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Economic determinants of price informativeness about future earnings☆

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ABSTRACT

This study investigates how the value-creation process affects the extent to which stock prices incorporate value-relevant information about future earnings. In contrast to previous studies focusing on the value-reporting process, this paper shows that strong product market power accelerates the incorporation of future earnings into current equity prices due to less uncertainty about future cash flows and that intensive long-term investment deters such incorporation because of greater uncertainty regarding future cash flows. The results suggest that firm fundamentals shaped by product market competition and long-term investment explain the price informativeness about future earnings beyond the impact of management's reporting discretion.

1. Introduction

This study investigates whether and how the value-creation process affects the extent to which current stock prices incorporate value-relevant information about future earnings. Prior studies document that stock prices lead accounting income in reflecting the change of firm value (e.g., Beaver et al., 1980; Kothari and Sloan, 1992; Warfield and Wild, 1992). A series of subsequent studies explore firm characteristics that explain the price informativeness about future earnings.[1] They document that current stock returns incorporate more information about future earnings when firms provide higher quality disclosures (e.g., Lundholm and Myers, 2002; Gelb and Zarowin, 2002; Ettredge et al., 2005; Choi et al., 2011; Park, 2011) and they have better information environments (e.g., Jiambalvo et al., 2002; Ayers and Freeman, 2003; Piotroski and Roulstone, 2004). In contrast to the previous studies focusing on the value-reporting process, this study examines product market power and long-term investment in the value-creation process as economic determinants of the price informativeness about future earnings.[2]

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[1] This study uses the terms "price informativeness about future earnings," "informativeness of stock prices (or current returns) about future earnings," and "prices leading earnings" interchangeably throughout the paper.

[2] In this paper, the value-creation process represents business process through which a firm generates its cash flows and increases its shareholder value, and the value-reporting process represents financial reporting process through which a firm prepares and discloses its financial reports about the level and change of shareholder value (Engel et al., 2003).

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This study is motivated by several influential academic studies. First, the informativeness of current returns about future earnings explains a significant portion of the return-earnings association. For instance, Collins et al. (1994) show that the inclusion of future earnings into the regression of current returns on contemporaneous earnings increases the explanatory power of the regression model by three to six times. In addition, the price informativeness about future earnings increases over time and becomes more important in understanding equity price formation (Ryan and Zarowin, 2003; Lev and Zarowin, 1999). Second, the price informativeness about future earnings captures the time lag between stock prices and accounting income in reflecting information about future cash flows. The recognition principle enhances the reliability of financial reporting by requiring the compliance of formal recognition conditions but inadvertently lengthens the time lag of accounting earnings in mirroring the change of equity value (Warfield and Wild, 1992; Collins et al., 1994). Thus, investors are likely to use forward-looking information about future cash flows after weighing the trade-off between timeliness and reliability of the information, and the price informativeness about future earnings reveals the trade-off. Third, prior studies have documented little about firm-level economic fundamentals that may influence the time lag between stock prices and accounting income and, in turn, the investors' capitalization of anticipated future earnings into equity prices. Firm fundamentals that determine the uncertainty about the realization of expected future cash flows can account for a significant portion of the association between current returns and future earnings even before managers exercise discretion over financial reporting and voluntary disclosures. This study, therefore, focuses on product market power and long-term investment in the value-creation process as two fundamental economic determinants in explaining the informativeness of stock prices about future earnings.

The choice of product market power and long-term investment as economic fundamentals is based on valuation models that decompose equity value into (i) the present value of expected future cash flows from investment generating a normal rate of return, and (ii) the counterpart from investment generating an above-normal rate of return (Fama and Miller, 1972; Ohlson, 1995; Feltham and Ohlson, 1995). Specifically, Feltham and Ohlson (1995) show that equity value is a function of the persistence of abnormal earnings and the growth in operating assets.[3] On the one hand, a firm's monopolistic power in product markets increases the persistence of above-normal earnings (Lev, 1983; Cheng, 2005; Healy et al., 2014) and reduces the uncertainty of future cash flows (Gaspar and Massa, 2006; Irvine and Pontiff, 2009; Datta et al., 2011). On the other hand, a firm's long-term investment determines the growth rate of operating assets (Feltham and Ohlson, 1995) and heightens the uncertainty over expected future earnings by increasing operating leverage and the volatility of future cash flows (Lev, 1983; Biddle and Seow, 1991).

This study posits that fundamental uncertainty in anticipated future earnings, determined by product market power and long-term investment, shapes the informativeness of stock prices about future earnings (Peress, 2010). Stock returns incorporate economic events related to the change of equity value continuously whereas accounting income reflects such events discretely due to the recognition principle. When investors receive forward-looking information with low uncertainty about future cash flows, investors would incorporate such information immediately into their stock trading activities. In contrast, when the information about future earnings is highly uncertain, investors are likely to await additional supporting information and thus postpone incorporating the forward-looking information into their equity trades. Therefore, the market's capitalization of future earnings into stock prices depends on the speed of resolution of uncertainty regarding future cash flows.

Building upon the preceding discussion, this study hypothesizes that, as economic determinants of the fundamental uncertainty embedded in future cash flows, product market power and long-term investment are associated with the extent to which stock prices reflect the information about future earnings. First, firms with strong power in the product market are predicted to have more informative stock prices about future earnings. Firms operating in monopolistic (or oligopolistic) product markets can transfer potential negative shocks to consumers rather than absorb them and thus exhibit not only more persistent earnings streams (Lev, 1983; Cheng, 2005; Healy et al., 2014) but also less uncertainty about future earnings (Gaspar and Massa, 2006; Irvine and Pontiff, 2009; Datta et al., 2011). The low uncertainty over future operating performance helps investors anticipate the future earnings of monopolistic firms and encourages investors to participate in the trading of such stocks (Hou and Robinson, 2006; Peress, 2010). Therefore, a firm's product market power is expected to make its stock prices more informative about future earnings by reducing its fundamental uncertainty.

Second, firms with intensive long-term investment are predicted to have less informative stock prices about future earnings. The investment in tangible and intangible operating assets increases the fundamental uncertainty about future cash flows. The long-term capital investment increases the operating leverage and the volatility of future cash flows (Lev, 1983; Biddle and Seow, 1991). Similarly, the investment in research and development (R&D) induces a greater risk of future cash flows (Kothari et al., 2002; Shi, 2003). If a firm invests intensively in long-term projects, investors are less likely to utilize forward-looking information with high uncertainty immediately for their stock trades but would seek additional information about the potential benefits from the long-term investment (Dow and Werlang, 1992; Cao et al., 2005; Easley and O'Hara, 2010). This tendency to defer the information-based trading would make the stock prices of high-investment firms less informative about future earnings than those of low-investment firms.

This study measures the investors' capitalization of anticipated future earnings into current stock prices by the future earnings response coefficient (FERC), the coefficient on future earnings in the regression of current stock returns on both current and future earnings after controlling for past earnings and future returns (Collins et al., 1994; Lundholm and Myers, 2002). A higher FERC indicates that current returns reflect more information about future earnings because investors incorporate forward-looking

[3] Feltham and Ohlson (1995) present valuation models including three key parameters: the persistence of abnormal earnings, the long-run growth in operating assets, and the degree of accounting conservatism. Accounting conservatism is not considered as an economic fundamental because management has a direct influence on the level of conservative accounting. In addition, the empirical results of this paper are robust to controlling for accounting conservatism (see Section 5.3).

information about future cash flows quickly into equity prices. To test the impact of product market power and long-term investment on the price informativeness about future earnings (measured by the FERC), this paper employs a large sample of 68,604 observations for U.S. public firms over the period of 1975–2006.[4]

The empirical results support the two preceding hypotheses. Product market power (measured by the Herfindahl-Hirschman index and excess price-cost margin) is positively associated with the FERC. This result indicates that firms with strong market power face less uncertainty over future cash flows, and thus have more informative stock prices about future earnings. In contrast, long-term investment (measured by capital expenditure and non-capital expenditure such as R&D and acquisition) is negatively associated with the FERC. Further analysis reveals that the negative relation between long-term investment and the FERC is attributable to the effect of non-capital investment, especially R&D investment. This implies that firms investing heavily in long-term intangibles have less informative stock prices about future earnings because such investment increases the uncertainty concerning the realization of anticipated future earnings. Additional analysis shows that industry-level deregulation weakening incumbents' market power is associated with a significant decrease in FERC, and a substantial increase in long-term investment is associated with a significant decrease in FERC. The temporal change in FERC is consistent with the view that the heightened uncertainty about future earnings, driven by the deregulation and large investment, has reduced the informativeness of stock prices about future earnings. The results are generally robust to using alterative measures of product market power and long-term investment and controlling for a variety of potential omitted variables such as operating characteristics, information environments, and financial reporting quality.

A concurrent paper by Haw et al. (2016) also documents the positive association between industry-level product market power (proxied by the Herfindahl-Hirschman index) and the FERC, but there are four major differences between this paper and Haw et al. (2016). First, this study examines the U.S. sample while Haw et al. (2016) explore the non-U.S. sample from 38 countries. Specifically, Haw et al. (2016, page 466) acknowledge that they exclude the U.S. sample from their analysis because, as a concurrent study, this paper provides evidence that the price informativeness about future earnings increases with industry concentration in the U.S. A cross-country study like Haw et al. (2016) may have a strength in external validity (i.e., the generalizability of findings), but it has a weakness in internal validity (i.e., the establishment of a causal relation) because the empirical results are subject to the influence of uncontrolled country-level characteristics on disclosure and information environments.[5] In contrast, a U.S. study like this paper can use a cleaner research setting to investigate the effect of product market power on price informativeness because it holds country-level characteristics constant.

