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Investment–cash flow sensitivity under changing information asymmetry

Jaideep Chowdhury [a,1], Raman Kumar [b,*], Dilip Shome [b,2]

[a] Department of Finance and Business Law, James Madison University, Harrisonburg, VA 22807, USA
[b] Department of Finance, Pamplin College of Business, Virginia Tech, Blacksburg, VA 24061, USA

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ABSTRACT

Empirical studies on whether investments are sensitive to cash flows in imperfect markets often report conflicting results and have been criticized on conceptual and methodological grounds. Our study mitigates some of these problems using a research design that relates changes in investment–cash flow sensitivity to changes in the bid-ask spread measure of information asymmetry surrounding (i) implementation of the Sarbanes-Oxley (SOX) Act and (ii) deregulation of firms in the Transportation, Telecommunication, and Petroleum and Natural Gas industries. Consistent with our hypotheses, we find that information asymmetry decreases following SOX and that there is a corresponding decrease in the investment–cash flow sensitivity, pre- to post-SOX. Further, greater decreases in information asymmetry following SOX are associated with greater decreases in investment–cash flow sensitivity. The results for the deregulation sample are also consistent with our hypothesis, wherein we observe an increase in information asymmetry and corresponding increase in the investment–cash flow sensitivity following deregulation.

1. Introduction

This study revisits the long unresolved question of whether a firm's investments are sensitive to cash flows. The paper attempts to address some of the theoretical and methodological criticisms that have cast doubts on the (often contradictory) conclusions emerging from the vast body of extant empirical work starting with Fazzari et al. (1988; hereafter, FHP, 1988).

The Q model of investments predicts that in perfect capital markets where internal and external funds are perfect substitutes, the investment decision of a firm is solely a function of its investment opportunities and invariant to the firm's cash flow. In imperfect markets, however, the presence of agency and information asymmetry costs creates a wedge between internal and external funds, making the latter more costly. Now firms with low internal funds may invest less than the first-best level. Conventional wisdom then suggests that the more financially constrained the firm, either in terms of (i) capital market imperfections or (ii) its available internal funds, the less it invests and the greater is its investment–cash flow sensitivity.

Most empirical studies of the investment–cash flow sensitivity hypothesis consist of some variation of cross-sectional regressions of investment levels against the firms' cash flows after controlling for their growth opportunity. These regressions are typically carried out on subsamples of firms stratified according to some perceived degree of a priori financial constraints from capital market imperfections or availability of internal funds. Various studies have classified the sample into subgroups with different degrees of financial constraints based on dividend payout rates (FHP, 1988), bond rating (Gilchrist and Himmelberg, 1995), membership in industrial groups or keiretsus (Hoshi et al., 1991), probability of informed trading as a measure of information asymmetry (Ascioglu et al., 2008), institutional ownership and analyst coverage (Ağca and Mozumdar, 2008), investor horizon (Attig et al., 2012), and size. The specific hypotheses tested and supported in these studies are (i) that the coefficient of cash flows is positive on average and (ii), importantly, that the coefficient is significantly larger for the more financially constrained subsample than for the less financially constrained subsample. From the latter finding, the studies implicitly conclude that investment–cash flow sensitivity is a useful measure of financial constraint.

* Corresponding author. Tel.: +1 540 231 5700; fax: +1 540 231 3155.
E-mail addresses: chowdhjx@jmu.edu (J. Chowdhury), rkumar@vt.edu (R. Kumar), dilip@vt.edu (D. Shome).
[1] Tel.: +1 540 568 3225; fax: +1 540 568 3017.
[2] Tel.: +1 540 239 6818; fax: +1 540 231 3155.

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There is a large and important body of empirical work based on the above methodology that is consistent with the investment–cash flow hypothesis, and there is ongoing interest in this line of research in the literature. However, some potential problems have been identified with the research design used in these studies, including (i) the appropriateness of the proxy measures of market imperfections/information asymmetry used to stratify the sample, (ii) the assumption that the investment–cash flow sensitivity increases monotonically with the degree of financial constraint (see Kaplan and Zingales, 1997; hereafter, KZ, 1997), (iii) the sensitivity of the results to different classification schemes used to stratify samples into more/less financially constrained firms based on capital market imperfection/information asymmetry and availability of internal funds,[3] (iv) the inability of the proxies used in the literature for asymmetric information or internal funds to disentangle the effect of financing constraints from firm-specific effects on the level of investment,[4] and (v) the possibility that the observed investment–cash flow sensitivity result could be due to biases arising out of the measurement errors in Tobin's Q. The impact of the measurement error in Q on the investment–cash flow sensitivity has not been satisfactorily resolved in the literature (Erickson and Whited, 2000, 2002; Cummins et al., 2006; Ağca and Mozumdar, 2012).

