severity and takes a value of three for firms that report *extremely late discontinuations* (losses on discontinuation exceed 5% of beginning-of-the-year assets), two for *very late discontinuation* (losses on discontinuation exceed 3% but are below 5% of beginning-of-the-year assets), one for firms that report *late discontinuations* (losses are 1–3% of beginning-of-the-year assets) and zero for firms that report *timely discontinuations* (the remaining firms). In both specifications,  $\beta_2$  measures the effect of CSCORE on the likelihood of *late* discontinuations. We expect  $\beta_2$  to be negative.

Table 4

Severity of project discontinuations and prior timeliness of loss recognition. Tests to examine whether late discontinuations are associated with lower CSCORE. **Model 1:** OLS regression model using data of only discontinuation firms that declared losses on discontinuation.\*

$$\begin{aligned} LossOnDiscontinuation_t = & \beta_1 + \beta_2 \times \sum_{i=1}^3 CSCORE_{t-i}/3 + \beta_3 \times MarketToBook_{t-1} + \beta_4 \times LogSize_{t-1} + \beta_5 \times CashDeficiencyQuartileRank_{t-1} + \beta_6 \times \sum_{i=1}^3 ROA_{t-i}/3 + \beta_7 \\ & \times Dummy\_APB30\_year_t + \beta_8 \times Dummy\_SFAS121\_year_t + \beta_9 \times Dummy\_SFAS144\_year_t + \varepsilon_t \end{aligned}$$

**Model 2:** Dichotomous logistic regression model 2 using data of only discontinuation firms.\*\* **Model 3:** Ordered logistic regression model 2 using data of only discontinuation firms.\*\*\*

$$\begin{aligned} LogLikelihood_t = & \beta_1 + \beta_2 \times \sum_{i=1}^3 CSCORE_{t-i}/3 + \beta_3 \times MarketToBook_{t-1} + \beta_4 \times LogSize_{t-1} + \beta_5 \times CashDeficiencyQuartileRank_{t-1} + \beta_6 \times \sum_{i=1}^3 ROA_{t-i}/3 + \beta_7 \times Dummy\_APB30\_year_t \\ & + \beta_8 \times Dummy\_SFAS121\_year_t + \beta_9 \times Dummy\_SFAS144\_year_t + \varepsilon_t. \end{aligned}$$

Variable	Predicted sign	Model 1		Predicted sign	Model 2		Model 3	
		Estimate	p-value <sup>‡</sup>		Estimate	p-value <sup>‡</sup>	Estimate	p-value <sup>‡</sup>
Intercept 1		0.046	<0.001		0.539	0.022	-0.830	0.002
Intercept 2							-0.315	0.162
Intercept 3							0.582	0.009
CSCORE	-	-0.036	0.003	-	-1.991	0.001	-2.05	<0.001
MarketToBook	?	0.003	<0.001	?	0.012	0.573	0.031	0.135
LogSize	?	-0.005	<0.001	?	-0.235	<0.001	-0.245	<0.001
CashDeficiencyQuartileRank	?	0.001	0.251	+	0.107	0.004	0.089	0.007
Profitability	?	-0.117	<0.001	?	-2.030	<0.001	-2.771	<0.001
Controls for fixed-effects for APB 30, SFAS 121, and SFAS 144			Yes			Yes		Yes
N			2278			3601		3601
F Value			37.3					
Model chi-square						240.1		285.6
Probability			<0.001			<0.001		<0.001
Percent Concordant						64.9%		63.8%
Adj/Pseudo R-squared			0.112			0.087		0.086

\* Model 1 is an OLS regression. *LossOnDiscontinuation* is the discontinuation loss deflated by beginning-of-the-year assets.

\*\* Model 2 is a logistic regression with a dichotomous dependent variable that equals one for firms that report *late discontinuations* (losses on discontinuation exceed 1% of beginning-of-the-year assets,  $N = 1474$ ) and zero for firms that report *timely discontinuations* (losses on discontinuation are below 1% of beginning-of-the-year assets,  $N = 2127$ ).