Second, this study investigates not only cross-industry product market power (proxied by the Herfindahl-Hirschman index) but also within-industry product market power (proxied by excess price-cost margin) as economic determinants of price informativeness. In contrast, Haw et al. (2016) examine only the cross-industry variation in product market power and its association with price informativeness. The evidence on the relation between firm-level market power and price informativeness is important because firm-specific market power enhances firm profitability and decreases the uncertainty about future cash flows beyond the impact of industry-level market power (Gaspar and Massa, 2006; Datta et al., 2011). Third, this study shows the over-time decrease in price informativeness following industry-wide deregulations and large increases in long-term investment whereas Haw et al. (2016) solely rely on pooled cross-sectional regressions that are subject to the effect of correlated omitted variables. Especially, the deregulation test on the change in product market power is critical to establish a causal relation between product market power and the FERC because industry concentration can be endogenously determined by previous competition within an industry (e.g., Demsetz, 1973; Carter, 1978). Finally, this study provides novel evidence on the negative association between long-term investment and the price informativeness about future earnings whereas Haw et al. (2016) are silent about the effect of long-term investment, suggesting a potential omitted variable problem in their study. This evidence sheds light on how firm-level investment activities influence the investors' capitalization of anticipated future earnings into equity prices.

In sum, this study contributes to the literature on the informativeness of stock prices. It reveals that product market characteristics and firm-level investing activities affect the fundamental uncertainty about future cash flows, and thus explain the cross-sectional and time-series variation in the price informativeness about future earnings. These firm fundamentals have a significant effect on investors' ability to anticipate future earnings even after controlling for information environments and financial reporting quality that prior studies document as explanatory variables of price informativeness. As a result, this study presents a more comprehensive framework of the relation between current returns and future earnings, and enhances our understanding of the market's incorporation of forward-looking information into stock prices.

The remainder of the paper is organized as follows. Section 2 reviews the related literature on stock prices leading earnings. Section 3 develops the hypotheses on the economic determinants of price informativeness about future earnings, and Section 4 describes the research design and sample selection. Section 5 provides the results of cross-sectional analyses, and Section 6 shows the results of change analyses. Section 7 concludes the paper.

[4] The estimation of the FERC model requires future earnings and stock returns over three years and additional three months of leading stock returns (see Section 4 for more details). For instance, the 2006 observations require future earnings from 2007 to 2009 and future returns from 2007 to 2010. Therefore, the sample period ending in 2006 covers the market's anticipation of future earnings over the 2007–2008 financial crisis. The empirical results of this study are robust to excluding the observations from 2004 to 2006 that use future three-year earnings and returns over the 2007–2008 financial crisis.

[5] For example, Haw et al. (2016) do not control for insider trading laws and information dissemination even though Haw et al. (2012) document the significant effects of such country-level factors on the price informativeness about future earnings.

2. Prior literature

Prior accounting research has documented empirical evidence that stock prices reflect the expectations of market participants about future earnings largely because the stock market anticipates future earnings using various sources of accounting and non-accounting information (e.g., Beaver et al., 1980; Kothari and Sloan, 1992; Warfield and Wild, 1992). To incorporate the market's anticipation of future earnings into the return-earnings relationship, Collins et al. (1994) develop a FERC model that regresses current returns on changes in current earnings and future earnings. They find that the coefficient on the change of future earnings (FERC) is significantly positive and the explanatory power of the FERC model is three to six times greater than that of the traditional ERC model. Lundholm and Myers (2002) modify the FERC model by regressing current returns on both current and future earnings after controlling for past earnings and future returns. Collins et al. (1994) and Lundholm and Myers (2002) interpret the FERC as an empirical measure of the extent to which current stock returns reflect value-relevant forward-looking information about future earnings. Consistent with this interpretation, Durnev et al. (2003) show that firms with higher firm-specific return variation exhibit stronger association between current returns and future earnings, and thus the FERC reflects the informativeness of stock prices about future earnings.

Previous FERC studies focus on the value-reporting process such as disclosure quality, information environment, and accounting choices to explain the cross-sectional variation in the price informativeness about future earnings. A high level of disclosure improves the extent to which stock prices reflect information about future earnings because additional disclosure provides investors with incremental forward-looking information about future earnings. Lundholm and Myers (2002) and Gelb and Zarowin (2002) demonstrate that high quality disclosures measured by analysts' ratings of disclosure quality facilitate the investors' anticipation of future earnings. Ettredge et al. (2005) and Park (2011) find that the improved segment reporting expedites the market's capitalization of future earnings into current stock prices. Choi et al. (2011) show that management earnings forecasts assist investors in predicting future earnings, especially when the forecasts are frequent and precise. Haw et al. (2012) further show that firms operating in countries with greater financial disclosure exhibit stronger association between current returns and future earnings.

In addition to mandatory or voluntary disclosure, information intermediaries generate private information about a firm's prospects and process and interpret public information, which increases the extent to which investors anticipate future earnings. Jiambalvo et al. (2002) show that firms with high institutional ownership have more informative stock prices about future earnings. Ayers and Freeman (2003) also find that financial analysts and institutional investors accelerate the market's pricing of future earnings. Piotroski and Roulstone (2004) further document that the informational contribution of financial analysts and institutional investors to the price informativeness about future earnings is mainly attributable to their interpretation of publicly available information rather than their generation of private information. Moreover, accounting standards and choices, such as income smoothing (Tucker and Zarowin, 2006), the capitalization of R&D expenditure (Oswald and Zarowin, 2007), and the direct method of cash flow statements (Orpurt and Zang, 2009), are also reported to increase the association between current stock returns and future earnings.[6] However, little is known about the direct effect of firm fundamentals governing the value-creation process on the price informativeness about future earnings.

3. Hypothesis development

This study posits that the uncertainty about the probability distribution of future cash flows underlies the price informativeness about future earnings (Dow and Werlang, 1992; Cao et al., 2005). To address the uncertainty over future cash flows, the accounting system incorporates value-relevant information *discretely* through the income recognition process. Accounting income thus reflects economic events indicating the change of equity value only when those events meet recognition thresholds (Warfield and Wild, 1992; Collins et al., 1994). In contrast, stock prices incorporate information about future cash flows *continuously* because equity investors can utilize any public and private information for their trading activities after weighing the trade-off between relevance and reliability of the information. This timing difference induces stock prices to reflect incremental information about future earnings even when current earnings are controlled for (Collins et al., 1994; Lundholm and Myers, 2002).

The time lag between stock prices and accounting income mainly depends on how investors incorporate forward-looking information about future cash flows into their stock trades. When the forward-looking information has a high precision with little uncertainty, investors are likely to use the information fully and immediately in their trading activities. However, if the forward-looking information has a low precision involving high uncertainty, investors would postpone the trading based on the information and search for additional information to reduce the uncertainty. Consistent with this conjecture, Dow and Werlang (1992) and Cao et al. (2005) show that, as the uncertainty about future payoff increases, uncertainty averse investors are more likely to avoid participating in equity trading. Easley and O'Hara (2010) further illustrate that extreme uncertainty leads to illiquid markets by discouraging investors from participating in stock trading. This tendency to defer the information-based trading would make the prices of high uncertainty stocks less informative about future earnings than the prices of low uncertainty stocks. Thus, the uncertainty about the realization of future cash flows serves an important role in explaining the extent to which stock prices reflect the value-relevant information about future earnings.

Investors face two types of uncertainty over a firm's future cash flows: fundamental uncertainty arising from a firm's underlying

[6] This study is different from Oswald and Zarowin (2007) because the former examines the impact of long-term investment (including R&D expenditure) on the FERC using a U.S. sample whereas the latter investigates the effect of firms' choice to capitalize R&D expenditures on the FERC using a U.K. sample.

operational volatility and informational uncertainty reflecting the quality of information (Zhang, 2006). This paper focuses on fundamental uncertainty to examine how the value-creation process shapes the price informativeness about future earnings. Specifically, this study hypothesizes product market power and long-term investment in the value-creation process as economic determinants of the price informativeness about future earnings and controls for the potential influence of information uncertainty in the value-reporting process.[7] The choice of two economic fundamentals, product market power and long-term investment, follows the valuation literature indicating that equity value is a function of the persistence of abnormal earnings and the growth in operating assets and that both valuation parameters depend on product market competition and long-term investment (Feltham and Ohlson, 1995; Ohlson, 1995).

3.1. Product market power

Product market competition affects the investors' capitalization of anticipated future earnings through its impact on the persistence of abnormal earnings and the volatility of future cash flows. First, a firm's strong power in product markets increases the persistence of above-normal earnings (Cheng, 2005; Healy et al., 2014). On one hand, firms with high market shares tend to earn economic rents because of their superiority in producing and marketing products (Demsetz, 1973; Carter, 1978). On the other hand, firms operating in a concentrated industry benefit from monopoly rents because of the easy collusion among industry peers or high barriers to entry (Shepherd, 1972; Eaton and Lipsey, 1981). Thus, firms with strong market power tend to sustain above-normal earnings for a longer period and exhibit a slower mean-reversion in accounting return (Lev, 1983; Baginski et al., 1999; Cheng, 2005; Healy et al., 2014).

