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Depreciation Choice and Future Operating Performance

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Abstract

In this study we test the argument that information asymmetry and the problems of adverse selection provide incentives for managers to use accounting choices to signal relatively higher future prospects. Specifically, we contend that firms use accelerated depreciation to credibly signal higher future earnings and cash flows, consistent with signaling theory. Compared to straight-line depreciation, accelerated depreciation reduces earnings in the earlier years of asset lives and produces more variability in earnings. Despite these drawbacks, hundreds of firms voluntarily use accelerated depreciation for at least some of their depreciable assets. Our results indicate that the use of accelerated depreciation foreshadows higher future earnings and cash flows for horizons of one, two, and three years ahead.

Keywords: Financial reporting, Depreciation choice, Operating performance, Signaling

1. Introduction

Accounting earnings are ascribed special importance by analysts (Brown 2001; Brown and Caylor 2005), investors (Dechow 1994; Kasznik and McNichols 2002), managers (DeAngelo 1988; Bartov et al. 2002), contracting parties (Holthausen 1981; Leftwich 1981; Watts and Zimmerman 1986, 1990), regulatory authorities (Jones 1991; Cahan 1992; Key 1997), and courts (DeAngelo 1986, 1990). Evidence suggests that managers are attuned to the importance that various stakeholders ascribe to earnings (Graham et al. 2005). A growing body of evidence indicates that managers expend considerable time and effort managing both accruals (Healy and Wahlen 1999; Fields et al. 2001) and operating activities (Bartov 1993; Roychowdhury 2006; Xu et al. 2007; Cohen et al. 2008) to meet earnings thresholds. Evidence also suggests that managers oppose accounting standards that reduce earnings or increase earnings volatility and, in some cases, are willing to forego real economic value to improve near-term earnings (Mittelstaedt et al. 1995; Dechow et al. 1996; Bushee 1998; Espahbodi et al. 2002; Bhojraj and Libby 2005; Graham et al. 2005; Hodder et al. 2006; Jackson 2008) (Note 1).

Given the importance widely ascribed to earnings, the voluntarily use of accounting methods that both reduce near-term earnings and increase earnings volatility is puzzling. Nonetheless, evidence reveals that hundreds of firms use accelerated depreciation rather than straight-line depreciation. Bowen et al. (1995) find that approximately 30 percent of firms use accelerated depreciation for at least some of their depreciable assets. A natural question, given the earnings-related consequences of accelerated depreciation, is why managers make this choice (Note 2). In this study, we provide an explanation for why some firms rationally choose to use accelerated depreciation – managers provide private information through their choice of depreciation method that influences the beliefs of rational investors.

Using the intuition in Akerlof (1970), Ross (1977) illustrates that capital structure decisions may serve as credible signals about future firm performance. Leland and Pyle (1977) develop a model in which retained insider ownership signals firm quality in initial public offerings. The Leland and Pyle (1977) model suggests a positive relation between firm quality and leverage, much like Ross (1977). More recent studies find cash dividends, stock dividends, and stock splits can also serve as signals about higher future stock returns and better future operating performance (Healy and Palepu 1988; McNichols and Dravid 1990; Rankine and Stice 1997; Desai and Jain 1997).

Based on the signaling models in corporate finance and in the accounting literature (Bagnoli and Watts 2005), we empirically test whether an accounting choice (the use of accelerated depreciation) serves as a credible signal about future operating performance. For an accounting choice to be a reliable signal, the cost of the signal must be higher for low quality firms than for high quality firms. Therefore, we hypothesize that firms that use accelerated depreciation will report higher future earnings and cash flows than firms that use straight-line depreciation. Of course, signals have varying degrees of reliability. A signal is more reliable if it is increasingly costly (and prohibitively so) to mimic.

It is plausible that managers use a variety of signals in financial reporting disclosures, including a number of accounting choices. In our study, we focus on this specific accounting choice because the consequences of the choice are clear. Indeed, Ricks (1982, p. 71) indicates that "it might be reasonable to argue that depreciation is one accounting issue where the effects of different methods are obvious and well understood."

To test our hypotheses, we use the two stage Heckman procedure (Heckman 1979; Maddala 1983; Greene 2003) to control for endogeneity problems. In our primary tests, we estimate a first-stage probit model in which the depreciation choice is the dependent variable and economic determinants of that choice are the independent variables (Bowen et al. 1995). In the second stage model, the dependent variables are measures of future operating performance and the independent variables include (i) a dummy variable for whether the firm uses accelerated depreciation, (ii) economic determinants of future operating performance, and (iii) the inverse Mills ratio which controls for the potential selection bias of the depreciation choice.

In our models of future operating performance, we consistently find that the economic determinants of earnings and cash flows explain substantial fractions of the cross-sectional and temporal variation in these variables, consistent with prior research. In the presence of these economic determinants, we find that the use of accelerated depreciation is associated with higher levels of future earnings and cash flows (Note 3). This association is statistically significant at reliable levels for future earnings and cash flow (i.e., one, two, and three years ahead).

This study makes a contribution to the accounting literature. We provide initial evidence that depreciation choices can signal higher future prospects. This contribution to the accounting literature is distinct from the contributions of prior studies which have examined the market-related consequences (Archibald 1972; Kaplan and Roll 1972; Beaver and Dukes 1973), contracting consequences (Holthausen 1981; Leftwich 1981; Ricks 1982; Holthausen and Leftwich 1983; Watts and Zimmerman 1986; Fields et al. 2001), and capital investment consequences (Jackson 2008; Seybert 2010) of depreciation choice. Instead, we document that signaling theory appears (in part) to explain accounting choices made by managers.

The remainder of this study proceeds as follows. Section 2 develops the hypotheses that we empirically test. Section 3 describes the methodology and variable definitions. Section 4 provides the sample selection procedures and results. Section 5 provides further empirical evidence in supplemental analyses to enhance the reliability of our conclusions. The final section provides summary and concluding comments.

2. Theory and Hypotheses

2.1 Background

Corporate insiders have an informational advantage over diffuse external investors (Jensen and Meckling 1976; Leland and Pyle 1977; Copeland and Weston 1988; Eisenhardt 1989; Brennan 1990). In the presence of information asymmetry and the inability of market prices to fully reflect all information about firms' future prospects, firms are valued at average price (Riley 1979). That is, firms with more (less) favorable future prospects are undervalued (overvalued). In this setting, managers of firms that have favorable future prospects have incentives to find ways to credibly signal their private information to outside investors to avoid undervaluation (Akerlof 1970; Ross 1977; Leland and Pyle 1977; Riley 1979; Hirshleifer and Riley 1992; Milgrom and Roberts 1992).