\*\*\* Model 3 is a logistic regression with an ordered dependent variable that equals three for firms that report *extremely late discontinuations* (losses on discontinuation exceed 5% of beginning-of-the-year assets,  $N = 560$ ), *very late discontinuations* (losses on discontinuation exceed 3% but are below 5% of beginning-of-the-year assets,  $N = 267$ ), one for firms that report *late discontinuations* (losses on discontinuation exceed 1% but are below 3% of beginning-of-the-year assets,  $N = 647$ ), and zero for firms that report *timely discontinuations* (losses on discontinuation are below 1% of beginning-of-the-year assets,  $N = 2127$ ).

<sup>‡</sup> One-tailed test for directional hypotheses.

### 3.7. Results for Hypothesis H2

We present results for Eqs. (2) and (3) in Table 4. The first column shows the results of estimating Eq. (2). The negative coefficient on CSCORE ( $\beta_2$ ) suggests that the losses on discontinuations decrease with timely-loss-recognition governance. In other words, timelier reporting of losses reduces the likelihood of late discontinuations.

The second and third columns of Table 3 present results of the two specifications of Eq. (3). The coefficient on aggregate CSCORE ( $\beta_2$ ) is negative, which suggests that as CSCORE increases, the likelihood of *late*, *very late*, and *extremely late* closures declines. These results taken together with results for Hypothesis 1 suggest that timely loss recognition increases the likelihood of discontinuations of unprofitable projects and also increases the likelihood that such projects are discontinued in a timely manner.

### 3.8. Testing Hypothesis H3

In this hypothesis, we examine the economic consequences to the firm of reporting late discontinuations. Fig. 1b illustrates our research design. We expect late discontinuation firms to improve the timeliness of loss reporting and reduce capital expenditures in the following years.

We test these two conjectures using the following regressions:

$$\begin{aligned} \text{ChangeCSCORE}_{(t+2,t+1)-(t-1,t-2)} = & \beta_1 + \beta_2 \times \text{DummyDiscontinuation}_t + \beta_3 \times \text{DummyLateDiscontinuation}_t \\ & + \beta_4 \times \text{MarketToBook}_{t-1} + \beta_5 \times \text{LogSize}_{t-1} + \beta_6 \\ & \times \text{CashDeficiencyQuartileRank}_{t-1} + \beta_7 \times \text{Dummy\_APB30\_year}_t \\ & + \beta_8 \times \text{Dummy\_SFAS121\_year}_t + \beta_9 \times \text{Dummy\_SFAS144\_year}_t \\ & + \varepsilon_t, \end{aligned} \quad (4)$$

and

$$\begin{aligned} \text{ChangeCAPEX}_{(t+2,t+1)-(t-1,t-2)} = & \beta_1 + \beta_2 \times \text{DummyDiscontinuation}_t + \beta_3 \times \text{DummyLateDiscontinuation}_t \\ & + \beta_4 \times \text{MarketToBook}_{t-1} + \beta_5 \times \text{LogSize}_{t-1} + \beta_6 \\ & \times \text{CashDeficiencyQuartileRank}_{t-1} + \beta_7 \times \text{Dummy\_APB30\_year}_t + \beta_8 \\ & \times \text{Dummy\_SFAS121\_year}_t + \beta_9 \times \text{Dummy\_SFAS144\_year}_t + \varepsilon_t, \end{aligned} \quad (5)$$

where the dependent variable in Eq. (4) is the change in CSCORE from the two years prior to the two years after the discontinuation years. In Eq. (5), the dependent variable is the change in capital expenditure over the same period. To test H3, we use sample and control firm matched pairs with data for all four years.

In Eq. (4), the coefficient on *DummyDiscontinuation* ( $\beta_2$ ) measures the changes in CSCOREs of timely-closure firms, while that on *DummyLateDiscontinuation* ( $\beta_3$ ) measures the changes in CSCOREs of late closure firms. We do not expect principals of *timely* closure firms to demand changes in conservatism, so we expect  $\beta_2$  to be zero. However, we expect principals of *late* closure firms to demand improvement in CSCORE, and we therefore expect the coefficient on *DummyLateDiscontinuation* ( $\beta_3$ ) to be positive.