Second, a firm's dominant power in product markets decreases the volatility in operating performance (Gaspar and Massa, 2006; Irvine and Pontiff, 2009; Datta et al., 2011). Firms with strong product market power can transfer potential negative external shocks to consumers rather than absorb them (Hou and Robinson, 2006; Gaspar and Massa, 2006). Accordingly, they face a lower firm-specific risk related to future earnings than do other firms (Irvine and Pontiff, 2009; Hou and Robinson, 2006), and exhibit less volatile income streams (Lev, 1983; Baginski et al., 1999).

The high persistence of abnormal earnings and low volatility of operating performance reduce the fundamental uncertainty about firms with strong market power. In other words, stock investors face less uncertainty over future cash flows when they trade the stocks of firms with strong market power. The low uncertainty about future cash flows facilitates the investors' prediction of future earnings (Dichev and Tang, 2009) and encourages investors to participate in equity trades (Peress, 2010). Therefore, stock prices are expected to be more informative about future earnings for firms with stronger market power. The preceding discussion leads to the following hypothesis.

H1. The extent to which current stock returns reflect future earnings increases with product market power.

3.2. Long-term investment

The uncertainty of future earnings is conditional upon what kinds of assets a firm invests in because some assets are exposed to greater uncertainty in relation to the realization of future economic benefits than are other assets (Warfield and Wild, 1992). Noncurrent assets take a longer time to generate cash flows from an investment than do current assets. Intangible assets tend to be riskier than tangible assets with respect to generating future cash flows. Accordingly, the long-term investment in tangible and intangible operating assets is likely to raise the fundamental uncertainty about future earnings. For instance, capital investment increases the operating leverage and the volatility of future earnings (Lev, 1983; Biddle and Seow, 1991). Similarly, R&D investment leads to a high volatility of future earnings (Kothari et al., 2002; Shi, 2003). When the causal effect of long-term investment on equity value is uncertain, investors are likely to search for additional information about future investment benefits and await the uncertain benefits to be realized rather than actively participating in equity trades. This tendency to defer the information-based trading reduces the extent to which investors incorporate anticipated future earnings into stock trading activities.

The agency problem between management and investors aggravates the fundamental uncertainty about the future benefits from long-term investment. Managers have incentives to expand the firm size beyond the optimal level for their personal benefits at the expense of shareholders' wealth (Jensen, 1986). Specifically, managers may invest in value-decreasing projects when investors do not monitor managerial activities effectively (Masulis et al., 2007; Giroud and Mueller, 2010, 2011). At the absence of effective governance and control, managers thus tend to consume liquid assets for suboptimal investment (Dittmar and Mahrt-Smith, 2007; Masulis et al., 2009). Moreover, the information asymmetry between management and investors further increases the uncertainty over future cash flows from long-term investment (Aboody and Lev, 2000; Barth et al., 2001). Managers can use a discretionary portion of R&D and capital expenditure to achieve specific financial reporting aims (Bushee, 1998; Roychowdhury, 2006), which deters investors from trading on forward-looking information about future benefits of long-term investment (Banker et al., 2000; Rajgopal et al., 2003). As a result, the heightened uncertainty related to the effect of long-term investment on future cash flows discourages investors from participating in equity trades and makes stock prices of high-investment firms less informative about future earnings than those of low-investment firms.

[7] Section 5.3 reports that empirical findings of this paper are robust to controlling for several proxies of information uncertainty (e.g., analyst following and earnings quality).

An alternative prediction is that long-term investment may increase the time lag between stock prices and accounting income by reducing the timeliness of accounting income in reflecting the change in equity value (Lev and Zarowin, 1999; Ryan and Zarowin, 2003). For example, investors may increase their reliance on forward-looking information regarding the outcome of R&D investment because it takes a longer time for accounting earnings to reflect the economic benefits from R&D investment than those from the investment in tangible assets (Lev and Sougiannis, 1996; Cheng, 2005). Although investors may rely heavily on forward-looking information to assess the future benefits from long-term investment, such information with high uncertainty is unlikely to make the stock prices of high-investment firms more informative compared to those of low-investment firms.[8] In sum, stock prices are expected to be less informative about future earnings for firms with larger long-term investment. The above discussion leads to the following hypothesis.

H2. The extent to which current stock returns reflect future earnings decreases with long-term investment.

4. Research design

4.1. Measurement of economic fundamental variables

Product market power is measured by the Herfindahl-Hirschman index and price-cost margin. The Herfindahl-Hirschman index (*HHI*), defined as the sum of squared market shares in each industry, represents the industry-level market concentration. Consistent with Cheng (2005) and Hou and Robinson (2006), industry membership is classified based on the three-digit SIC code.[9] Price-cost margin (*PCM*), defined as the ratio of a firm's net sales to operating costs, reflects firm-level power in product markets (Karuna, 2007; Gaspar and Massa, 2006). Excess price-cost margin (*EPCM*), a firm's *PCM* minus its industry average *PCM* in each year, is used for the regression analyses. While *HHI* captures inter-industry differences in market power, *EPCM* is better able to reflect the intra-industry variation in market power. The greater values of both measures represent stronger power in product markets.

Long-term investment (*INVEST*) is defined as the sum of capital investment and non-capital investment (Biddle et al., 2009; Richardson, 2006). Capital investment (*CAP*) that captures the growth in operating tangible assets is measured by capital expenditure minus cash receipts from sale of property, plant, and equipment, deflated by beginning total assets.[10] Non-capital investment (*NONCAP*) that reflects the growth in intangible assets is defined as the sum of R&D investment and acquisition investment. R&D investment (*RND*) is measured by a firm's R&D expenditure deflated by its beginning total assets. Acquisition investment (*ACQ*) is measured by cash expenditure for the acquisition of other firms, deflated by beginning total assets. *RND* and *ACQ* are set to zero if information about R&D and acquisition expenditures is unavailable or coded as insignificant on Compustat, respectively.[11] The measurement of the above variables is summarized in the appendix.

4.2. Future earnings response coefficient model

This study employs the future earnings response coefficient (FERC) model, developed by Collins et al. (1994) and modified by Lundholm and Myers (2002), to examine the impact of product market power and long-term investment on the extent to which stock prices reflect information about future earnings. Eq. (1) (hereafter, the standard FERC model) as a benchmark model relates current returns to both current and future earnings.

$$R_t = \alpha_0 + \alpha_1 E_{t-1} + \alpha_2 E_t + \alpha_3 E3_t + \alpha_4 R3_t + \varepsilon_t, \tag{1}$$

where R_t represents annual stock returns in year t, E_{t-1} represents one-year past earnings, E_t represents current earnings, $E3_t$ represents future earnings aggregated over three years, and $R3_t$ represents future stock returns over three years, with all earnings variables deflated by the beginning market value of equity. Future earnings ($E3_t$) and future returns ($R3_t$) are measured over three years because Collins et al. (1994) and Lundholm and Myers (2002) show that future earnings from year $t + 4$ contribute little to the explanatory power of the standard FERC model. The measurement of the variables is detailed in the appendix. The firm subscript on all the variables is suppressed to simplify the notation in all the regression equations of this paper.

The coefficients on current and future earnings (α_2 and α_3, respectively) reflect the extent to which current realized earnings and future anticipated earnings are capitalized into stock prices, respectively.[12] The coefficients on current and future earnings are

[8] If high-investment firms have less timely earnings (and a longer time lag between stock prices and accounting income) than low-investment firms, it will strengthen the positive association between current returns and future earnings and work against finding the significant result supporting the second hypothesis that high-investment firms have less informative stock prices about future earnings than do low-investment firms.

[9] The results are robust when a different industry classification is used, such as the four-digit SIC code or the industry classification of Fama and French (1997).

[10] The results are virtually identical when *CAP* is simply defined as capital expenditure deflated by beginning total assets without the adjustment for cash receipts from sale of property, plant, and equipment.

[11] The results do not change qualitatively for two alternative methods: (1) excluding observations with missing R&D expenditure information and (2) excluding acquisition expenditure from the measurement of *INVEST* and *NONCAP*.

[12] This study focuses on the extent to which investors use the value-relevant information impounded in current realized earnings and the forward-looking information about future earnings for equity price formation per se, not whether investors fully use publicly available information for equity valuation. To address the potential impact of market inefficiency, this study examines the robustness of the results after controlling for the arbitrage risk and trading cost proxies used by Ali et al. (2003) and Mashruwala et al. (2006). Untabulated results suggest that arbitrage costs and trading costs do not systematically influence the results.

denoted as the current earnings response coefficient (CERC) and the future earnings response coefficient (FERC), respectively.[13] As both current and future earnings impound information about the change in equity value, the CERC and FERC are expected to be significantly positive (i.e., $\alpha_2 > 0$ and $\alpha_3 > 0$, respectively). The coefficient on one-year past earnings (E_{t-1}) is expected to be negative because E_{t-1} controls for the market expectation of current earnings. The coefficient on future stock returns ($R3_t$) is expected to be negative because future returns control for the measurement errors that are inherent in future earnings ($E3_t$) as a proxy for expected future earnings (Collins et al., 1994; Lundholm and Myers, 2002). Future returns ($R3_t$), as an instrumental variable, purge the unexpected portion of ex-post future earnings ($E3_t$).