Ross (1977) illustrates how financial policy decisions can serve as credible signals that help to resolve the information asymmetry problem that naturally arises when absentee owners delegate decision making authority to professional managers. For a financial policy signal to yield such a separating equilibrium, however, the cost of the signal must be decreasing in firm quality (Hirshleifer and Riley 1992; Copeland and Weston 1988; Milgrom and Roberts 1992; Spence 1973). That is, the cost of the signal must be higher for low quality firms than for high quality firms. The incentive-signaling paradigm has been posited as a way to understand a variety of financial policy and related decisions. For example, one stream of research contends that cash dividends, stock dividends, stock splits, and open market repurchases signal higher future stock returns and better operating performance (John and Williams 1985; Lakonishok and Lev 1987; Ofer and Siegel 1987; Barclay and Smith 1988; Brennan and Copeland 1988; Healy and Palepu 1988; McNichols and Dravid 1990; Ikenberry et al. 1996; Rankine and Stice 1997; Desai and Jain 1997).

A few examples of signaling theory are worthy of further exploration. Leland and Pyle (1977) analyze the role of signals within the process of initial public offerings (Note 4). They show that companies with good future prospects and higher possibilities of being successful (i.e., “good” companies) have incentives to signal to the market when going public (e.g., a significant percentage of the company will be retained by the owner). A reliable signal generally exists in the presence of information asymmetry and is viewed as too costly to be imitated by those companies with lower possibilities of success (i.e., “bad” companies). Leland and Pyle (1977) show that the costs (i.e., a relatively larger equity stake is more costly to a manager of a “bad” company) of imitating a signal are greater than the benefits. Similarly, Spence (1973) argues that a signal can be used to distinguish high and low productive workers. In his model, high productive workers can acquire education at a lower cost (e.g., less time, fewer direct costs, fewer other tradeoffs) than low productive workers. Spence illustrates how a signaling equilibrium exists in which high productive workers look for greater education in relation to low productive workers, and greater levels of education result in higher wages offered by employers. In his model, education serves as a reliable signal of potential productivity levels because the costs of mimicking are higher than the benefits (to low productive workers).

2.2 Depreciation Choice and Future Operating Performance

Although research suggests that managers use financial policy and related decisions to credibly signal higher future stock returns and operating performance, there is a limited amount of empirical evidence about the signaling role of accounting choices. With imperfect and incomplete markets, financial reporting disclosures can be efficient mechanisms to address market imperfections. Closely related to our motivation is empirical evidence that managers signal private information in accrual decisions. Subramanyam (1996) concludes that discretionary accruals are interpreted by investors as signals about the future financial prospects of firms. Louis and Robinson (2005) conclude that discretionary accruals recorded before stock-split announcements are interpreted by investors as signals of managerial optimism rather than managerial opportunism. However, research has yet to provide compelling evidence of whether accounting method choices are used by managers to credibly signal the favorable future prospects of firms.

For an accounting choice to credibly signal higher future operating performance, the alternative accounting method must produce costs that are *decreasing* in firm quality, making the choice especially costly for firms with poor future prospects to imitate. Evidence suggests that firms' depreciation choice fits this requirement. Although the total amount of depreciation expense will be the same regardless of the choice of depreciation method (Note 5), the choice of accelerated depreciation produces less short-term earnings and more variability in earnings.

The culture in many organizations emphasizes the primacy of financial performance measures (Morgan 1997; Jensen 2001). Earnings are often viewed as the single most important financial performance metric (Dechow 1994; Graham et al. 2005). Accounting choices that reduce near-term earnings and produce more variability in earnings are likely to be costly because such choices potentially (i) risk meeting earnings thresholds (Brown and Caylor 2005), (ii) reduce managerial compensation (Gaver and Gaver 1998; Murphy 1999; Matsunaga and Park 2001), (iii) increase the likelihood of debt covenant violation (Watts and Zimmerman 1986, 1990; Sweeney 1994; DeFond and Jiambalvo 1994), (iv) reduce firms' ability to raise external capital (Graham and Harvey 2001), (v) increase managerial turnover (Farrell and Whidbee 2003; Engel et al. 2003), (vi) decrease earnings predictability (Dichev and Tang 2009), and (vii) increase the perceived riskiness of the firm (Graham et al. 2005).

Bagnoli and Watts (2005) offer a set of conditions that support a separating equilibrium for the signal in a depreciation choice. They show that investors can use the discretion in depreciation to infer private information about future prospects. As the costs of lower earnings and higher variability are expected to be relatively high for companies with poor future prospects, those managers will not mimic the depreciation reporting choice of managers who believe their firm's prospects are relatively strong. At a minimum, we can conclude that the cost of the accelerated depreciation choice signal is decreasing (increasing) for firms with higher (lower) future prospects. Our hypothesis, stated in alternative form, is as follows:

Hypothesis: Firms use the choice of accelerated depreciation as a positive signal to higher quality firms as evidenced by higher future prospects.

We operationalize this hypothesis by testing whether firms that choose accelerated depreciation have more favorable future operating performance (in future earnings and future cash flows). That is, we predict a positive correlation between firm quality and the choice of accelerated depreciation.

3. Methodology and Variables Measurement

3.1 Overview

Firms can choose between straight-line depreciation and accelerated depreciation under generally accepted accounting principles (GAAP) and evidence suggests that firms' choice between these methods is non-random (Christie and Zimmerman 1994; Bowen et al. 1995). Therefore, we use the two stage Heckman procedure to account for the endogenous nature of firms' depreciation choice (Heckman 1979). In the first stage, we use a probit model where we regress depreciation choice on expected economic determinants of the decision. The key output of this model is the inverse Mills ratio, which is used in second stage models to control for the endogenous nature of firms' depreciation choice. In the second stage models, we estimate two models to test whether depreciation choice is associated with higher future performance using future earnings and cash flows. The independent variables in the second stage models are (i) a dummy variable for firms' depreciation choice, (ii) economic determinants of the dependent variable drawn from prior research, and (iii) the inverse Mills ratio, which is obtained from the first step probit model. A number of accounting studies have previously used the two stage Heckman procedure (e.g., see Shehata 1991; Christian et al. 1994; Leuz and Verrecchia 2000; Barton 2001; Kim et al. 2003; and Tucker 2007).

3.2 Depreciation Choice Model

Bowen et al. (1995) document a number of economic determinants of firms' depreciation choice. Their model is specified as follows: (Note 6)

$$\begin{aligned} CHOICE_{it} = {} & \lambda_0 + \lambda_1 DUR_{it} + \lambda_2 RD_{it} + \lambda_3 LABOR_{it} + \lambda_4 DPEN_{it} + \lambda_5 (MFG_{it} {*} COGS_{it}) \\ & + \lambda_6 (NMFG_{it} {*} COGS_{it}) + \lambda_7 NP_{it} + \lambda_8 ADV_{it} + \lambda_9 LEVMV_{it} + \lambda_{10} DROA_{it} \\ & + \lambda_{11} SALE_{it} + \lambda_{12} (OG_{it} {*} SALE_{it}) + \varepsilon_{it} \end{aligned} \quad (1)$$

where

$CHOICE_{it}$	=	dummy variable equal to 1 for firms that use the accelerated depreciation method for all or some of their assets, and 0 for firms that use the straight-line depreciation method;
DUR_{it}	=	dummy variable equal to 1 for firms producing durable goods (SIC codes 150 – 179, 245, 250 – 259, 283, 301, and 324 – 399), and 0 otherwise;
RD_{it}	=	research and development expense scaled by ADJ_TA_{it} (0 if RD expense is missing);
$LABOR_{it}$	=	labor intensity measured as one minus the ratio of gross property, plant, and equipment to ADJ_TA_{it} (0 if gross property, plant, and equipment is missing);
$DPEN_{it}$	=	dummy variable equal to 1 for firms with defined benefit pension plans, identified as those firms with a nonnegative value for projected pension obligation or assumed rate of return for pension benefits, and 0 otherwise;
MFG_{it}	=	dummy variable equal to 1 for manufacturing firms (SIC codes 200-399), and 0 otherwise;
$NMFG_{it}$	=	dummy variable equal to 1 for non-manufacturing firms (all SIC codes except 200-399), and 0 otherwise;