Similarly, in Eq. (4), the coefficient on *DummyDiscontinuation* ( $\beta_2$ ) measures the changes in capital expenditures of *timely* closure firms. We do not expect principals of *timely* closure firms to constrain capital expenditures, so we expect  $\beta_2$  to be zero. On the other hand; we expect principals of *late* closure firms to constrain further capital expenditures; therefore, we expect a negative coefficient on *DummyLateDiscontinuation* ( $\beta_3$ ).

### 3.9. Results for Hypothesis H3

In column 1 of Table 5, we present results for Eq. (4). The coefficient on *DummyDiscontinuation* ( $\beta_2$ ) is not different from zero, which suggests that principals do not demand changes in timely-loss-recognition governance for firms that promptly close unprofitable projects. On the other hand, the coefficient on

Table 5

Economic consequences of late discontinuations. **Model 1:** Shareholders of firms that report late discontinuations demand improvement in CSCORE.\*

$$\begin{aligned} \text{ChangeCSCORE}_{(t+2,t+1)-(t-1,t-2)} = & \beta_2 \times \text{DummyDiscontinuation}_t + \beta_3 \times \text{DummyLateDiscontinuation}_t + \beta_4 \times \text{MarketToBook}_{t-1} \\ & + \beta_5 \times \text{LogSize}_{t-1} + \beta_6 \times \text{CashDeficiencyQuartileRank}_{t-1} + \beta_8 \times \text{Dummy\_APB30\_year}_t \\ & + \beta_9 \times \text{Dummy\_SFAS121\_year}_t + \beta_{10} \times \text{Dummy\_SFAS144\_year}_t + \varepsilon_t \end{aligned}$$

**Model 2:** Shareholders of firms that report late discontinuation constrain capital expenditure.\*

$$\begin{aligned} \text{ChangeCAPEX}_{(t+2,t+1)-(t-1,t-2)} = & \beta_2 \times \text{DummyDiscontinuation}_t + \beta_3 \times \text{DummyLateDiscontinuation}_t + \beta_4 \times \text{MarketToBook}_{t-1} \\ & + \beta_5 \times \text{LogSize}_{t-1} + \beta_6 \times \text{CashDeficiencyQuartileRank}_{t-1} + \beta_8 \times \text{Dummy\_APB30\_year}_t \\ & + \beta_9 \times \text{Dummy\_SFAS121\_year}_t + \beta_{10} \times \text{Dummy\_SFAS144\_year}_t + \varepsilon_t. \end{aligned}$$

Variable	Predicted sign	Model 1		Predicted sign	Model 2	
		Estimate	p-value**		Estimate	p-value**
Intercept 1		0.271	<0.001		0.044	<0.001
DummyDiscontinuation	?	0.005	0.605	?	0.004	0.319
DummyLateDiscontinuation	+	0.029	0.015	–	–0.024	<0.001
MarketToBook	?	–0.284	<0.001	?	–0.002	0.043
LogSize	?	0.001	0.563	?	–0.005	<0.001
CashDeficiencyQuartileRank	?	0.003	0.500	?	–0.020	<0.001
Controls for fixed-effects for APB 30, SFAS 121, and SFAS 144			Yes			Yes
N			4222			4222
F Value			69.4			14.4
Probability			<0.001			<0.001
Adj R-squared			0.115			0.025

\* Models use OLS regression. *DummyLateDiscontinuations* equals one if losses on discontinuation exceed 1% of beginning-of-the-year assets and zero otherwise; *DummyDiscontinuations* equals one for firms that report losses on discontinuation, which are below 1% of beginning-of-the-year assets and zero otherwise. The number of observations is smaller than the earlier firms because it includes only those sample and corresponding control firms for which data also are available two years after sample firms announce discontinuations.

\*\* One-tailed test for directional hypotheses.

*DummyLateDiscontinuation* ( $\beta_3$ ) is positive, which suggests that late discontinuation firms improve the timeliness of loss recognition, responding to principals’ demands.

The results of Eq. (5), presented in column 2 of Table 5, show that there is no change in capital expenditures of firms that shelve projects in a timely manner; however, there is a significant decline in capital expenditure of firms that report late discontinuations.

