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Do scaling and selection explain earnings discontinuities? ☆

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ABSTRACT

Earnings distributions commonly exhibit statistically significant discontinuities at zero earnings, which are widely interpreted as evidence of earnings management to avoid a loss. In contrast, Durtschi and Easton (2005, 2009, hereafter DE) assert that discontinuities are instead explained by some combination of prior researchers' choice(s) of scaling and sample selection as well as a scaling-related effect due to a systematic relation between the sign of earnings and market prices. Resolution of the conflicting interpretations of discontinuities is important because (1) it affects how investors, regulators, and scholars view earnings management and (2) it demonstrates the importance of a close linkage between theory and research design choices. We point out that DE provide no evidence that scaling or selection create discontinuities, but only evidence showing that changes in scaling or selection eliminate discontinuities. We demonstrate why the research designs used by DE eliminate discontinuities and why alternative designs using the same data yield statistically significant discontinuities that cannot be attributed to either scaling or selection.

1. Introduction

There is extensive evidence of discontinuities in distributions of reported earnings at prominent earnings benchmarks, where distributions comprise fewer observations immediately below the benchmark and more observations immediately above the benchmark than are expected if the distribution is smooth.[1] For example, Burgstahler and Dichev (1997, hereafter BD) show that distributions of scaled earnings exhibit discontinuities at zero. In addition, BD document that the strength of discontinuities varies with the costs and benefits of meeting benchmarks. This evidence is widely interpreted as consistent with the theory that managers take both real and accounting actions to avoid losses. This interpretation is further supported

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[1] The smoothness assumption is discussed in more detail in Section 2 and in Burgstahler and Chuk (2014). Benchmarks for which discontinuities have been documented include the profit/loss benchmark (Hayn, 1995; Burgstahler and Dichev, 1997; Degeorge et al., 1999; Leuz et al., 2003; Daske et al., 2006); prior-year earnings (Burgstahler and Dichev, 1997; Degeorge et al., 1999; Beatty et al., 2002; Daske et al., 2006; Donelson et al., 2013); and analyst forecasts (Degeorge et al., 1999; Burgstahler and Eames, 2006; Daske et al., 2006; Donelson et al., 2013). This paper focuses on discontinuities at the profit/loss benchmark.

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by survey evidence in Dichev et al. (2013) indicating that 99.4% of CFOs believe at least some firms manage earnings and also by survey evidence in Graham et al. (2005) indicating that managers are willing to incur real costs in order to meet benchmarks.

Durtschi and Easton (2005, hereafter DE1, 2009, hereafter DE2) assert that inferences attributing discontinuities to actions taken by managers are "erroneous." These papers provide examples where discontinuities are eliminated when the research design is changed and assert that discontinuities in earnings distributions are driven by "deflation, sample selection, and a difference between the characteristics of profit and loss observations." These assertions have led many to question whether discontinuities at zero earnings represent compelling empirical evidence of earnings management, or instead are due to the artifactual explanations advocated in DE1 and DE2 (hereafter referred to collectively as DE).

The purpose of this paper is to distinguish between two competing interpretations of the empirical results reported in DE. The first interpretation is that discontinuities do not exist in earnings distributions, but the scaling and sample selection choices, widely used in the literature, induce the discontinuities. The second interpretation is that discontinuities exist in earnings distributions but the alternative scaling and selection choices implemented by DE obscure the discontinuities.

Our analysis shows that the DE research design choices systematically reduce power, thereby obscuring or eliminating evidence of discontinuities due to earnings management because the DE research designs (1) do not account for the effect of firm size as a covariate, (2) place high weight on results for firms in the smallest size quartile and low weight on results for firms in the upper three quartiles, and (3) do not account for firm-size-related differences in the amount of earnings that can be managed at a cost lower than the benefits. To illustrate the importance of power in interpreting results, consider a research design choice with an obvious and well-known effect on power, namely sample size. Non-significant results from replications using a much smaller sample size than was used in the original test should not be interpreted as contradicting the significant results from the original test nor as confirmation of the null hypothesis. The same principle applies in interpreting results from the DE research designs. Because the DE designs reduce power, the lack of significant evidence of discontinuities based on the DE research designs should not be interpreted as contradicting previous significant results nor as confirming the null.

Another way to evaluate the DE explanations is to examine whether the presence or absence of discontinuities is explained by the presence or absence of scaling or selection effects. Gilliam et al. (2013, hereafter GHP) illustrate this approach. GHP conjecture that the implementation of the Sarbanes-Oxley Act (SOX) and other events around SOX have decreased the incidence of earnings management and document that the discontinuity at zero earnings disappears after SOX. As GHP point out, if discontinuities are explained by the data artifacts proposed by DE, then the data artifacts must have changed such that they once created the zero-earnings discontinuity before 2002 but no longer created the discontinuity after 2002. GHP do not find such a change in data artifacts after 2002, thereby casting doubt on the DE artifactual explanations.[2]

The approach in our paper and the approach in GHP are complementary, and each approach has its advantages. One of the main advantages to GHP's approach is that it identifies effects of a regulatory change that is explicitly linked to the incentives for earnings management. GHP show that evidence of discontinuities disappears when regulatory changes reduce the incentives for earnings management, even though the same scaling and selection artifacts continue. The main advantage of our approach is that we directly test the DE assertions and explicitly show that there is no evidence in DE that scaling and selection cause discontinuities. Our analyses and the analyses in GHP represent separate yet parallel approaches that both support the conclusion that the DE scaling and selection effects cannot explain discontinuities.

The paper is organized as follows. Section 2 provides background on theory and evidence of earnings management to meet benchmarks. Section 3 provides empirical evidence showing why the DE research designs predictably lead to non-significant discontinuity evidence. Section 4 concludes.

2. Background

Earnings management often is inferred based on evidence that the distribution of reported earnings differs from what would have been expected in the absence of earnings management. Specifically, BD suggest that earnings management to meet benchmarks creates discontinuities in the distribution of reported earnings. These discontinuities provide evidence that *some* firms have taken actions consistent with earnings management but do not specifically identify *which* firms have taken these actions. Further, because this approach focuses on reported total earnings, the set of actions included in the definition of earnings management is broad, including all accounting (accrual and disclosure) actions and all "real" operating, investing, and financing actions that affect reported earnings.

Economic theory suggests that managers take actions when they believe the benefits exceed the costs. When pre-managed earnings are below the benchmark by a small enough amount that the cost of managing earnings upward to meet the benchmark is less than the benefits, earnings will be managed upward to meet the benchmark. The cost of managing earnings includes the costs of accounting actions or the opportunity cost of suboptimal real operating, investing, or

[2] Similarly, Jacob and Jorgensen (2007), Donelson et al. (2013), and Jorgensen et al. (2013) show that discontinuities exist in earnings measures where there are incentives to manage earnings but do not exist in closely-related earnings measures that are subject to exactly the same scaling and selection artifacts but where there is little or no incentive to manage earnings, thereby also casting doubt on the DE explanations.

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