$COGS_{it}$	=	cost of goods sold scaled by ADJ_TA_{it};
NP_{it}	=	notes payable scaled by ADJ_TA_{it} (0 if notes payable is missing);
ADV_{it}	=	advertising expense scaled by ADJ_TA_{it} (0 if advertising expense is missing);
$LEVMV_{it}$	=	ratio of long-term debt to market value of common stock (0 if long-term debt is missing);
$DROA_{it}$	=	dummy variable equal to 1 for firms with return on assets (defined as income before extraordinary items and discontinued operations scaled by ADJ_TA_{it}) in deciles 2 through 9, where deciles are defined within two-digit SIC codes, and 0 otherwise;
$SALE_{it}$	=	natural logarithm of net sales in thousands;
OG_{it}	=	dummy variable equal to 1 for firms in the oil and gas industry (SIC codes 131 and 291), and 0 otherwise;
ADJ_TA_{it}	=	average of beginning of year and end of year adjusted total assets, where adjusted total assets are equal to total assets plus accumulated depreciation;
i, t	=	firm and year subscripts, respectively.

We scale variables by average adjusted total assets, similar to Bowen et al. (1995). This adjustment adds back accumulated depreciation so that we do not scale by a variable that is influenced by depreciation choice. We also combine firms that only use accelerated depreciation with those that use a mix of accelerated and straight-line depreciation in defining $CHOICE_{it}$. Our reason for doing this is because few firms use accelerated depreciation for all of their depreciable assets. In addition, our coding of $CHOICE_{it}$ is opposite by design of that in Bowen et al. (1995). Thus, the predicted signs of the coefficients are reversed. We make this coding change to help clarify the discussion of the results. Finally, because firms in our sample have repeated observations over time, we use clustered standard errors.

3.3 Depreciation Choice and Future Operating Performance Model

Prior theoretical and empirical research suggests a number of characteristics that are associated with future operating performance, and we draw on this literature. Our model expands the model in Barth et al. (2001) by adding (i) a dummy variable for firms' depreciation choice, (ii) additional economic determinants, and (iii) the inverse Mills ratio (discussed above). The model is specified as follows:

$$\begin{aligned} DV\_1_{it+j} = {} & \beta_0 + \beta_1 CHOICE_{it} + \beta_2 CFO_{it} + \beta_3 \Delta AR_{it} + \beta_4 \Delta INV_{it} + \beta_5 \Delta AP_{it} \\ & + \beta_6 DEP_{it} + \beta_7 AMORT_{it} + \beta_8 OTHER_{it} + \beta_9 CFO_{it-1} + \beta_{10} ACC_{it-1} \\ & + \beta_{11} RET_{it} + \beta_{12} EP_{it} + \beta_{13} CAP_{it} + \beta_{14} AGE_{it} + \beta_{15} ATO_{it} \\ & + \beta_{16} MILLS_{it} + \varepsilon_{it} \end{aligned} \quad (2)$$

where

DV_1_{it+j}	=	dependent variable, defined as either ADJ_INC_{it+j} or CFO_{it+j};
ADJ_INC_{it+j}	=	income before extraordinary items and discontinued operations plus depreciation expense scaled by ADJ_TA_{it};
CFO_{it+j}	=	net cash flow from operating activities minus the accrual portion of extraordinary items and discontinued operations reported on the statement of cash flows scaled by ADJ_TA_{it};
ΔAR_{it}	=	change in accounts receivable from the statement of cash flows scaled by ADJ_TA_{it} and multiplied by -1;
ΔINV_{it}	=	change in inventory from the statement of cash flows scaled by ADJ_TA_{it} and multiplied by -1;
ΔAP_{it}	=	change in accounts payable and accrued liabilities from the statement of cash flows scaled by ADJ_TA_{it} ;
DEP_{it}	=	depreciation expense, computed as depreciation and amortization expense minus amortization expense (coded as 0 if amortization expense is missing) scaled by ADJ_TA_{it} ;
$AMORT_{it}$	=	amortization expense (coded as 0 if amortization expense is missing) scaled by ADJ_TA_{it} ;
$OTHER_{it}$	=	net of all other accruals, calculated as income before extraordinary items and discontinued operations scaled by $ADJ\_TA_{it} – (CFO_{it} + \Delta AR_{it} + \Delta INV_{it} – \Delta AP_{it} – DEP_{it} – AMORT_{it})$;
CFO_{it-1}	=	net cash flow from operating activities minus the accrual portion of extraordinary items and discontinued operations reported on the statement of cash flows scaled by ADJ_TA_{it} ;
ACC_{it-1}	=	total accruals scaled by ADJ_TA_{it} ;
RET_{it}	=	stock return, computed as the year-to-year change in closing stock price divided by the prior year closing stock price;
EP_{it}	=	earnings-to-price ratio if the ratio is nonnegative and 0 if the ratio is negative, where the earnings-to-price ratio is defined as income before extraordinary items and discontinued operations divided by the market value of common equity;
CAP_{it}	=	logarithm of the market value of common equity;
AGE_{it}	=	logarithm of number of years firm has been listed on CRSP;
ATO_{it}	=	asset turnover, defined as net sales divided by ADJ_TA_{it} ;
$MILLS_{it}$	=	inverse Mills ratio from estimation of Equation (1);
i, t	=	firm and year subscripts, respectively;
j	=	1, 2, and 3.

The variable of interest in Equation (2) is $CHOICE_{it}$, and our theory predicts that its coefficient will be positive. Seven of the control variables in Equation (2) are drawn from Barth et al. (2001) (CFO_{it}, ΔAR_{it}, ΔINV_{it}, ΔAP_{it}, DEP_{it}, $AMORT_{it}$, and $OTHER_{it}$). The coefficients on these variables are predicted to be positive, except for the coefficient on ΔAP_{it} which is predicted to be negative. Equation (2) also includes lags of disaggregated income (CFO_{it-1} and ACC_{it-1}) (Note 7). The coefficients on these variables are predicted to be positive. Finally, Equation (2) includes five economic determinants drawn from prior research (RET_{it}, EP_{it}, CAP_{it}, AGE_{it}, and ATO_{it}) (Note 8). We expect that the coefficient on RET_{it} to be positive because evidence shows that stock returns lead earnings (Beaver et al. 1980; Kothari and Sloan 1992). We expect the coefficient on EP_{it} to be negative because a smaller earnings-to-price ratio is an indicator of future growth in earnings (Penman 1996). We expect the coefficients on CAP_{it} and AGE_{it} to be positive because larger and more mature firms are likely to have better future operating performance than smaller, less mature firms (Anthony and Ramesh 1992; Black 1998). Finally, we expect the coefficient on ATO_{it} to be positive because companies that more effectively utilize their assets are likely to have better future operating performance.