A recent study by Cleary et al. (2007; hereafter, CPR, 2007) captures the idea that two otherwise identical firms may face differently severe problems of information asymmetry. The model predicts that investment–cash flow sensitivity is *unambiguously higher* the *greater the asymmetry of information*, the correlation being positive (negative) for positive (negative) cash flow firms. We use this insight of CPR (2007) as the basis for a research design that mitigates some of these theoretical and empirical problems. First, we stratify the sample based on asymmetric information as a measure of the severity of financial constraint. Importantly, we estimate the *change* in investment–cash flow sensitivity resulting from exogenous shocks that decrease or increase the information asymmetry *for the same set of firms* in a time-series framework. The time-series framework surrounding events that change information asymmetry potentially mitigates some of the theoretical and empirical problems identified in the literature. It (i) resolves the monotonicity issue, (ii) more effectively separates the impact of firm-specific factors on investment from the impact of financial constraints by examining differences over time for the same firms, and (iii) results in some of the biases in the coefficients arising from measurement error on the Q variable canceling out since the research design focuses on the differences in the investment–cash flow coefficients. To the extent that the event itself can induce changes in the firm-specific factors and in Q, the corrections from examining differences in the investment–cash flow coefficients over time are partial. Finally, we use the bid-ask spread measure of information asymmetry as our proxy for capital market imperfection/financial constraint. This measure is generally accepted in the market microstructure literature and improves upon the broad proxies such as dividend payout rates used in FHP (1988) and related studies.

We study two events that exogenously impact a firm's information asymmetry. The first is the implementation of the Sarbanes-Oxley Act of 2002 (SOX). We hypothesize that the implementation of SOX, with its requirement of increased disclosures, decreases the information asymmetry between the firm and the market. Accordingly, following CPR (2007), we expect an unambiguous decrease (increase) in the firms' investment–cash flow sensitivity, pre- to post-SOX, for firms with positive (negative) cash flows, with larger changes for subsamples of firms with larger decreases in information asymmetry. Our results are consistent with these hypotheses.

The second exogenous shock we study is the deregulation of industries, which brings about significant changes in the operating and information structure of the firms in the industries. We hypothesize with supporting arguments that deregulation increases the information asymmetry between the firm and the market. Accordingly, we expect an unambiguous increase (decrease) in the firm's investment–cash flow sensitivity, pre- to post-deregulation for positive (negative) cash flow firms, with larger changes for subsamples of firms with larger increases in information asymmetry. We test these hypotheses for positive cash flow firms only because of the small sample size of negative cash flow firms and report results consistent with the hypotheses for positive cash flow firms.

To the best of our knowledge, this is the first paper that examines investment–cash flow sensitivity in a time-series framework surrounding events that exogenously change a firm's information asymmetry. Thus, the primary contributions of the paper are (i) the new research design that mitigates several of the problems outstanding in the literature as discussed above and (ii) the use of bid-ask spread as a direct measure of information asymmetry in testing the investment–cash flow hypothesis, the only paper to do so. Additionally, the paper provides insights into how the SOX regulation and industry deregulation have changed information asymmetry between the firm and the investors. Such changes have obvious and important implications on the decisions of corporations and investors.

The rest of the paper is organized as follows. Section 2 describes the research design and hypotheses of the study. Section 3 presents the empirical analyses and results for the SOX and deregulation events, respectively. Section 4 presents the results of several robustness tests, and Section 5 concludes the paper.

2. Research design and hypotheses

The main result of the CPR (2007) model is that for a given level of information asymmetry, a firm's investments are a U-shaped function of internal funds that reconciles the conflicting results of FHP (1988) and KZ (1997). In an extension of their model, CPR (2007) examine the U-shaped investments-internal funds function for high and low information asymmetry firms. The extended model predicts that when firms have positive internal funds, in the right segment of the U-curve, "*greater asymmetry of information should be associated with greater sensitivity of investments to changes in internal funds*." For sufficiently negative internal funds, in the left segment of the U-curve, the model predicts that the investment–cash flow sensitivity will still be higher, the higher the information asymmetry, but the correlation is now negative. The basis of our research design is the empirical prediction of the CPR (2007) model that with changing information asymmetry, the investment–cash flow sensitivity will *unambiguously* increase (decrease) with increases in information asymmetry for positive (negative) cash flow firms.

Previous empirical tests of the investment–cash flow sensitivity have typically used panel data to estimate the following cross-sectional regressions for subsamples of firms stratified by the perceived degree of a priori financial constraints, either based on proxy measures of capital market imperfection (FHP, 1988; and others) or availability of internal funds (KZ, 1997; and others):

$$\frac{I_{i,t}}{K_{i,t-1}} = \alpha + \beta_1\, Tobin's\, Q_{i,t} + \beta_2 \frac{CF_{i,t}}{K_{i,t-1}} + \varepsilon_{i,t} \quad \text{(R1)}$$

[3] See Fazzari et al. (1988), Kaplan and Zingales (1997), Cleary (1999), Allayannis and Mozumdar (2004).

[4] See Kaplan and Zingales (1997).