The FERC model provides two advantages over the traditional ERC model for investigating the extent to which current returns reflect future earnings information. First, whereas the ERC model indirectly links current returns to future earnings via the persistence of earnings (e.g., Kormendi and Lipe, 1987; Collins and Kothari, 1989), the FERC model directly examines the association between current returns and future earnings. Second, the FERC model is less likely to suffer from a correlated omitted variable problem, which creates the potential bias in the estimated coefficients on current and future earnings, than is the ERC model (Collins et al., 1994).

The primary analysis of this study examines the impact of product market power and long-term investment on the FERC as hypothesized in Section 3. The main and interaction effects of two economic fundamentals are added to the standard FERC model, which leads to Eq. (2) (hereafter, the extended FERC model).

$$\begin{aligned} R_t = {} & \alpha_0 + \alpha_1 E_{t-1} + \alpha_2 E_t + \alpha_3 E3_t + \alpha_4 R3_t + \beta_0 X_t + \beta_1 E_{t-1} * X_t + \beta_2 E_t * X_t + \beta_3 E3_t * X_t + \beta_4 R3_t * X_t \\ & + \gamma_0 Z_t + \gamma_1 E_{t-1} * Z_t + \gamma_2 E_t * Z_t + \gamma_3 E3_t * Z_t + \gamma_4 R3_t * Z_t + YEAR + \varepsilon_t, \end{aligned} \tag{2}$$

where X_t is a vector of economic fundamental variables, namely, the Herfindahl-Hirschman index (*HHI*) and excess price-cost margin (*EPCM*), which represent product market power; and long-term investment (*INVEST*) and its components such as capital investment (*CAP*) and non-capital investment (*NONCAP*). Z_t is a vector of control variables including firm size (*SIZE*), book-to-market ratio (*BTM*), loss occurrence (*LOSS*), and earnings volatility (*EVOL*). *YEAR* controls for year fixed effects.[14] The measurement of the variables is described in the appendix. All the other variables are as defined for Eq. (1).

The coefficients on the interaction terms between future earnings and economic fundamentals ($E3_t * X_t$) reflect the incremental effect of economic fundamentals on the association between current stock returns and future earnings. If product market power increases the FERC (i.e., if H1 holds), the coefficients on $E3_t * HHI_t$ and $E3_t * EPCM_t$ are predicted to be positive. If long-term investment decreases the FERC (i.e., if H2 holds), the coefficients on $E3_t * INVEST_t$, $E3_t * CAP_t$, and $E3_t * NONCAP_t$ are predicted to be negative.

All the continuous economic fundamental variables and control variables are converted into fractional rank variables in the regression analyses. This transformation mitigates the influence of extreme observations, addresses the potential non-linearity between economic fundamental variables and the FERC, and makes the incremental effects of different economic fundamentals on the FERC comparable to each other (e.g., Lundholm and Myers, 2002; Tucker and Zarowin, 2006).[15]

4.3. Sample selection

The initial sample consists of all publicly traded companies with available data from the NYSE, AMEX, and NASDAQ. Accounting and stock return data are retrieved from the 2011 version of the Compustat and CRSP database, respectively. Analyst forecasts and institutional ownership data are obtained from the I/B/E/S and CDA/Spectrum institutional (13-f) holdings database, respectively. The sample period covers the 32 years from 1975 to 2006. The first year is set as 1975 because that was the year when Statement of Financial Accounting Standards (SFAS) No. 2, which requires all U.S. listed firms to immediately expense their R&D expenditure, became effective (Lev and Sougiannis, 1996). The data requirement of future three-year earnings and returns and additional three months of leading stock returns eliminates observations from 2007 to 2010.[16] Firms in financial and utilities industries (SIC 6000-6999 and 4000-4999, respectively) are excluded from the sample because the nature of their accounting reports and information environments are not comparable with those of other industries (Tucker and Zarowin, 2006; Cheng, 2005). To control for the effect of outliers, the analyses exclude observations that fall below the bottom 1 percent or above the top 1 percent of the distribution of R_t, E_{t-1}, E_t, $E3_t$, and $R3_t$. Consistent with Lundholm and Myers (2002), extreme observations with an E_{t-1} and E_t greater than 1 or less than -1 and those with an $E3_t$ greater than 3 or less than -3 are trimmed. After these selection procedures, the final sample has 68,604 firm-year observations, with a range of 1469 to 2475 observations per year.

[13] This study denotes the coefficient on E_t as the *current* earnings response coefficient (CERC) to distinguish it from the coefficient on current earnings in the traditional ERC model.

[14] Eq. (2) excludes industry fixed effects due to the linear dependence with the Herfindahl-Hirschman index. The results are robust to the inclusion of industry fixed effects when Eq. (2) uses excess price-cost margin as a sole proxy for product market power.

[15] Winsorizing the economic fundamental variables and control variables at the 1st and 99th percentiles produces similar results.

[16] Both current and future return variables (R_t and $R3_t$) are measured over the periods starting from three months after the beginning of the fiscal year (see Appendix for variable definitions). This measurement ensures that current (future) stock returns incorporate the public disclosures of current (future) earnings.

Table 1
Descriptive statistics and the correlation matrix (N = 68,604).

Panel A: Sample distribution of the research variables

Variable	Mean	Std. Dev.	1st	25th	50th	75th	99th
R_t	0.195	0.594	−0.681	−0.158	0.096	0.409	2.285
$R3_t$	0.508	1.170	−0.880	−0.234	0.233	0.887	5.073
E_t	0.055	0.151	−0.493	0.014	0.064	0.117	0.449
$E3_t$	0.222	0.539	−1.319	−0.005	0.200	0.426	1.970
HHI_t	0.208	0.164	0.042	0.098	0.157	0.262	0.857
$EPCM_t$	0.024	1.753	−2.470	−0.081	−0.019	0.035	2.852
$INVEST_t$	0.140	0.149	−0.005	0.048	0.098	0.179	0.764
CAP_t	0.073	0.079	−0.016	0.025	0.050	0.093	0.415
$NONCAP_t$	0.066	0.120	0.000	0.000	0.018	0.080	0.634
RND_t	0.040	0.079	0.000	0.000	0.003	0.046	0.393
ACQ_t	0.025	0.079	0.000	0.000	0.000	0.003	0.435

Panel B: Pearson (above the diagonal) and Spearman (below the diagonal) correlations

Variable	R_t	$R3_t$	E_t	$E3_t$	HHI_t	$EPCM_t$	$INVEST_t$	CAP_t	$NONCAP_t$	RND_t	ACQ_t
R_t		**−0.07**	**0.21**	**0.22**	0.00	**0.01**	**0.03**	**0.01**	**0.03**	**0.04**	0.00
$R3_t$	**−0.03**		**0.04**	**0.38**	**0.01**	0.01	**−0.06**	**−0.02**	**−0.06**	**−0.04**	**−0.05**
E_t	**0.37**	**0.16**		**0.51**	**0.08**	**0.07**	**−0.08**	**0.10**	**−0.16**	**−0.23**	0.01
$E3_t$	**0.36**	**0.52**	**0.59**		**0.07**	**0.05**	**−0.12**	**0.03**	**−0.17**	**−0.22**	**−0.02**
HHI_t	**0.03**	**0.06**	**0.17**	**0.14**		**−0.02**	**−0.15**	**−0.04**	**−0.16**	**−0.22**	**−0.01**
$EPCM_t$	**0.12**	**0.05**	**0.27**	**0.19**	**−0.02**		**−0.04**	**0.04**	**−0.07**	**−0.11**	**0.01**
$INVEST_t$	0.00	**−0.08**	**−0.06**	**−0.10**	**−0.23**	**0.11**		**0.55**	**0.81**	**0.54**	**0.58**
CAP_t	**0.03**	**0.01**	**0.17**	**0.10**	−0.01	**0.19**	**0.64**		**−0.02**	**−0.04**	0.01
$NONCAP_t$	**−0.02**	**−0.09**	**−0.17**	**−0.17**	**−0.23**	0.00	**0.62**	**−0.04**		**0.70**	**0.69**
RND_t	**−0.03**	**−0.06**	**−0.20**	**−0.18**	**−0.27**	**−0.02**	**0.45**	**−0.06**	**0.78**		0.00
ACQ_t	**0.01**	**−0.03**	**0.03**	0.01	**0.02**	**0.06**	**0.28**	0.00	**0.47**	**−0.02**	

Variable definitions: R_t is annual stock returns. $R3_t$ is future stock returns over three years. E_t is current earnings, divided by the beginning market value of equity. $E3_t$ is future earnings aggregated over three years, divided by the beginning market value of equity. HHI_t is the Herfindahl-Hirschman index of industry concentration. $EPCM_t$ is excess price-cost margin (after industry adjustment). $INVEST_t$ is long-term investment. CAP_t is capital expenditure. $NONCAP_t$ is non-capital expenditure. RND_t is R&D expenditure. ACQ_t is acquisition expenditure. All investment variables ($INVEST_t$, CAP_t, $NONCAP_t$, RND_t and ACQ_t) are deflated by beginning total assets. See the appendix for descriptions of the research variables.
In this table, observations that fall below the bottom 1 percent or above the top 1 percent of the distribution of R_t, E_{t-1}, E_t, $E3_t$, and $R3_t$ are deleted. Extreme observations with an E_{t-1} and E_t greater than 1 or less than −1 and those with an $E3_t$ greater than 3 or less than −3 are also excluded. All the continuous economic fundamental variables are transformed into fractional rank variables in the following regression analyses. In Panel B, the numbers above (below) the diagonal represent the Pearson (Spearman) correlation coefficients. The economic fundamental variables are winsorized at the 1st and 99th percentiles to estimate the parametric Pearson correlations. The correlation coefficients in bold are significant at the 1 percent level.