4. Results

4.1 Sample Selection

Our sample starts with 1988 and extends through 2005. We start with 1988 because this is the first year cash flows from operations are disclosed in the statement of cash flows. Following prior research, we exclude regulated industries (SIC codes between 4000-4999) and financial institutions (SIC codes between 6000-6999). We require that firms have the needed Compustat financial data to construct variables in Equations (1) and (2) and have positive sales and stockholders' equity (Note 9). After imposing these data restrictions, our sample for estimating Equations (1) and (2) consists of 56,303 firm years. To reduce the influence of outliers and extreme values on the results, we winsorize all variables (except for dummy variables and AGE_{it}) at the 1^{st} and 99^{th} percentiles.

4.2 Descriptive Statistics

Table 1 provides the depreciation choice profile for our sample of 56,303 firm years by both year (Panel A) and industry (Panel B). Panel A shows that the popularity of straight-line depreciation choice has grown over our sample period. Panel B shows that our sample is a large cross-section of different industries. Our sample is comprised of 7,902 unique firms. The only industry that represents more than 10 percent of our sample firms is SIC two-digit classification 73. Also, the main depreciation choice in most industries is the straight-line method.

Table 1. Depreciation choice and industry sample profile

Panel A. Depreciation choice profile by year

	Straight-line depreciation		Accelerated Depreciation			Straight-line depreciation		Accelerated Depreciation	
Year	#	%	#	%	Year	#	%	#	%
1988	352	70.68	146	29.32	1998	3,094	81.25	714	18.75
1989	1,877	72.53	711	27.47	1999	2,973	82.38	636	17.62
1990	2,023	73.01	748	26.99	2000	2,979	83.17	603	16.83
1991	2,075	73.87	734	26.13	2001	3,036	84.38	562	15.62
1992	2,242	75.46	729	24.54	2002	2,872	84.52	526	15.48
1993	2,443	77.48	710	22.52	2003	2,785	84.55	509	15.45
1994	2,686	78.81	722	21.19	2004	2,662	85.21	462	14.79
1995	2,804	79.23	735	20.77	2005	2,174	85.42	371	14.58
1996	2,980	80.13	739	19.87	All years	45,193	80.27	11,110	19.73
1997	3,136	80.64	753	19.36					

Panel B. Depreciation choice profile by industry

SIC code	SIC code description	#	% of total	% SL	% ACC
10	Metal mining	93	1.18	10.75	89.25
13	Oil and gas extraction	349	4.42	15.47	84.53
15	Building construction general contractors	55	0.70	74.55	25.45
20	Food and kindred products	196	2.48	87.76	12.24
22	Textile mill products	55	0.70	87.27	12.73
23	Apparel and other finished products made from fabrics	91	1.15	75.82	24.18
25	Furniture and fixtures	55	0.70	76.36	23.64
26	Paper and allied products	91	1.15	59.34	40.66
27	Printing, publishing, and allied industries	109	1.38	80.73	19.27
28	Chemicals and allied products	711	9.00	86.50	13.50

29	Petroleum refining and related industries	54	0.68	31.48	68.52
30	Rubber and miscellaneous plastics products	108	1.37	79.63	20.37
32	Stone, clay, glass, and concrete products	56	0.71	62.50	37.50
33	Primary metal industries	131	1.66	80.15	19.85
34	Fabricated metal products	121	1.53	83.47	16.53
35	Industrial and commercial machinery and equipment	617	7.81	83.14	16.86
36	Electronic and other electrical equipment and components	721	9.12	83.50	16.50
37	Transportation equipment	182	2.30	76.37	23.63
38	Measuring, analyzing, and controlling instruments	626	7.92	84.19	15.81
39	Miscellaneous manufacturing industries	104	1.32	75.00	25.00
50	Wholesale trade durable goods	259	3.28	77.61	22.39
51	Wholesale trade non-durable goods	134	1.70	78.36	21.64
53	General merchandise stores	58	0.73	94.83	5.17
54	Food stores	52	0.66	92.31	7.69
56	Apparel and accessory stores	68	0.86	92.65	7.35
57	Home furniture, furnishings, and equipment stores	53	0.67	92.45	7.55
58	Eating and drinking places	152	1.92	94.74	5.26
59	Miscellaneous retail	200	2.53	89.00	11.00
73	Business services	1,269	16.06	88.49	11.51
78	Motion pictures	79	1.00	48.10	51.90
79	Amusement and recreation services	102	1.29	85.29	14.71
80	Health services	223	2.82	91.48	8.52
87	Engineering, accounting, management, and related services	207	2.62	84.06	15.94
	Other SIC codes	521	6.59	77.54	22.46
	Total	7,902	100.0		

In both panels, "accelerated depreciation" captures firms that use accelerated depreciation for all or some of their assets. In Panel B, "Other SIC codes" captures 21 two-digit SIC codes containing fewer than 50 firms each.

Table 2 provides descriptive statistics for the variables used in Equations (1) and (2). Table 2 shows that the sample used to estimate Equations (1) and (2) includes 56,303 firm year observations. The sample is comprised of 45,193 firm years (80.27 percent of the sample) using straight-line depreciation and 11,110 firm years (19.73 percent of the sample) using accelerated depreciation.

Table 2. Descriptive statistics

	All firms (n = 56,303)		Straight-line firms (n = 45,193)		Accelerated firms (n = 11,110)	
Variables	Mean	Median	Mean	Median	Mean	Median
$CHOICE_{it}$	0.1973	0.0000	0.0000	0.0000	1.0000	1.0000
DUR_{it}	0.4437	0.0000	0.4622	0.0000	0.3682	0.0000
RD_{it}	0.0444	0.0038	0.0497	0.0071	0.0225	0.0000
$LABOR_{it}$	0.5929	0.6308	0.6241	0.6559	0.4659	0.4950
$DPEN_{it}$	0.2916	0.0000	0.2707	0.0000	0.3765	0.0000
$MFG_{it}*COGS_{it}$	0.3604	0.2483	0.3663	0.2571	0.3365	0.1896
$NMFG_{it}*COGS_{it}$	0.3424	0.0000	0.3639	0.0000	0.2548	0.0000
NP_{it}	0.0241	0.0000	0.0236	0.0000	0.0259	0.0000
ADV_{it}	0.0110	0.0000	0.0120	0.0000	0.0073	0.0000
$LEVMV_{it}$	0.3492	0.0883	0.3438	0.0768	0.3711	0.1337
$DROA_{it}$	0.8284	1.0000	0.8239	1.0000	0.8471	1.0000
$SALE_{it}$	11.9114	11.8611	11.8673	11.8331	12.0906	11.9952
$OG_{it}*SALE_{it}$	0.4906	0.0000	0.0611	0.0000	2.2375	0.0000
ADJ_INC_{it}	0.0148	0.0521	0.0097	0.0519	0.0356	0.0527
CFO_{it}	0.0342	0.0586	0.0303	0.0577	0.0500	0.0614
CFO_{it-1}	0.0317	0.0585	0.0276	0.0574	0.0481	0.0616
ΔAR_{it}	0.0139	0.0052	0.0147	0.0057	0.0106	0.0034