### 3.10. Results of tests using the conservatism ratio

In this section, we report the results of tests using an alternate measure of the timeliness of the recognition of economic news in accounting earnings, the Conservatism Ratio (Callen et al., 2010). This measure is based on the idea that current earnings, market returns, and the book-to-market ratio all contain information about future earnings and returns (the *expected* components). Accordingly, in this model, expected earnings and returns are obtained from the current year’s variables using a system of equations that assumes a first-order vector autoregressive process. The unexpected component of earnings, the *earnings news*, is measured as actual accounting earnings minus *expected earnings*. Similarly, returns are decomposed into the *expected* and *unexpected* portions, with the latter further decomposed into the *earnings shock* (i.e., the true economic news) and the shock to the discount rate (Vuolteenaho, 2002). The Conservatism Ratio (CR) is defined as the ratio of *earnings news* to *earnings shock* that measures the extent to which accounting earnings incorporate economic news in a timely manner.



We calculate CR for all firm years.<sup>14</sup> We restrict our sample to non-financial firms with market value greater than \$ 10 million and Compustat data on special items (“SPI”) for 1968 to 2007. We retain firms with data on current and lagged returns, earnings and the book to market ratio, and eliminate observations with extreme values of each of these variables (based on 1st and 99th percentiles). Our sample univariate statistics and the parameters in the variance–covariance matrix (obtained from an intermediate step in calculating CR) are similar to those reported by Callen et al. (2010). We derive firm-specific unexpected earnings from expected earning models estimated by Fama–French industry groups and use the unexpected earnings to estimate CR for each firm-year. Similar to Callen et al. (2010), we retain firm years with positive CR, which leaves us with a sample of 74,584 observations. Next, we retain firms that report discontinuations and have data to estimate CR for all three years prior to the discontinuation year. We construct a control sample of firms that report no discontinuations using the matching procedure described in Section 3. This leaves us with a matched-pair sample of 997 firms.

We find that the average CR in the three years preceding the discontinuation is not statistically different for the sample and control firms. Nevertheless, we confirm the findings of the tests on the relation between earnings timeliness and the magnitude of discontinuation losses reported in Table 4 when we use CR in place of CSCORE. Specifically, we find that among firms that report discontinuation losses, the magnitude of losses decreases with the level of CR. Moreover, CR is negatively associated with the likelihood that a firm reports late discontinuations. This provides additional support for our hypothesis that the prompt reporting of economic news in accounting earning reduces the likelihood that managers continue unprofitable projects.

#### 4. Supplementary tests to examine validity of DO measure

In this section, we examine the validity of our empirical measure of “economic losses” on project discontinuations: “Net Income (loss) from discontinued operations” in Compustat. This variable includes both the operating losses of the discontinued division and the capital losses on its disposal, and is stated on an after-tax basis. Both those losses are components of our intended construct of unprofitability of discontinued operations – the first loss represents the current operating losses and the second reflects the present value of future operating losses (adjusted for holding costs of disposed assets).

The “DO” measure is subject to three potential limitations. First, “DO” may not accurately represent either the accounting information or the construct of unprofitability of discontinued operations that we set out to examine. Second, “Net Income (loss) from discontinued operations” is likely to contain operating losses of the discontinued division for only a part of the year, and this might reduce its comparability across firms. Third, we deflate “DO” by the total assets of the firm and use that ratio for our main tests. While this ratio measures the economic significance of discontinuation for the firm, it might not accurately reflect the ROA of the discontinued operations that should ideally be based on the book value of its assets.

In order to address those potential concerns and to test the statistical and construct validity of our total-assets deflated “DO” measure, we hand collect data from firms’ 10-K filings. To economize on hand collection costs, we shortlist S&P 1500 firms with total assets greater than \$ 1000M. Then, we retain observations consistent with SFAS 121 and SFAS 144 accounting regimes (but not with APB 18 regime), which leaves us with 431 observations. Of those observations, we could obtain data on operating losses of discontinued operations and their asset values (either value of assets held for sale or asset values of discontinued operations) for 238 observations, which we use to calculate return on assets (ROA) of the discontinued operations in the pre-disclosure year. We found data on disposal gains (losses) for 142 observations.