5. Empirical results

5.1. Descriptive statistics

Table 1 presents the sample distribution and correlation matrix of research variables. As explained in Section 4.3, extreme values for the returns and earnings variables (R_t, E_t, $E3_t$, and $R3_t$) are deleted before computing the descriptive statistics. Panel A shows that current stock returns (R_t) have a mean (median) of 19.5% (9.6%), and current earnings divided by the beginning market value of equity (E_t) have a mean (median) of 5.5% (6.4%). Current stock returns are positively skewed, whereas current earnings are slightly negatively skewed. Among the market power variables, the Herfindahl-Hirschman index (HHI_t) has a mean of 0.208 and excess price-cost margin ($EPCM_t$) has a mean of 0.024. Long-term investment ($INVEST_t$) has a mean of 0.140, which consists of capital investment (CAP_t) with a mean of 0.073 and non-capital investment ($NONCAP_t$) with a mean of 0.066.[17] Non-capital investment ($NONCAP_t$) can be split into R&D investment (RND_t) with a mean of 0.040 and acquisition investment (ACQ_t) with a mean of 0.025.

Panel B of Table 1 shows the pairwise Pearson (above the diagonal) and Spearman (below the diagonal) correlation coefficients for the primary variables.[18] The coefficients in bold are significant at the 1 percent level. Current returns are positively correlated to both current and future earnings (Pearson correlation = 0.21 and 0.22, and Spearman correlation = 0.37 and 0.36, respectively), which is consistent with the specification of the FERC model. Current earnings are also positively correlated with future earnings (Pearson correlation = 0.51 and Spearman correlation = 0.59), which indicates the persistence of earnings. Consistent with the positive relation between product market power and economic rents (Lev, 1983; Cheng, 2005), both the Herfindahl-Hirschman index

[17] A negative value of *EPCM* means that the firm's price-cost margin is less than the industry average price-cost margin. A negative value of *CAP* implies that the firm's capital expenditure is less than its cash receipts from sale of property, plant, and equipment.
[18] Each economic fundamental variable is winsorized at the 1st and 99th percentiles to estimate the parametric Pearson correlations.

and excess price-cost margin exhibit positive correlations with current stock returns, current earnings, and future earnings (Spearman correlation = 0.03, 0.17, and 0.14 for HHI_t and 0.12, 0.27, and 0.19 for $EPCM_t$, respectively).[19]

In contrast, long-term investment is negatively correlated with current earnings and future earnings (Spearman correlation = −0.06 and −0.10, respectively) and is not significantly correlated with current returns. This result is consistent with those of Hall (1993) and Jensen (1993), suggesting that net benefits from long-term investment decrease over time and long-term investment appears to lower firm value in the recent period. The two major components of long-term investment show different correlations with stock return and accounting income variables. While capital investment is positively correlated with current returns, current earnings, and future earnings (Spearman correlation = 0.03, 0.17, and 0.10, respectively), non-capital investment is negatively correlated with the three variables (Spearman correlation = −0.02, −0.17, and −0.17, respectively). The negative correlation between non-capital investment and firm performance variables is attributable to the effect of R&D investment. R&D investment has negative correlations with current returns, current earnings, and future earnings (Spearman correlation = −0.03, −0.20, and −0.18, respectively), but acquisition investment has weakly positive correlations with the three variables (Spearman correlation = 0.01, 0.03, and 0.01, respectively). No pair of the economic fundamentals, except for the components of a certain variable (e.g., the correlations between $INVEST_t$ and its components such as CAP_t and $NONCAP_t$), has a correlation coefficient greater than 0.3. The results from correlation analysis should be interpreted with caution because the pairwise correlations may suffer from a correlated omitted variable problem.

5.2. Results for the extended FERC model

Table 2 presents the regression results for the extended FERC model in Eq. (2) including the main and interaction effects of economic fundamental variables.[20] Specifically, five different regression models are estimated depending on the choice of product market power (HHI_t and $EPCM_t$) and long-term investment measures ($INVEST_t$, CAP_t, and $NONCAP_t$). All the economic determinant variables are transformed into fractional rank variables in the regression analyses. The t-statistics are adjusted for heteroskedasticity and double (firm and year) clustering (Petersen, 2009).[21]

Consistent with the findings of Collins et al. (1994) and Lundholm and Myers (2002), the coefficients on E_t and $E3_t$ are significantly positive. The coefficients on E_{t-1} and $R3_t$ are significantly negative, which is consistent with the specification of FERC model. More importantly, the results for the extended FERC model support the hypotheses presented in Section 3. As hypothesized in H1, product market power is positively associated with the price informativeness about future earnings. Both coefficients on $E3_t * HHI_t$ and $E3_t * EPCM_t$ are positive and statistically significant across all five specifications.[22] The estimated coefficients are also economically significant. If all other things are equal, the estimated FERC in column (5) increases from 1.025 in the least concentrated industry to 1.163 (= 1.025 + 0.138) in the most concentrated industry (i.e., 13.5% increase of the FERC). Similarly, the FERC increases from 1.025 in the lowest EPCM firm to 1.156 (= 1.025 + 0.131) in the highest EPCM firm (i.e., 12.8% increase of the FERC). This result supports the prediction of H1 that the informativeness of current returns about future earnings increases with product market power measured by industry concentration and excess price-cost margin. This is in line with the notion that the low uncertainty about future cash flows in firms with strong product market power accelerates the investors' incorporation of forward-looking information about future earnings into stock prices. In contrast, the coefficients on $E_t * HHI_t$ and $E_t * EPCM_t$ are statistically insignificant at the conventional level. This evidence suggests that the market's capitalization of current earnings into stock prices is not significantly related to the degree of product market power because, even before current earnings information is released, future cash flow information has been mostly impounded in current returns through the market's anticipation of future earnings.

Next, as hypothesized in H2, long-term investment is negatively associated with the price informativeness. The coefficient on $E3_t * INVEST_t$ is significantly negative in columns (1) and (2). If all other things are equal, the estimated FERC in column (1) decreases from 1.016 in the lowest investment firm to 0.859 (= 1.016 − 0.157) in the highest investment firm (i.e., 15.5% decrease of the FERC). The economic significance of the coefficient on $E3_t * INVEST_t$ in column (2) is similar (i.e., 17.9% decrease of the FERC). This result indicates that the informativeness of current returns about future earnings decreases with the intensity of long-term investment. This is consistent with the view that the high uncertainty about future cash flows arising from long-term investment deters equity investors

[19] As this study transforms economic fundamentals into rank variables in all the regression analyses, the correlation analysis of the economic fundamental variables focuses on Spearman rank correlations. The Spearman correlations between economic fundamentals and stock returns (or earnings) are generally greater than the corresponding Pearson correlations, which is consistent with a non-linear relation between economic fundamentals and firm performance.

[20] The standard FERC model in Eq. (1) is also estimated as a benchmark model. The following equation presents the parameter estimates with the corresponding t-statistics in parentheses.

$$\begin{array}{lcccccccc} R_t & = & 0.092 & - & 0.803E_{t-1} & + & 0.800E_t & + & 0.255E3_t & - & 0.073R3_t. \\ & & (11.98) & & (-29.59) & & (30.55) & & (29.97) & & (-31.84). \end{array}$$

The adjusted R^2 of the standard FERC model is 20.6%, which is higher than the explanatory power of the standard ERC model (14.9%), which regresses R_t on E_t alone. This significant improvement in explanatory power is consistent with the finding of Collins et al. (1994).

[21] Applying Fama and MacBeth (1973) procedure produces similar inferences about the significance of regression coefficients.

[22] The results are qualitatively similar when product market power is measured by the four-firm concentration ratio, defined as the sum of market shares of the four largest companies in terms of sales revenue in each industry. Market share is not used as a firm-level measure of product market power because it also reflects industry-adjusted firm size. A further analysis shows that firms with a high market share exhibit a significantly higher FERC when firm-level market share is introduced as a sole determinant of FERC, but this association becomes insignificant when firm size along with other firm characteristics in Eq. (2) is controlled for.

Table 2
Regression results for the extended FERC model (N = 68,604).