ΔINV_{it}	0.0088	0.0000	0.0093	0.0000	0.0066	0.0000
ΔAP_{it}	0.0074	0.0000	0.0077	0.0000	0.0062	0.0000
DEP_{it}	0.0360	0.0325	0.0351	0.0319	0.0397	0.0349
$AMORT_{it}$	0.0027	0.0000	0.0030	0.0000	0.0018	0.0000
$OTHER_{it}$	-0.0222	-0.0093	-0.0243	-0.0103	-0.0137	-0.0060
ACC_{it}	-0.0465	-0.0396	-0.0468	-0.0390	-0.0456	-0.0412
ACC_{it-1}	-0.0404	-0.0371	-0.0405	-0.0364	-0.0401	-0.0395
RET_{it}	0.0433	0.0353	0.0424	0.0343	0.0471	0.0394
EP_{it}	1.0416	0.9102	1.0858	0.9469	0.8617	0.7289
CAP_{it}	5.0445	4.9104	4.9936	4.8763	5.2513	5.0949
AGE_{it}	2.2993	2.3026	2.2563	2.1972	2.4739	2.4849
ATO_{it}	0.1744	0.0000	0.1765	0.0000	0.1657	0.0118
ADJ_TA_{it} ($bill.)	2.3406	0.1538	1.3857	0.1430	6.2249	0.2369

Variable definitions are provided in Appendix A.

4.3 Depreciation Choice Results

Table 3 reports the probit regression results for Equation (1). As expected, the coefficients on RD_{it}, $LABOR_{it}$, $MFG_{it}*COGS_{it}$, $NMFG_{it}*COGS_{it}$, ADV_{it}, and $LEVMV_{it}$ are all negative and significant (p-values $\leq$ 0.017). Also, as expected, the coefficients on $DPEN_{it}$ and $OG_{it}*SALE_{it}$ are both positive and significant (p-value < 0.001). The coefficients on DUR_{it}, $DROA_{it}$, and $SALE_{it}$ are all insignificant (p-values > 0.10), while the coefficient on NP_{it} is significant in the opposite direction (p-value < 0.001) (Note 10). The pseudo R^2 is 13.57 percent and the model is highly significant (p-value < 0.001). On balance, these results are quite comparable to the results in Bowen et al. (1995). Overall, the results for our sample in Tables 1, 2 and 3 are also comparable to similar tables in Jackson et al. (2009).

$$\begin{aligned} CHOICE_{it} = {} & \lambda_0 + \lambda_1 DUR_{it} + \lambda_2 RD_{it} + \lambda_3 LABOR_{it} + \lambda_4 DPEN_{it} + \lambda_5 (MFG_{it}*COGS_{it}) \\ & + \lambda_6 (NMFG_{it}*COGS_{it}) + \lambda_7 NP_{it} + \lambda_8 ADV_{it} + \lambda_9 LEVMV_{it} + \lambda_{10} DROA_{it} \\ & + \lambda_{11} SALE_{it} + \lambda_{12} (OG_{it}*SALE_{it}) + \varepsilon_{it} \end{aligned} \tag{1}$$

Table 3. First stage probit regression of depreciation choice on economic determinants

Variables	Predicted sign	Coefficient	Z-statistic	p-value
Intercept	?	-0.182	-1.24	0.214
DUR_{it}	-	0.051	1.02	0.309
RD_{it}	-	-2.437	-8.29	< 0.001
$LABOR_{it}$	-	-0.729	-9.10	< 0.001
$DPEN_{it}$	+	0.169	3.62	< 0.001
$MFG_{it}*COGS_{it}$	-	-0.146	-2.40	0.017
$NMFG_{it}*COGS_{it}$	-	-0.155	-3.53	< 0.001
NP_{it}	-	1.236	4.67	< 0.001
ADV_{it}	-	-2.046	-2.77	0.006
$LEVMV_{it}$	-	-0.085	-3.53	< 0.001
$DROA_{it}$	-	-0.025	-0.82	0.410
$SALE_{it}$	+	-0.016	-1.38	0.169
$OG_{it}*SALE_{it}$	+	0.149	12.55	< 0.001
Observations				56,303
Pseudo R^2 (%)				13.57
Model p-value				< 0.001

Variables are defined in Appendix A. Significance tests use standard errors clustered by firm.

4.4 Depreciation Choice and Future Earnings Results

Regression results for testing whether accelerated depreciation choice is associated with higher future performance are provided in Table 4 (future earnings) and Table 5 (future operating cash flows). Table 4 reveals that the coefficient on $CHOICE_{it}$ in Equation (2) is positive and statistically significant when the dependent variable is ADJ_INC_{it+1} (coefficient = 0.032, t-statistic = 10.54, p-value < 0.001), ADJ_INC_{it+2} (coefficient = 0.048, t-statistic = 11.58, p-value < 0.001), and ADJ_INC_{it+3} (coefficient = 0.061, t-statistic = 12.01, p-value < 0.001).

The interpretation of the coefficient on $CHOICE_{it}$ is that adjusted income, expressed as a percentage of adjusted total assets, is reliably higher in periods t+1, t+2, and t+3, respectively, for firms that use accelerated depreciation compared with those firms that use straight-line depreciation. These findings are consistent with our hypothesis that the use of accelerated depreciation is correlated with higher future performance (i.e., proxied by future earnings).

$$ADJ\_INC_{it+j} = \beta_0 + \beta_1 CHOICE_{it} + \beta_2 CFO_{it} + \beta_3 \Delta AR_{it} + \beta_4 \Delta INV_{it} + \beta_5 \Delta AP_{it} + \beta_6 DEP_{it} + \beta_7 AMORT_{it} + \beta_8 OTHER_{it} + \beta_9 CFO_{it-1} + \beta_{10} ACC_{it-1} + \beta_{11} RET_{it} + \beta_{12} EP_{it} + \beta_{13} CAP_{it} + \beta_{14} AGE_{it} + \beta_{15} ATO_{it} + \beta_{16} MILLS_{it} + \varepsilon_{it} \quad (2a)$$

Table 4. Second stage OLS regressions of future earnings on depreciation choice and economic determinants

Panel A. ADJ_INC_{it+1}

Variables	Predicted sign	Coeff.	t-stat.	p-value
Intercept	?	-0.068	-25.31	< 0.001
Test variable				
$CHOICE_{it}$	+	0.032	10.54	< 0.001
Earnings decomposition from Barth et al. (2001)				
CFO_{it}	+	0.692	61.80	< 0.001
ΔAR_{it}	+	0.548	31.41	< 0.001
ΔINV_{it}	+	0.497	23.85	< 0.001
ΔAP_{it}	–	-0.556	-22.88	< 0.001
DEP_{it}	+	0.155	4.41	< 0.001
$AMORT_{it}$	+	-1.135	-9.79	< 0.001
$OTHER_{it}$	+	0.358	26.27	< 0.001
Additional lags				
CFO_{it-1}	+	0.154	15.26	< 0.001
ACC_{it-1}	+	0.107	11.27	< 0.001
Other economic determinants				
RET_{it}	+	0.009	10.77	< 0.001