First, we test the statistical validity of data field “DO” in the Compustat database. “DO” matches the hand-collected data on a dollar-to-dollar basis for 97% of the 238 observations described above. This 97% matching is made up of matches with operating losses (59%) and matches with the sum of operating and disposal losses (38%). These tests establish the statistical validity of the “DO” measure.

Next, we examine the construct validity of total-assets deflated “DO” measure that we use for our main tests. We find that the ROA of the discontinued division in the year prior to the discontinuation year is highly correlated with DO deflated by total assets: The Pearson correlation coefficient is 0.24, and the Spearman

<sup>14</sup> We are grateful to the authors of Callen et al. (2010) for sharing the SAS programming code for calculating CR.

correlation coefficient is 0.54, both significant at  $p$ -level better than 0.01. Similarly, the deflated disposal losses are highly correlated with DO deflated by total assets: The Pearson correlation coefficient is 0.57, and the Spearman correlation is 0.82, both significant at  $p$ -level better than 0.01. Those tests establish the construct validity of “DO” measure.

Next, we test whether the two components of “DO” are correlated, which would suggest that we would obtain consistent results using DO or either of its components. We find that the ROA of discontinued operations in the year before the discontinuation year is highly correlated with the deflated disposal losses, both calculated using book value of discontinued assets: The Pearson (Spearman Rank) correlation coefficient is 0.42 (0.50), both significant at  $p$ -level better than 0.01.

Many firms discontinue profitable operations, which is apparently contrary to our conjecture that firms only close unprofitable operations. However, firms may close profitable operations that do not earn the cost of capital or meet the firms’ internal hurdle rate of return. We test that conjecture next. We calculate the difference between the ROA of the rest-of-the-firm (i.e., without the discontinued division) and the ROA of the discontinued division in the year before the discontinuation year. First, we find that the average (median) difference in the two ROAs is 0.03 (0.02) indicating that firms discontinue projects with profitability lower than the rest of their operations. Moreover, as we expect, both deflated disposal values and our empirical measure (that is, the total-asset-deflated “DO” measure) are negatively associated with the difference of ROAs. The Pearson (Spearman Rank) correlation coefficients are  $-0.40$  ( $-0.44$ ) and  $-0.22$  ( $-0.42$ ), all significant at  $p$ -level better than 0.01. In other words, the lower the profitability of discontinued operations relative to that of the rest of the firm, the lower the disposal proceeds, and the more negative the total-asset-deflated “DO” measure.

## 5. Conclusion

In the normal course of business, firms undertake capital projects, some of which later turn out to be unprofitable. Managers receive information about expected cash flows from those unprofitable projects earlier than the principals. Managers can limit firms’ economic losses by closing unprofitable projects in a timely manner. However, managers may continue to operate unprofitable projects to build “empires”, to protect their performance-based bonuses, and to avoid signaling bad performance to retain their employment. Prior studies argue that prompt loss recognition can reduce such agency costs by improving monitoring of managers and by reducing incentives for managers to delay closures of unprofitable projects. However, no prior study has empirically examined this notion. Francis and Martin (2010) find that prompt loss recognition is associated with more profitable acquisition strategies and more prompt post-acquisition divestitures of unprofitable investments. We extend their study by examining whether timely loss recognition is associated with timely closures of unprofitable projects.

We use firms’ reporting of discontinued operations as a proxy for the termination of unprofitable projects. We form a control group of firms that did not report any discontinuations, but belong to same industries as discontinuation firms and have similar size. We assume that industry- and size-matched control firms have similar investment opportunities and face similar economic shocks as discontinuation firms. We find that in the three years prior to reporting discontinuations, sample firms have timelier loss recognition than the control firms. Moreover, firms that announce large discontinuation losses have less effective timely-loss-recognition governance than the other firms.

We argue that after firms announce late discontinuations, principals would demand improved timeliness of loss recognition. As expected, the inter-temporal change in CSCORE is greater for late discontinuation firms than for the other firms in the same period. Moreover, we find evidence that the managers of late discontinuation firms are restrained from implementing further capital expenditure projects.

Our study provides empirical support for the notion that prompt loss recognition reduces agency costs by improving board of directors’, lenders’, and shareholders’ monitoring of managers’ investment activities. We extend Francis and Martin (2010) by providing empirical evidence that prompt loss recognition provides alternate corporate governance mechanism for checking managers’ tendency to continue implementing unprofitable projects.

