



Economic consequences of firms' depreciation method choice: Evidence from capital investments[☆]

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ABSTRACT

This study identifies several interrelated reasons why firms' depreciation method choice is likely to influence managers' capital investment decisions. We find that firms that use accelerated depreciation make significantly larger capital investments than firms that use straight-line depreciation. Further, we find that there has been a migration away from accelerated depreciation to straight-line depreciation over the past two decades. Firms that make such accounting changes make smaller capital investments in the post-change periods than in the pre-change periods. These results suggest that a choice made for external financial reporting purposes influences managers' capital investment decisions.

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1. Introduction

Capital investment decisions are among the most important decisions entrusted to managers because those decisions influence shareholder wealth (McConnell and Muscarella, 1985), firms' long-term prospects for survival (Klammer et al., 1991), and the overall economic welfare of society (Harris and Raviv, 1996). The sheer magnitude of capital investments is enormous. The United States Census Bureau (2007) reports that businesses spent an aggregate of approximately \$7.5 trillion on capital investments or an average of almost \$1.1 trillion per year during the period 1999 through 2005. Given the importance of capital investments to firms, shareholders, and society, efforts to understand the factors that influence managers' capital investment decisions are of considerable practical importance.

This study examines whether the choice that firms make between straight-line depreciation and accelerated depreciation influences managers' capital investment decisions. From a normative perspective, internal management decisions should focus on the incremental costs and benefits associated with alternative courses of action. While choices that firms make for external financial reporting purposes are normatively irrelevant factors in making capital investment decisions (Garrison and Noreen, 2003; Horngren et al., 2005; Titard, 1993), some academics have speculated that firms' depreciation method choice may nonetheless influence those decisions (Dearden, 1960; Hatfield, 1944; Titard, 1993; Zajac, 1995). Evidence confirming the existence of such an association would suggest that a seemingly inconsequential choice

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that firms make for external financial reporting purposes influences one of the most important internal decisions entrusted to managers.

We draw on research in accounting and psychology to identify four interrelated reasons why firms' depreciation method choice is likely to influence managers' capital investment decisions (i.e., loss aversion, earnings consequences, perceived utility, and waste avoidance). These reasons are based on theories of individual behavior and derive from the observation that, at any point during the life of a depreciable asset, accelerated depreciation results in a lower accounting book value than straight-line depreciation. Our main research hypothesis is that firms that use accelerated depreciation make larger capital investments than firms that use straight-line depreciation, *ceteris paribus*.

To test this hypothesis, we estimate a two-stage "treatment effects" model (Greene, 2003; Maddala, 1983) that accounts for the endogenous nature of firms' depreciation method choice. In the first stage, we estimate a multivariate probit model in which the dependent variable is firms' depreciation method choice and the independent variables include previously identified economic determinants of that choice. In the second stage, we estimate a regression in which the dependent variable is capital investments and the independent variables include (i) an indicator for whether the firm uses accelerated depreciation (the variable of interest), (ii) previously identified economic determinants of capital investments, and (iii) the inverse Mills ratio, which accounts for the self-selection nature of firms' depreciation method choice. By including a large array of economic determinants in the second-stage regression, we control for the factors that drive capital investments, thereby enabling us to make inferences about the incremental effect of firms' depreciation method choice.

Consistent with our expectations, we find that the coefficient on the indicator for whether the firm uses accelerated depreciation is significantly positive and economically meaningful. This finding indicates that accelerated depreciation is associated with higher levels of capital investments than straight-line depreciation. To help corroborate this finding, we also examine investments in research and development (R&D), which is a type of investment that should have a non-positive relation with the use of accelerated depreciation. Consistent with our expectations, we find that the coefficient on the indicator for whether the firm uses accelerated depreciation is non-positive. Thus, we find a positive relation between the use of accelerated depreciation and investments when we expect that relation to be positive (i.e., in the case of capital investments), and we find a non-positive relation between the use of accelerated depreciation and investments when we expect that relation to be non-positive (i.e., in the case of R&D investments).

Further, we find that there has been a migration away from accelerated depreciation to straight-line depreciation over the past two decades. The frequency of firms using accelerated depreciation for all or some of their depreciable assets has declined from approximately 31 percent in 1988 to approximately 14 percent in 2006. Firms that change from accelerated depreciation to straight-line depreciation make significantly smaller capital investments in the post-change periods than in the pre-change periods. Taken together, our results suggest that firms' depreciation method choice influences one of the most important decisions that managers make—their decisions about investing scarce capital resources.

In a review of the accounting choice research published during the 1990s, Fields et al. (2001) conclude that "...accounting research has made modest progress in advancing the state of knowledge beyond what was known in the 1970s and 1980s." They contend that the rate of research progress slowed in the 1990s because researchers continued to replicate well-known results in slightly different settings. Perhaps one of the reasons that research on depreciation method choice has slowed is because of the perception that "...depreciation is one accounting issue where the effects of the different methods are obvious and well understood" (Ricks, 1982, p. 71). An implication of our study is that the array of consequences associated with different depreciation methods may be broader than prior accounting choice research contemplates.

Prior research on firms' depreciation method choice has focused on the market-related consequences and contracting consequences of that choice. Beaver and Dukes (1973) find no evidence that investors fixate on earnings prepared under different depreciation methods (i.e., the market appears to adjust for depreciation-method-induced differences in earnings). Archibald (1972) and Kaplan and Roll (1972) find that changes from accelerated depreciation to straight-line depreciation have no discernable stock price effect even though earnings are greater under the new method. In the absence of market-related consequences, firms' depreciation method choice may have economic consequences because that choice alters firms' reported earnings, thereby altering how firms' cash flows are divided among contracting parties (Fields et al., 2001; Holthausen and Leftwich, 1983; Holthausen, 1981; Leftwich, 1981; Ricks, 1982; Watts and Zimmerman, 1986). Our study contributes to the accounting choice literature by providing archival evidence that firms' depreciation method choice has economic consequences even in the absence of market-related consequences and contracting consequences.

Although archival researchers have used a variety of economic determinants of capital investments in their empirical models (Adam and Goyal, 2006; Barro, 1990; Richardson, 2006; Shin and Kim, 2002), there has been limited effort devoted to understanding whether real-world capital investment decisions are influenced by variables of a non-economic nature. A number of experimental studies document that managers' capital investment decisions are influenced by factors of a non-economic nature (Kida et al., 2001; Moreno et al., 2002; Sawers, 2005; Staw, 1976), but it is not clear whether the results of those studies persist in real-world settings that involve actual economic consequences to both managers and their firms. This study identifies an additional determinant of managers' capital investment decisions (i.e., firms' depreciation method choice) that is of non-economic nature and provides archival evidence that this determinant influences managers' capital investment decisions.

The remainder of this study proceeds as follows. Section 2 provides the theory and formulates our research hypothesis. Section 3 describes our research methodology, and Section 4 describes our sample selection procedures. Section 5 discusses the main results and additional analyses. The final section provides concluding comments.

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