EP_{it}	–	-0.026	-2.26	0.024
CAP_{it}	+	0.001	5.76	< 0.001
AGE_{it}	+	0.010	17.62	< 0.001
ATO_{it}	+	0.013	15.19	< 0.001
$MILLS_{it}$	?	-0.016	-8.89	< 0.001
Observations				56,303
Adjusted R^2 (%)				56.09
Model p-value				< 0.001

Panel B. ADJ_INC_{it+2}

Variables	Predicted sign	Coeff.	t-stat.	p-value
Intercept	?	-0.080	-21.07	< 0.001
Test variable				
CHOICEit	+	0.048	11.58	< 0.001
Earnings decomposition from Barth et al. (2001)				
CFOit	+	0.532	42.05	< 0.001
ΔARit	+	0.357	18.08	< 0.001
ΔINVit	+	0.350	14.66	< 0.001
ΔAPit	–	-0.429	-15.30	< 0.001
DEPit	+	0.350	7.70	< 0.001
AMORTit	+	-0.317	-2.17	0.030
OTHERit	+	0.246	15.42	< 0.001
Additional lags				

CFOit-1	+	0.175	15.63	< 0.001
ACCit-1	+	0.124	11.48	< 0.001
Other economic determinants				
RETit	+	-0.002	-1.58	0.115
EPit	–	-0.042	-2.71	0.007
CAPit	+	0.002	5.13	< 0.001
AGEit	+	0.011	14.56	< 0.001
ATOit	+	0.016	14.04	< 0.001
MILLSit	?	-0.026	-10.36	< 0.001
Observations				49,175
Adjusted R2 (%)				40.85
Model p-value				< 0.001

Panel C. ADJ_INC_{it+3}

Variables	Predicted sign	Coeff.	t-stat.	p-value
Intercept	?	-0.084	-18.24	< 0.001
Test variable				
CHOICEit	+	0.061	12.01	< 0.001
Earnings decomposition from Barth et al. (2001)				
CFOit	+	0.428	29.95	< 0.001
ΔARit	+	0.290	14.43	< 0.001
ΔINVit	+	0.268	10.60	< 0.001

ΔAPit	–	-0.386	-12.64	< 0.001
DEPit	+	0.402	7.71	< 0.001
AMORTit	+	0.330	1.93	0.054
OTHERit	+	0.215	11.96	< 0.001
Additional lags				
CFOit-1	+	0.190	15.76	< 0.001
ACCit-1	+	0.139	11.49	< 0.001
Other economic determinants				
RETit	+	-0.006	-5.53	< 0.001
EPit	–	-0.045	-2.59	0.010
CAPit	+	0.002	5.50	< 0.001
AGEit	+	0.011	11.81	< 0.001
ATOit	+	0.018	12.58	< 0.001
MILLSit	?	-0.034	-10.90	< 0.001
Observations				42,794
Adjusted R2 (%)				34.11
Model p-value				< 0.001

Variables are defined in Appendix A. Significance tests use standard errors clustered by firm.

Table 4 shows that the coefficients on the control variables in Equation (2) are significant in the predicted directions for earnings horizons of one, two, and three years ahead (p-values < 0.001), except for $AMORT_{it}$ and RET_{it}. The sign of the coefficient on $AMORT_{it}$ is significant in the opposite direction for earnings horizons of t+1 and t+2 (p-values ≤ 0.030). The sign of the coefficient on RET_{it} is insignificant for the earnings horizon of t+2 (p-value = 0.115), while the sign of the coefficient on RET_{it} is significant in the opposite direction for the earnings horizon of t+3 (p-value < 0.001) (Note 11). The coefficient on the self-selection variable, $MILLS_{it}$, in Table 4 is highly significant (p-value < 0.001), which verifies the appropriateness of using the two stage Heckman procedure. Finally, the explanatory power of the models is substantial, ranging from 34.11 percent (year t+3) to 56.09 percent (year t+1).

4.5 Depreciation Choice and Future Cash Flows Results

Table 5 reveals that the coefficient on $CHOICE_{it}$ in Equation (2) is positive and highly significant when the dependent variable is CFO_{it+1} (coefficient = 0.038, t-statistic = 15.53, p-value < 0.001), CFO_{it+2} (coefficient = 0.047, t-statistic = 13.56, p-value < 0.001), and CFO_{it+3} (coefficient = 0.056, t-statistic = 12.92, p-value < 0.001). The interpretation of the coefficient on $CHOICE_{it}$ is that operating cash flows, expressed as a percentage of adjusted total assets, are reliably higher in periods t+1, t+2, and t+3, respectively, for firms that use accelerated depreciation compared with those firms that use straight-line depreciation. These findings add further support to our hypothesis that the use of accelerated depreciation is correlated with higher firm performance (i.e., proxied by future cash flows).

$$\begin{aligned} CFO_{it+j} = {} & \beta_0 + \beta_1 CHOICE_{it} + \beta_2 CFO_{it} + \beta_3 \Delta AR_{it} + \beta_4 \Delta INV_{it} + \beta_5 \Delta AP_{it} \\ & + \beta_6 DEP_{it} + \beta_7 AMORT_{it} + \beta_8 OTHER_{it} + \beta_9 CFO_{it-1} + \beta_{10} ACC_{it-1} \\ & + \beta_{11} RET_{it} + \beta_{12} EP_{it} + \beta_{13} CAP_{it} + \beta_{14} AGE_{it} + \beta_{15} ATO_{it} \\ & + \beta_{16} MILLS_{it} + \varepsilon_{it} \end{aligned} \tag{2b}$$

Table 5. Second stage OLS regressions of future cash flows on depreciation choice and economic determinants

Panel A. CFO_{it+1}

Variables	Predicted sign	Coeff.	t-stat.	p-value
Intercept	?	-0.035	-16.67	< 0.001
Test variable				
$CHOICE_{it}$	+	0.038	15.53	< 0.001
Earnings decomposition from Barth et al. (2001)				
CFO_{it}	+	0.578	68.02	< 0.001
ΔAR_{it}	+	0.411	30.20	< 0.001
ΔINV_{it}	+	0.245	14.67	< 0.001
ΔAP_{it}	–	-0.502	-25.87	< 0.001
DEP_{it}	+	0.368	15.17	< 0.001
$AMORT_{it}$	+	0.465	6.75	< 0.001
$OTHER_{it}$	+	0.145	15.18	< 0.001
Additional lags				
CFO_{it-1}	+	0.179	23.69	< 0.001