Variable	Predicted Sign	(1)		(2)		(3)		(4)		(5)	
		Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.
Intercept		0.112***	7.01	0.063***	3.78	0.033*	1.72	−0.024	−1.20	0.005	0.26
E_{t-1}	−	−4.087***	−26.53	−3.894***	−24.46	−3.752***	−20.77	−3.508***	−18.80	−3.644***	−19.42
E_t	+	2.179***	12.39	2.134***	11.77	1.909***	9.25	1.860***	8.65	1.802***	8.31
$\boldsymbol{E3_t}$	+	**1.016*** **	**21.37**	**0.974*** **	**19.99**	**1.098*** **	**20.35**	**1.064*** **	**19.16**	**1.025*** **	**18.10**
$R3_t$	−	−0.135***	−12.71	−0.117***	−10.37	−0.137***	−10.53	−0.117***	−8.59	−0.119***	−8.47
HHI_t		−0.085***	−6.06			−0.090***	−6.50			−0.088***	−6.31
$E_{t-1} * HHI_t$		0.411***	3.13			0.449***	3.48			0.441***	3.42
$E_t * HHI_t$		0.030	0.22			0.053	0.40			0.065	0.49
$\boldsymbol{E3_t * HHI_t}$	+	**0.131*** **	**3.24**			**0.135*** **	**3.36**			**0.138*** **	**3.40**
$R3_t * HHI_t$		0.005	0.42			0.005	0.37			0.005	0.36
$EPCM_t$				0.049***	4.26			0.055***	4.75	0.054***	4.66
$E_{t-1} * EPCM_t$				−0.147	−1.50			−0.160*	−1.65	−0.160*	−1.65
$E_t * EPCM_t$				0.046	0.48			0.078	0.80	0.073	0.75
$\boldsymbol{E3_t * EPCM_t}$	+			**0.142*** **	**4.58**			**0.128*** **	**4.10**	**0.131*** **	**4.22**
$R3_t * EPCM_t$				−0.034***	−3.98			−0.035***	−4.08	−0.034***	−4.04
$INVEST_t$		0.199***	17.73	0.208***	18.37						
$E_{t-1} * INVEST_t$		−0.587***	−5.96	−0.637***	−6.39						
$E_t * INVEST_t$		0.233**	2.29	0.227**	2.22						
$\boldsymbol{E3_t * INVEST_t}$	−	**−0.157*** **	**−5.74**	**−0.175*** **	**−6.24**						
$R3_t * INVEST_t$		0.001	0.07	0.001	0.10						
CAP_t						0.072***	6.19	0.072***	6.15	0.070***	5.95
$E_{t-1} * CAP_t$						−0.363***	−3.77	−0.359***	−3.72	−0.352***	−3.65
$E_t * CAP_t$						0.164	1.60	0.156	1.54	0.171*	1.68
$\boldsymbol{E3_t * CAP_t}$	−					**−0.028**	**−0.99**	**−0.044**	**−1.53**	**−0.041**	**−1.44**
$R3_t * CAP_t$						0.012	1.41	0.013	1.62	0.014*	1.67
$NONCAP_t$						0.252***	15.77	0.267***	16.58	0.251***	15.76
$E_{t-1} * NONCAP_t$						−0.730***	−4.64	−0.829***	−5.20	−0.750***	−4.78
$E_t * NONCAP_t$						0.493***	3.02	0.484***	2.92	0.486***	2.97
$\boldsymbol{E3_t * NONCAP_t}$	−					**−0.241*** **	**−5.75**	**−0.244*** **	**−5.73**	**−0.231*** **	**−5.54**
$R3_t * NONCAP_t$						−0.006	−0.56	−0.009	−0.73	−0.008	−0.71
$SIZE_t$		−0.218***	−19.42	−0.220***	−19.28	−0.218***	−19.35	−0.221***	−19.27	−0.222***	−19.48
$E_{t-1} * SIZE_t$		0.496***	5.41	0.495***	5.32	0.513***	5.59	0.510***	5.47	0.518***	5.58
$E_t * SIZE_t$		−0.670***	−7.14	−0.679***	−7.17	−0.683***	−7.23	−0.696***	−7.32	−0.685***	−7.17
$E3_t * SIZE_t$	+	0.097***	3.47	0.074***	2.59	0.094***	3.33	0.073**	2.53	0.079***	2.77
$R3_t * SIZE_t$		0.034***	3.67	0.039***	4.19	0.032***	3.44	0.037***	3.97	0.037***	3.98
BTM_t		0.154***	13.07	0.164***	13.84	0.148***	12.60	0.157***	13.35	0.158***	13.38
$E_{t-1} * BTM_t$		−0.053	−0.61	−0.053	−0.62	−0.068	−0.78	−0.069	−0.80	−0.066	−0.76
$E_t * BTM_t$		−0.643***	−6.19	−0.630***	−6.06	−0.620***	−5.95	−0.604***	−5.79	−0.603***	−5.77
$E3_t * BTM_t$	−	−0.085***	−2.92	−0.081***	−2.77	−0.084***	−2.91	−0.078***	−2.69	−0.078***	−2.69
$R3_t * BTM_t$		−0.005	−0.58	−0.005	−0.53	−0.003	−0.38	−0.003	−0.37	−0.004	−0.44
$LOSS_t$		−0.084***	−9.11	−0.075***	−7.85	−0.087***	−9.35	−0.076***	−7.99	−0.080***	−8.34
$E_{t-1} * LOSS_t$		0.148***	2.92	0.114**	2.21	0.137***	2.72	0.099*	1.92	0.119**	2.31
$E_t * LOSS_t$		−1.391***	−18.47	−1.344***	−18.08	−1.387***	−18.34	−1.335***	−17.91	−1.334***	−17.85
$E3_t * LOSS_t$	−	−0.117***	−6.41	−0.096***	−5.15	−0.118***	−6.45	−0.101***	−5.40	−0.096***	−5.17
$R3_t * LOSS_t$		0.019***	3.59	0.012**	2.16	0.020***	3.89	0.014**	2.46	0.014**	2.48
$EVOL_t$		−0.252***	−17.24	−0.250***	−17.06	−0.250***	−17.11	−0.248***	−16.94	−0.248***	−16.98
$E_{t-1} * EVOL_t$		3.955***	25.27	3.938***	25.03	3.957***	25.41	3.943***	25.26	3.925***	25.19
$E_t * EVOL_t$		−0.260	−1.36	−0.264	−1.38	−0.273	−1.43	−0.279	−1.46	−0.244	−1.28
$E3_t * EVOL_t$	−	−0.884***	−19.94	−0.874***	−19.57	−0.885***	−19.98	−0.874***	−19.61	−0.877***	−19.80
$R3_t * EVOL_t$		0.050***	4.96	0.047***	4.71	0.049***	4.93	0.047***	4.68	0.047***	4.68
YEAR		Included		Included		Included		Included		Included	
Adj. R^2		0.275		0.275		0.275		0.275		0.276	

This table provides the results of the following FERC model with control variables.

$$R_t = \alpha_0 + \alpha_1 E_{t-1} + \alpha_2 E_t + \alpha_3 E3_t + \alpha_4 R3_t + \beta_0 X_t + \beta_1 E_{t-1} * X_t + \beta_2 E_t * X_t + \beta_3 E3_t * X_t + \beta_4 R3_t * X_t + \gamma_0 Z_t + \gamma_1 E_{t-1} * Z_t + \gamma_2 E_t * Z_t + \gamma_3 E3_t * Z_t + \gamma_4 R3_t * Z_t + YEAR + \varepsilon_t,$$

where X_t is a vector of economic fundamental variables and Z_t is a vector of control variables. X_t includes the Herfindahl-Hirschman index (*HHI*), excess price-cost margin (*EPCM*), long-term investment (*INVEST*), capital expenditure (*CAP*), and non-capital expenditure (*NONCAP*). Z_t includes firm size (*SIZE*), book-to-market ratio (*BTM*), loss occurrence (*LOSS*), and earnings volatility (*EVOL*). *YEAR* is year dummy variables. See the appendix for details of the measurement of the variables. The t-statistics are adjusted for heteroskedasticity and double (firm and year) clustering. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively, in the two-tailed test.

from incorporating forward-looking information about future earnings into stock prices. In contrast, the coefficient on $E_t * INVEST_t$ is significantly positive at the 5 percent level in columns (1) and (2). This result indicates that stock investors place a greater weight on the current earnings information provided by firms with a high level of long-term investment in their equity valuation (compared to

the similar earnings information from firms with a low level) because investors value the realized current benefits from long-term investment rather than relying on its uncertain future benefits.

Columns (3) to (5) show the regression results when long-term investment is divided into its two components: capital and non-capital investment. While the coefficient on $E3_t * CAP_t$ is statistically indifferent from zero, the coefficient on $E3_t * NONCAP_t$ is significantly negative across the three specifications. Specifically, if all other things are equal, the estimated FERC in column (5) decreases from 1.025 in the lowest NONCAP firm to 0.794 (= 1.025 − 0.231) in the highest NONCAP firm (i.e., 22.5% decrease of the FERC). This result indicates that the negative association between long-term investment and the price informativeness about future earnings is attributable to the high uncertainty about future earnings arising from non-capital investment including R&D and acquisition expenditures rather than capital investment. This is consistent with the notion that investors face greater uncertainty about the future cash flows from intangible assets (e.g., R&D related assets and goodwill) than about the future cash flows from tangible assets (e.g., property, plant, and equipment).

The results for firm-specific control variables are generally consistent with those reported in prior studies. While the coefficient on $E3_t * SIZE_t$ is significantly positive, those on $E3_t * BTM_t$, $E3_t * LOSS_t$ and $E3_t * EVOL_t$ are significantly negative. Large firms have a higher FERC because they tend to provide better disclosures and have richer information environments than small firms (Ayers and Freeman, 2000; Lundholm and Myers, 2002). Firms with high growth opportunities (measured by a low book-to-market ratio) have a higher FERC because their values mainly depend on future anticipated earnings rather than current realized earnings (Lundholm and Myers, 2002; Tucker and Zarowin, 2006). Loss firms and high volatility firms have a lower FERC because it is more difficult for investors to anticipate future earnings of such companies (Lundholm and Myers, 2002; Ettredge et al., 2005; Tucker and Zarowin, 2006).[23] Therefore, the overall results reported in this section provide support for the two hypotheses that (1) the price informativeness about future earnings increases with product market power and (2) it decreases with long-term investment.