## Appendix A. Measure of timeliness of loss recognition

### A.1. Loss-term coefficient in CSCORE (Khan and Watts, 2009)

Basu's equation for measuring conservatism is as follows:

$$X_{it} = \beta_1 + \beta_2 \times D_{it} + \beta_3 \times R_{it} + \beta_4 \times D_{it} \times R_{it} + \varepsilon_{i,t}, \quad (\text{A1})$$

where  $X$  is the annual earnings and  $R$  is the returns during the year.  $D$  takes a value of 0 if firms have positive returns and 1 if firms have negative returns. Effectively,  $\beta_4$  measures the differential timeliness of recognition of economic loss in accounting earnings relative to that of economic gains.

Khan and Watts (2009) modify the measure using the following equation:

$$\begin{aligned} X_{it} = & \beta_{1t} + \beta_{2t} \times D_{it} + \beta_{3t} \times R_{it} \times (\mu_1 + \mu_2 \times Size_{it} + \mu_3 \times M/B_{it} + \mu_4 \times Lev_{it}) + \beta_{4t} \times D_{it} \times R_{it} \\ & \times (\lambda_1 + \lambda_2 \times Size_{it} + \lambda_3 \times M/B_{it} + \lambda_4 \times Lev_{it}) + \beta_{5t} \times (v_2 \times Size_{it} + v_3 \times M/B_{it} + v_4 \times Lev_{it}) \\ & + \beta_{6t} \times D_{it} \times (\omega_1 + \omega_2 \times Size_{it} + \omega_3 \times M/B_{it} + \omega_4 \times Lev_{it}) + \varepsilon_{it}, \end{aligned} \quad (\text{A2})$$

where  $Size$  is the natural log of market value,  $M/B$  is the market to book ratio, and  $Lev$  is the leverage of the firm.

In Eq. (A2), the terms that are multiplied by  $D$  (the second, fourth, and sixth terms) are zero for gains observations (firms whose returns are positive). Because we focus on cross-sectional variation in the timeliness of loss recognition, we exclude the gain term and estimate the following equation on firms with negative returns.

$$\begin{aligned} X_{it} = & \beta_{1t} + \beta_{2t} \times R_{it} \times (\mu_1 + \mu_2 \times Size_{it} + \mu_3 \times M/B_{it} + \mu_4 \times Lev_{it}) + \beta_{3t} \times (v_2 \times Size_{it} + v_3 \\ & \times M/B_{it} + v_4 \times Lev_{it}) + \varepsilon_{it}. \end{aligned} \quad (\text{A3})$$

We exclude finance firms and firms with share prices less than \$ 1, and we calculate regression parameters separately for each year ( $\alpha_{1t}$ ,  $\alpha_{2t}$ ,  $\alpha_{3t}$ ,  $\alpha_{4t}$ , and  $\alpha_{5t}$ ) using Eq. (A4).

$$\begin{aligned} X_{it} = & \alpha_{1t} + \alpha_{2t} \times R_{it} + \alpha_{3t} \times Size_{it} \times R_{it} + \alpha_{4t} \times M/B_{it} \times R_{it} + \alpha_{5t} \times Lev_{it} \times R_{it} + \alpha_{6t} \times Size_{it} + \alpha_{7t} \\ & \times M/B_{it} + \alpha_{8t} \times Lev_{it} + \varepsilon_{it}. \end{aligned} \quad (\text{A4})$$

Then we calculate CSCORE (loss recognition) for each firm year using coefficients estimated for that year as follows:

$$CSCORE_{i,t}(\text{loss recognition}) = \tilde{\alpha}_{2t} + \tilde{\alpha}_{3t} \times Size_{it} + \tilde{\alpha}_{4t} \times M/B_{it} + \tilde{\alpha}_{5t} \times Lev_{it}. \quad (\text{A5})$$

We define variables similar to Khan and Watts (2009) as follows (data items in Compustat):

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Earnings	Earnings per share (EPSFX) divided by beginning price (PRCC_F)
Returns	[change in price + dividends (DVPSX)]/beginning price. The variables are adjusted for stock splits using adjustment factor (AJEX)
M/B	Market value of equity [Price × Number of shares outstanding (CSHO)]/book value of equity (CEQ)
Size	Natural log of market value of equity
Leverage	Total Debt [Long term debt (DLTT) + debt in current liability (DLC)]/Market value of equity

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All variables are winsorized at the 1st and 99th percentile by year.