ACC_{it-1}	+	0.070	9.86	< 0.001
Other economic determinants				
RET_{it}	+	-0.003	-4.16	< 0.001
EP_{it}	–	-0.093	-9.93	< 0.001
CAP_{it}	+	0.002	9.79	< 0.001
AGE_{it}	+	0.004	10.38	< 0.001
ATO_{it}	+	0.009	12.90	< 0.001
$MILLS_{it}$	?	-0.022	-14.46	< 0.001
Observations				56,303
Adjusted R^2 (%)				58.98
Model p-value				< 0.001

Panel B. CFO_{it+2}

Variables	Predicted sign	Coeff.	t-stat.	p-value
Intercept	?	-0.044	-15.34	< 0.001
Test variable				
CHOICEit	+	0.047	13.56	< 0.001
Earnings decomposition from Barth et al. (2001)				
CFOit	+	0.467	48.81	< 0.001
ΔARit	+	0.296	20.65	< 0.001
ΔINVit	+	0.252	13.88	< 0.001
ΔAPit	–	-0.320	-15.02	< 0.001
DEPit	+	0.449	13.34	< 0.001
AMORTit	+	0.595	6.10	< 0.001
OTHERit	+	0.135	11.80	< 0.001

Additional lags				
CFOit-1	+	0.183	22.15	< 0.001
ACCit-1	+	0.077	10.02	< 0.001
Other economic determinants				
RETit	+	-0.003	-4.89	< 0.001
EPit	–	-0.075	-6.22	< 0.001
CAPit	+	0.003	10.96	< 0.001
AGEit	+	0.005	8.03	< 0.001
ATOit	+	0.011	11.78	< 0.001
MILLSit	?	-0.028	-13.00	< 0.001
Observations				49,175
Adjusted R2 (%)				46.76
Model p-value				< 0.001

Panel C. CFO_{it+3}

Variables	Predicted sign	Coeff.	t-stat.	p-value
Intercept	?	-0.048	-13.57	< 0.001
Test variable				
CHOICEit	+	0.056	12.92	< 0.001
Earnings decomposition from Barth et al. (2001)				
CFOit	+	0.395	36.57	< 0.001
ΔARit	+	0.268	16.68	< 0.001

ΔINVit	+	0.204	10.18	< 0.001
ΔAPit	–	-0.290	-12.34	< 0.001
DEPit	+	0.470	11.63	< 0.001
AMORTit	+	0.653	5.22	< 0.001
OTHERit	+	0.111	8.45	< 0.001
Additional lags				
CFOit-1	+	0.179	19.46	< 0.001
ACCit-1	+	0.088	9.91	< 0.001
Other economic determinants				
RETit	+	-0.005	-6.12	< 0.001
EPit	–	-0.061	-4.46	< 0.001
CAPit	+	0.004	11.15	< 0.001
AGEit	+	0.004	5.92	< 0.001
ATOit	+	0.012	10.43	< 0.001
MILLSit	?	-0.033	-12.57	< 0.001
Observations				42,794
Adjusted R2 (%)				39.60
Model p-value				< 0.001

Variables are defined in Appendix A. Significance tests use standard errors clustered by firm.

Table 5 shows that the coefficients on the control variables in Equation (2) are significant in the predicted directions for operating cash flow horizons of one, two, and three years ahead (p-values < 0.001), except for RET_{it} (Note 12). The sign of the coefficient on RET_{it} is significant in the opposite direction for each of the cash flow horizons considered (p-values < 0.001), which suggests that evidence in prior research that stock returns foreshadow higher future earnings does not hold for operating cash flows. The coefficient on the self-selection variable, $MILLS_{it}$, in Table 5 is highly significant (p-value < 0.001), which verifies the appropriateness of using the two stage Heckman procedure. Finally, the explanatory power of the models is substantial, ranging from 39.60 percent (year t+3) to 58.98 percent (year t+1).

5. Supplemental Analysis

5.1 Depreciation Choice and Future Losses

Table 2 indicates that loss years are much more common for straight-line firms than for accelerated firms. Losses occur in 9.24 percent of our sample firm years, but this frequency varies dramatically between straight-line firms and accelerated firms. For straight-line firms, losses occur in 10.35 percent of the firm years. However, for accelerated firms, losses occur in only 4.26 percent of the firm years. Given this difference, we explore whether firms' depreciation choices foreshadow future losses.

To address this question, we re-estimate Equation (2) with an alternative dependent variable, $LOSS_{it}$. Because of the coding of this alternative dependent variable, the expected signs of the variables in Equation (2) by design will switch. In untabulated results, we find the coefficient on $CHOICE_{it}$ is negative and significant when the dependent variable is $LOSS_{it+1}$ (coefficient = -0.680, t-statistic = -6.51, p-value < 0.001), $LOSS_{it+2}$ (coefficient = -0.726, t-statistic = -6.12, p-value < 0.001), and $LOSS_{it+3}$ (coefficient = -0.885, t-statistic = 6.54, p-value < 0.001) (Note 13). These results imply that the use of accelerated depreciation foreshadows a lower incidence of future losses than the use of straight-line depreciation.

5.2 Mix of Assets Using Alternative Depreciation Methods

Our main sample categorizes an accelerated depreciation observation as one in which the Compustat footnote code suggests that accelerated depreciation is used for some or all of their depreciable assets. We drop from the analysis those observations that use both methods. That is, we test future performance of the group of accelerated depreciation (only) observations compared to with the straight-line depreciation (only) observations. The conclusions on the positive association of the choice variable to future performance are robust to this reduced sample.

6. Conclusions

This study provides evidence that firms' depreciation choice is associated with future earnings and cash flows for horizons of one, two, and three years ahead. The suggestion that asymmetric information is the only factor in depreciation choice would not be justified. We make no such claim. The evidence does, however, indicate that information asymmetry can contribute to our understanding of accounting choices made by managers.

A few caveats are worth noting as well as some directions for future research. First, in our research design, we attempted to control for a great deal of heterogeneity across firms. It is possible that our results could be explained (in part or in whole) due to our inability to consider such differences or due to poorly measured proxies employed in our controls. Second, the data sources used in the study for firms that choose accelerated depreciation lack sufficient detail to consider the levels of asset classes subject to alternative depreciation methods. Future research could extend our study using data (likely hand collected) on the levels of asset classes subject to different depreciation methods. Third, we did not consider the variation in information asymmetry in our tests. A powerful test to extend our study might incorporate a reliable proxy for the variation in asymmetric information to investigate whether the signaling we document in depreciation choice is positively correlated with the degree of information asymmetry.

In sum, our findings are consistent with a large body of theoretical and empirical research in corporate finance and economics on signaling theory. We offer empirical evidence that accounting choices can be explained (in part) by incentives to signal, most likely due to the problem of adverse selection.

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Notes

Note 1. In a survey of CFOs, Graham et al. (2005) states that "an overwhelming majority of CFOs prefer smooth earnings (versus volatile earnings). Holding cash flows constant, volatile earnings are thought to be riskier than smooth earnings. Moreover, smooth earnings ease the analyst's task of predicting future earnings. Predictability of earnings is an over-arching concern among CFOs. The executives believe that less predictable earnings—as reflected in a missed earnings target or volatile earnings—command a risk premium in the market. A surprising 78% of the surveyed executives would give up economic value in exchange for smooth earnings" (page 5).