5.3. Controlling for correlated omitted variables

This subsection examines whether the main findings of this study are robust to controlling for additional variables that prior literature finds are related to the extent to which stock prices reflect information about future earnings. The first set of control variables comprises a firm's operating characteristics that influence the time lag of accounting earnings in mirroring the change of equity value, including operating cycle and order backlog. The second set of control variables reflects a firm's information environment, including analyst following and institutional ownership. The third set of control variables represents financial reporting quality, including accounting conservatism, income smoothing, and earnings quality. The measurement of the control variables is detailed in the appendix.

Table 3 presents the regression results for the extended FERC model including the control variables. For simplicity, only the coefficients on the main and interaction effects of future earnings ($E3_t$) are summarized. All the continuous control variables as well as the economic determinants are transformed into fractional rank variables. The regression results reveal that controlling for potential omitted variables does not alter the tenor of findings in Table 2. Industry concentration and excess price-cost margin are consistently positively associated with the FERC, and long-term investment and non-capital investment are negatively associated with the FERC. The results further support the hypotheses that the informativeness of stock prices about future earnings increases with product market power and decreases with long-term investment, especially non-capital investment.

The results for the control variables are consistent with the evidence provided by prior studies. Firms with a longer operating cycle and those with a larger amount of order backlog exhibit a higher FERC (Warfield and Wild, 1992; Lundholm and Myers, 2002; Rajgopal et al., 2003). While firms with greater analyst coverage do not exhibit a significantly different FERC compared to other firms, firms with higher institutional ownership show a higher FERC (Jiambalvo et al., 2002; Ayers and Freeman, 2003; Piotroski and Roulstone, 2004).[24] Interestingly, the impact of the three financial reporting quality measures (i.e., CON_t, IS_t, and EQ_t) on the FERC is not statistically significant, which contrasts to the significant effects of income smoothing and earnings quality in Tucker and Zarowin (2006) and Haw et al. (2012). One possible explanation is that product market power and long-term investment (in the value-creation process) dominate financial reporting attributes (in the value-reporting process) in shaping the informativeness of stock prices about future earnings. For instance, firms with strong market power may smooth accounting income by transferring external demand shock to consumers rather than by absorbing it, which predetermines the firms' ability to smooth income streams.

[23] Dichev and Tang (2009) show that earnings predictability is negatively associated with earnings volatility and positively associated with earnings persistence. The results in Table 2 remain intact when the extended FERC model includes not only earnings volatility (*EVOL*) but also earnings persistence (*EPER*) as an additional control variable. *EPER* is measured by the first-order autoregressive coefficient in the regression of current earnings (E_t) on one-year past earnings (E_{t-1}). The autoregressive model is estimated over the five years from year $t-4$ to year t (Lundholm and Myers, 2002; Lev, 1983). There are two possible reasons why controlling for the two earnings attributes does not subsume the significant effect of economic fundamentals on the investors' ability to anticipate future earnings (measured by the FERC). First, earnings volatility and earnings persistence estimated from a time-series of past earnings may not fully explain fundamental uncertainty about future cash flows, which underlies the price informativeness about future earnings, because ex-post earnings volatility and persistence are not the causes, but the consequences, of uncertain cash flows. Second, product market power and long-term investment, which determine the fundamental uncertainty about future cash flows, are likely to influence the investors' ex-ante expectations about future earnings beyond the effect of volatility and persistence of ex-post earnings.

[24] The regressions in Panels C and D of Table 3 use a restricted sample that excludes the observations with missing values for *AF* and *INST*, respectively (Jiambalvo et al., 2002; Ayers and Freeman, 2003). The results are robust when *AF* and *INST* are coded as zero for missing values. Specifically, the coefficients on $E3_t * HHI_t$ and $E3_t * EPCM_t$ are significantly positive and those on $E3_t * INVEST_t$ and $E3_t * NONCAP_t$ are significantly negative. Moreover, not only the coefficient on $E3_t * INST_t$ but also that on $E3_t * AF_t$ becomes significantly positive in the full-sample regressions.

Table 3
Regression results for the extended FERC model with additional control variables.

Variable	Predicted	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.
Panel A. Controlling for operating cycle (OPCYCLE)											
$E3_t$	+	0.988***	19.47	0.952***	18.57	1.058***	18.73	1.029***	17.93	0.990***	16.90
$E3_t * HHI_t$	+	0.132***	3.23			0.134***	3.28			0.136***	3.31
$E3_t * EPCM_t$	+			0.144***	4.52			0.128***	4.01	0.132***	4.14
$E3_t * INVEST_t$	−	−0.152***	−5.46	−0.171***	−5.97						
$E3_t * CAP_t$	−					−0.012	−0.40	−0.031	−1.03	−0.028	−0.93
$E3_t * NONCAP_t$	−					−0.255***	−5.93	−0.253***	−5.80	−0.241***	−5.63
$E3_t * OPCYCLE_t$	+	0.042	1.38	0.028	0.93	0.077**	2.45	0.060*	1.90	0.061*	1.91
No. of Obs.		67,562		67,562		67,562		67,562		67,562	
Adj. R^2		0.275		0.275		0.275		0.276		0.277	
Panel B. Controlling for order backlog (BACKLOG)											
$E3_t$	+	0.974***	20.02	0.928***	18.60	1.064***	19.50	1.025***	18.31	0.991***	17.31
$E3_t * HHI_t$	+	0.122***	3.00			0.122***	2.99			0.124***	3.03
$E3_t * EPCM_t$	+			0.142***	4.57			0.126***	4.04	0.129***	4.15
$E3_t * INVEST_t$	−	−0.151***	−5.53	−0.169***	−6.01						
$E3_t * CAP_t$	−					−0.016	−0.57	−0.031	−1.07	−0.029	−1.00
$E3_t * NONCAP_t$	−					−0.261***	−6.18	−0.263***	−6.15	−0.252***	−5.99
$E3_t * BACKLOG_t$	+	0.119***	4.99	0.124***	5.15	0.138***	5.64	0.143***	5.77	0.139***	5.61
No. of Obs.		68,604		68,604		68,604		68,604		68,604	
Adj. R^2		0.276		0.276		0.276		0.277		0.278	
Panel C. Controlling for analyst following (AF)											
$E3_t$	+	1.602***	18.18	1.562***	16.92	1.731***	16.92	1.715***	15.95	1.632***	14.72
$E3_t * HHI_t$	+	0.238***	3.01			0.283***	3.51	0.164***	2.89	0.294***	3.60
$E3_t * EPCM_t$	+			0.193***	3.43					0.172***	3.02
$E3_t * INVEST_t$	−	−0.361***	−6.76	−0.397***	−7.21						
$E3_t * CAP_t$	−					−0.106*	−1.89	−0.139**	−2.42	−0.125**	−2.21
$E3_t * NONCAP_t$	−					−0.469***	−6.16	−0.478***	−6.22	−0.456***	−6.07
$E3_t * AF_t$	+	−0.019	−0.27	−0.027	−0.40	−0.028	−0.41	−0.039	−0.58	−0.022	−0.32
No. of Obs.		35,336		35,336		35,336		35,336		35,336	
Adj. R^2		0.289		0.289		0.289		0.289		0.290	
Panel D. Controlling for institutional ownership (INST)											
$E3_t$	+	1.246***	15.63	1.169***	14.13	1.341***	14.89	1.278***	13.62	1.226***	12.67
$E3_t * HHI_t$	+	0.179**	2.57			0.200***	2.85			0.199***	2.83
$E3_t * EPCM_t$	+			0.222***	4.46			0.204***	4.07	0.204***	4.07
$E3_t * INVEST_t$	−	−0.298***	−6.28	−0.326***	−6.66						
$E3_t * CAP_t$	−					−0.074	−1.47	−0.099*	−1.92	−0.093*	−1.82
$E3_t * NONCAP_t$	−					−0.381***	−5.60	−0.389***	−5.65	−0.369***	−5.43
$E3_t * INST_t$	+	0.238***	4.63	0.257***	4.97	0.255***	4.96	0.276***	5.32	0.266***	5.16
No. of Obs.		34,769		34,769		34,769		34,769		34,769	
Adj. R^2		0.296		0.296		0.296		0.296		0.297	
Panel E. Controlling for accounting conservatism (CON)											
$E3_t$	+	1.005***	20.52	0.962***	19.33	1.087***	19.72	1.052***	18.69	1.012***	17.54
$E3_t * HHI_t$	+	0.131***	3.29			0.136***	3.42			0.138***	3.47
$E3_t * EPCM_t$	+			0.143***	4.58			0.128***	4.09	0.131***	4.21
$E3_t * INVEST_t$	−	−0.157***	−5.61	−0.175***	−6.13						
$E3_t * CAP_t$	−					−0.027	−0.97	−0.043	−1.51	−0.040	−1.42
$E3_t * NONCAP_t$	−					−0.242***	−5.68	−0.245***	−5.69	−0.233***	−5.48
$E3_t * CON_t$	+	0.022	0.96	0.023	1.00	0.023	0.98	0.023	0.98	0.024	1.04
No. of Obs.		68,604		68,604		68,604		68,604		68,604	
Adj. R^2		0.275		0.275		0.275		0.275		0.276	
Panel F. Controlling for income smoothing (IS)											
$E3_t$	+	1.160***	17.22	1.152***	16.82	1.215***	16.30	1.217***	16.05	1.180***	15.17
$E3_t * HHI_t$	+	0.127**	2.41			0.141***	2.64			0.142***	2.66
$E3_t * EPCM_t$	+			0.078*	1.77			0.067	1.50	0.070*	1.67
$E3_t * INVEST_t$	−	−0.145***	−3.75	−0.164***	−4.12						
$E3_t * CAP_t$	−					−0.036	−0.91	−0.053	−1.31	−0.046	−1.15
$E3_t * NONCAP_t$	−					−0.194***	−3.34	−0.201***	−3.41	−0.190***	−3.29
$E3_t * IS_t$	+	−0.023	−0.70	−0.018	−0.55	−0.022	−0.65	−0.015	−0.43	−0.022	−0.67
No. of Obs.		43,406		43,406		43,406		43,406		43,406	
Adj. R^2		0.282		0.281		0.282		0.281		0.282	
Panel G. Controlling for earnings quality (EQ)											
$E3_t$	+	1.151***	16.70	1.143***	16.10	1.192***	15.49	1.195***	15.22	1.158***	14.36
$E3_t * HHI_t$	+	0.121**	2.27			0.137**	2.53			0.138**	2.54
$E3_t * EPCM_t$	+			0.074*	1.69			0.063	1.59	0.066*	1.65
$E3_t * INVEST_t$	−	−0.132***	−3.33	−0.149***	−3.63						