Following is the comparison of coefficients on loss terms with those reported by Khan and Watts (2009) (obtained by adding coefficient on gains term and loss interaction terms in Table 3).

		Our calculations		Khan and Watts (2009)
		Mean across years	Median across years	
First term	$\tilde{\alpha}_{2,t}$	0.232	0.233	0.268
Size term	$\tilde{\alpha}_{3,t}$	-0.024	-0.024	-0.028
Market to book term	$\tilde{\alpha}_{4,t}$	0.009	0.006	-0.013 (NS)
Leverage term	$\tilde{\alpha}_{5,t}$	0.069	0.066	0.038

Following is the comparison of CSCORE (for loss observations) with those reported by Khan and Watts (2009) (obtained by adding coefficient on CSCORE and GSCORE in Table 4 Panel A).

	Our calculations		Khan and Watts (2009)
	Mean	Median	
CSCORE (for loss observations)	0.157	0.139	0.153

The slight differences from the Khan and Watts (2009) estimates are likely for the following reasons:

1. Unlike Khan and Watts (2009), we exclude finance firms (SIC Codes 6000 to 6999) from our analysis.
2. Unlike Khan and Watts (2009), we winsorize our data at 1st and 99th percentile by year.
3. Khan and Watts (2009) measure fiscal year returns over 12 months beginning in the month after the earnings announcement. We measure fiscal year returns over the fiscal year.
4. Our measurement period is 1972 to 2007 as against 1963 to 2005 in Khan and Watts (2009).

## Appendix B. Definitions of variables

<i>Discontinuations</i>	When firms report non-zero gains and losses from discontinued operations (DO)
<i>DummyDiscontinuation</i>	Takes value one in the years in which firms announce a discontinuation and zero otherwise
<i>Late discontinuations</i>	When firms report losses from discontinued operations exceeding 1% of beginning-of-the-year assets (AT)
<i>DummyLateDiscontinuation</i>	Takes value one in the years in which firms announce a late discontinuation with large losses and zero otherwise
<i>Sample firms</i>	Firms that report discontinuations, but do not report discontinuations in the previous three years
<i>Control firms</i>	Firms that belong to the same industry as sample firms (have same 3-digit or 2-digit SIC code), are closest in asset size to sample firms four years prior to their reported discontinuations, and do not report any discontinuations
<i>Assets</i>	Total assets (AT)
<i>Revenue</i>	Revenue (SALE)
<i>Market value</i>	Market value of equity [Price (PRCCF) × Number of shares outstanding (CSHO)]
<i>Net income</i>	Income before extraordinary items (IB)
<i>Capital Expenditure</i>	Capital expenditure (CAPX)
<i>Market to book ratio</i>	Market value of equity/book value of equity (CEQ)

<i>CashDeficiencyQuartile Rank</i>	Inverse quartile rank of cash balance (CHE) by industry (3-digit SIC code) and year
<i>LogSize</i>	Natural log of market value of equity
<i>Deflated Capital Expenditure</i>	Capital Expenditure (CAPX)/beginning-of-the-year assets (AT)
<i>Funds raised</i>	Funds raised [debt issued (DLTIS) + Equity issued (SSTK)]/beginning-of-the-year assets
ROE	Income before extraordinary items (IB)/book value of equity (CEQ)
ROA	Operating Income After Depreciation (OIADP)/Beginning-of-the-year Assets (AT)
<i>Asset Turnover</i>	Revenue/Assets
<i>Dummy_APB30_year</i>	Takes value one if discontinuation year falls between 1973 and 1996 and zero otherwise
<i>Dummy_SFAS121_year</i>	Takes value one if discontinuation year falls between 1997 and 2001 and zero otherwise
<i>Dummy_SFAS144_year</i>	Takes value one if discontinuation year is after 2001 and zero otherwise

All variables are winsorized at the 1st and 99th percentile.

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