Note 2. Fields et al. (2001) provides a broad definition for accounting choice. They state that an "accounting choice is any decision whose primary purpose is to influence (either in form or substance) the output of the accounting system in a particular way, including not only financial statements published in accordance with GAAP, but also tax returns and regulatory filings" (page 256).

Note 3. The positive association between firms' use of accelerated depreciation and higher future cash flows cannot be attributed to taxes. This is because firms compute tax depreciation using rules prescribed by the Internal Revenue Code, while they compute financial reporting depreciation using rules prescribed by GAAP. There is no requirement that tax depreciation and financial reporting depreciation conform to one another. Thus, similar tax depreciation can occur regardless of the depreciation method chosen for financial reporting purposes for specific long-lived assets. Additionally, neither method of financial depreciation will be equivalent to tax depreciation. Thus, the choice of accelerated or straight-line offers no administrative cost savings. Furthermore, the argument of relative cost savings of straight-line over accelerated methods seems implausible given the apparent costs of lower near-term earnings and higher earnings volatility.

Note 4. Leland and Pyle (1977) has been confirmed by other studies (Grinblatt and Hwang 1989; Fan 2007).

Note 5. In our example of accounting choice, earnings satisfies the Law of Conservation of Income (Sunder 1997, p. 67) because any differences in income in one period will eventually be reversed over the life of an asset.

Note 6. Compustat annual data items are the source of financial accounting data, except for the variable CHOICEit, which is obtained from the annual footnote data in Compustat.

Note 7. Our definition of income excludes depreciation expense because we wish to purge from income the effect of firms' depreciation choice. When we add back depreciation, we express this variable on an after tax basis using the firm's effective tax rate (ETR) (i.e., we multiply depreciation expense by 1 – total income taxes / pretax income). Without this change, CHOICEit would be functionally associated with earnings. Following Gupta and Newberry (1997), we set ETR to 1 when ETR is greater than 100 percent and we set ETR to 0 when ETR is negative. Our inferences and conclusions are not affected by defining ADJ_INCit on a pre-depreciation expense basis.

Note 8. We require the values of EPit be between zero and positive infinity because negative values for this variable have limited meaning. However, our inferences and conclusions are the same regardless of whether we impose this constraint on EPit.

Note 9. Also, for the variable DROAit in Equation (1), we exclude firm years in which there are fewer than ten firms within a two-digit SIC code.

Note 10. In Bowen et al. (1995), the coefficient on NPit was insignificant in each year examined and its sign was inconsistent across years.

Note 11. This finding suggests that while stock returns lead earnings for relatively short horizons (i.e., t+1), they do not lead earnings for longer horizons (i.e., t+2 and t+3).

Note 12. In Table 5, the signs of the coefficients on the earnings decomposition variables are the same as the signs on those variables in Barth et al. (2001).

Note 13. We have omitted the tables for the supplemental analyses to ease the exposition.

Appendix

Appendix A. Variables Used in the Study

$CHOICE_{it}$ = dummy variable equal to 1 for firms that use the accelerated depreciation method for all or some of their assets, and 0 for firms that use the straight-line depreciation method;

DUR_{it} = dummy variable equal to 1 for firms producing durable goods (SIC codes 150 – 179, 245, 250 – 259, 283, 301, and 324 – 399), and 0 otherwise;

RD_{it} = research and development expense scaled by ADJ_TA_{it} (0 if RD expense is missing);

$LABOR_{it}$ = labor intensity measured as one minus the ratio of gross property, plant, and equipment to ADJ_TA_{it} (0 if gross property, plant, and equipment is missing);

$DPEN_{it}$ = dummy variable equal to 1 for firms with defined benefit pension plans, identified as those firms with a non-negative value for projected pension obligation or assumed rate of return for pension benefits, and 0 otherwise;

MFG_{it} = dummy variable equal to 1 for manufacturing firms (SIC codes 200-399), and 0 otherwise;

$NMFG_{it}$ = dummy variable equal to 1 for non-manufacturing firms (all SIC codes except 200-399), and 0 otherwise;

$COGS_{it}$= cost of goods sold scaled by ADJ_TA_{it};

NP_{it} = notes payable scaled by ADJ_TA_{it} (0 if notes payable is missing);

ADV_{it}= advertising expense scaled by ADJ_TA_{it} (0 if advertising expense is missing);

$LEVMV_{it}$ = ratio of long-term debt to market value of common stock (0 if long-term debt is missing);

$DROA_{it}$ = dummy variable equal to 1 for firms with return on assets (defined as income before extraordinary items and discontinued operations scaled by ADJ_TA_{it}) in deciles 2 through 9, where deciles are defined within two-digit SIC codes, and 0 otherwise;

$SALE_{it}$ = natural logarithm of net sales in thousands;

OG_{it} = dummy variable equal to 1 for firms in the oil and gas industry (SIC codes 131 and 291), and 0 otherwise;

ADJ_INC_{it+j} = income before extraordinary items and discontinued operations plus depreciation expense scaled by ADJ_TA_{it};

CFO_{it+j} = net cash flow from operating activities minus the accrual portion of extraordinary items and discontinued operations reported on the statement of cash flows scaled by ADJ_TA_{it};

ΔAR_{it} = change in accounts receivable from the statement of cash flows scaled by ADJ_TA_{it} and multiplied by -1; ΔINV_{it} = change in inventory from the statement of cash flows scaled by ADJ_TA_{it} and multiplied by -1;

ΔAP_{it} = change in accounts payable and accrued liabilities from the statement of cash flows scaled by ADJ_TA_{it};

DEP_{it} = depreciation expense, computed as depreciation and amortization expense minus amortization expense (coded as 0 if amortization expense is missing) scaled by ADJ_TA_{it};

$AMORT_{it}$ = amortization expense (coded as 0 if amortization expense is missing) scaled by ADJ_TA_{it};

$OTHER_{it}$ = net of all other accruals, calculated as income before extraordinary items and discontinued operations scaled by $ADJ\_TA_{it} - (CFO_{it} + \Delta AR_{it} + \Delta INV_{it} - \Delta AP_{it} - DEP_{it} - AMORT_{it})$;

CFO_{it-1} = net cash flow from operating activities minus the accrual portion of extraordinary items and discontinued operations reported on the statement of cash flows scaled by ADJ_TA_{it};

ACC_{it-1} = total accruals scaled by ADJ_TA_{it};

RET_{it} = stock return, computed as the year-to-year change in closing stock price divided by the prior year closing stock price;

EP_{it} = earnings-to-price ratio if the ratio is non-negative and 0 if the ratio is negative, where the earnings-to-price ratio is defined as income before extraordinary items and discontinued operations divided by the market value of common equity;

CAP_{it} = logarithm of the market value of common equity;

AGE_{it} = logarithm of number of years firm has been listed on CRSP;

ATO_{it} = asset turnover, defined as net sales divided by ADJ_TA_{it};

ADJ_TA_{it} = average of beginning of year and end of year adjusted total assets, where adjusted total assets are equal to total assets plus accumulated depreciation.