(*continued on next page*)

Table 3 (*continued*)

Variable	Predicted	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.
$E3_t * CAP_t$	−					−0.019	−0.48	−0.033	−0.83	−0.028	−0.69
$E3_t * NONCAP_t$	−					−0.185***	−3.09	−0.192***	−3.15	−0.182***	−3.05
$E3_t * EQ_t$	+	−0.042	−1.21	−0.038	−1.06	−0.030	−0.84	−0.026	−0.73	−0.029	−0.81
No. of Obs.		42,940		42,940		42,940		42,940		42,940	
Adj. R^2		0.281		0.280		0.281		0.280		0.281	

This table provides the results of the following FERC model with additional control variables. Only the coefficients on the main and interaction effects of future earnings ($E3_t$) are reported for simplicity.

$$R_t = \alpha_0 + \alpha_1 E_{t-1} + \alpha_2 E_t + \alpha_3 E3_t + \alpha_4 R3_t + \beta_0 X_t + \beta_1 E_{t-1} * X_t + \beta_2 E_t * X_t + \beta_3 E3_t * X_t + \beta_4 R3_t * X_t + \gamma_0 Z_t + \gamma_1 E_{t-1} * Z_t + \gamma_2 E_t * Z_t + \gamma_3 E3_t * Z_t + \gamma_4 R3_t * Z_t + YEAR + \varepsilon_t,$$

where X_t is a vector of economic fundamental variables and Z_t is a vector of control variables. X_t includes the Herfindahl-Hirschman index (*HHI*), excess price-cost margin (*EPCM*), long-term investment (*INVEST*), capital expenditure (*CAP*), and non-capital expenditure (*NONCAP*). Z_t includes firm size (*SIZE*), book-to-market ratio (*BTM*), loss occurrence (*LOSS*), earnings volatility (*EVOL*), and each of additional control variables. *YEAR* is year dummy variables. See the appendix for details of the measurement of the variables. The t-statistics are adjusted for heteroskedasticity and double (firm and year) clustering. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively, in the two-tailed test.

5.4. Alternative measures of long-term investment

This subsection investigates the relation between long-term investment and price informativeness further using alternative investment measures. The first set of additional investment proxies is R&D investment (RND_t) and acquisition investment (ACQ_t) that constitute non-capital investment ($NONCAP_t$). The second set of investment proxies is industry-adjusted investments including industry-adjusted capital investment (ADJ_CAP_t) and non-capital investment (ADJ_NONCAP_t). The third set splits industry-adjusted non-capital investment (ADJ_NONCAP_t) into industry-adjusted R&D and acquisition investments (ADJ_RND_t and ADJ_ACQ_t, respectively). The industry adjustment subtracts from each investment variable its industry mean in each year. The fourth set adopts an alternative proxy for capital investment ($CAPEX_t$), defined as capital expenditure deflated by beginning property, plant, and equipment (Biddle et al. 2009).

Table 4 presents the regression results for the extended FERC model including the alternative investment proxies. All the investment variables are transformed into fractional rank variables like other economic fundamental variables. In Panel A, the coefficients on $E3_t * HHI_t$ and $E3_t * EPCM_t$ are significantly positive and the coefficient on $E3_t * CAP_t$ is statistically indifferent from zero, which are consistent with the results in Tables 2 and 3. Interestingly, the two components of non-capital investment (RND_t and ACQ_t) have the opposite effect on the price informativeness about future earnings. The coefficient on $E3_t * RND_t$ is significantly negative whereas the coefficient on $E3_t * ACQ_t$ is significantly positive.[25] As reported in Table 1, RND_t takes a greater proportion of non-capital investment than ACQ_t. In addition, the absolute magnitude of $E3_t * RND_t$ coefficient is consistently greater than that of $E3_t * ACQ_t$. This result indicates that the negative association between non-capital investment and the FERC in Tables 2 and 3 is driven by R&D investment rather than acquisition investment. This is also consistent with the view that investors face greater uncertainty over the future benefits from R&D expenditure than those from acquisition expenditure, which deters investors from trading on forward-looking information about future benefits of R&D investment.

In Panels B and C, the results are generally robust to employing industry-adjusted investment variables. The coefficients on $E3_t * HHI_t$ and $E3_t * EPCM_t$ are consistently positive and significant. While the coefficient on $E3_t * ADJ\_CAP_t$ is statistically insignificant, the coefficients on $E3_t * ADJ\_NONCAP_t$ and $E3_t * ADJ\_RND_t$ are significantly negative. The coefficient on $E3_t * ADJ\_ACQ_t$ turns insignificant after industry adjustment on acquisition expenditure. In Panel D, the results remain similar when capital investment is measured by *CAPEX*. While the coefficient on $E3_t * CAPEX_t$ is not significant, the coefficient on $E3_t * NONCAP_t$ is consistently negative and highly significant. The overall results in Table 4 suggest that the negative relation between long-term investment and price informativeness is attributable to R&D investment that involves high uncertainty over future benefits and that the findings in previous tables are robust to alternative measures of investment components.

6. Further analyses

As shown in Tables 2–4, the results from the pooled cross-sectional regressions are robust to controlling for a variety of potential determinants of FERC. However, it is still difficult to rule out the possibility that some omitted variables might jointly explain firm-level economic fundamentals and price informativeness. To address this concern, this section explores how the price informativeness about future earnings changes following industry-level deregulations and large changes in long-term investment.

6.1. Industry-level deregulation and price informativeness

Numerous prior studies have exploited industry deregulation as an exogenous event that reduces firm-level market power (e.g.,

[25] There are two possible reasons for the significantly positive coefficient on $E3_t * ACQ_t$. First, some acquisitions may enable acquirers to strengthen their product market power by reducing the number of competitors in an industry, which would increase the FERC. Second, acquisition investment (ACQ_t) may be a noisy measure of non-capital investment because it includes not only the investment in intangible assets (e.g., identifiable intangibles and goodwill) but also the investment in tangible assets (e.g., property, plant, and equipment) of a target firm. This measurement error works against finding a negative coefficient on $E3_t * ACQ_t$.

Table 4
Regression results for the extended FERC model with alternative investment measures (N = 68,604).

Panel A. Separating NONCAP into RND and ACQ							
Variable	Predicted Sign	(1)		(2)		(3)	
		Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.
$E3_t$	+	0.924***	16.17	0.883***	15.08	0.852***	14.26
$E3_t$ * HHI_t	+	0.130***	3.27			0.133***	3.33
$E3_t$ * $EPCM_t$	+			0.126***	4.05	0.129***	4.17
$E3_t$ * CAP_t	−	−0.025	−0.89	−0.040	−1.41	−0.037	−1.32
$E3_t$ * RND_t	−	−0.114***	−4.57	−0.117***	−4.67	−0.108***	−4.36
$E3_t$ * ACQ_t	−	0.075**	2.12	0.082**	2.29	0.079**	2.21
Adj. R^2		0.276		0.276		0.277	
Panel B. Using industry-adjusted investment variables: ADJ_CAP and ADJ_NONCAP							
Variable	Predicted Sign	(4)		(5)		(6)	
		Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.
$E3_t$	+	0.956***	19.23	0.913***	17.64	0.886***	16.95
$E3_t$ * HHI_t	+	0.199***	4.67			0.205***	4.78
$E3_t$ * $EPCM_t$	+			0.133***	4.20	0.140***	4.45
$E3_t$ * ADJ_CAP_t	−	0.000	0.02	−0.006	−0.20	−0.018	−0.66
$E3_t$ * ADJ_NONCAP_t	−	−0.098***	−3.55	−0.083***	−2.98	−0.095***	−3.43
Adj. R^2		0.270		0.269		0.272	
Panel C. Using industry-adjusted investment variables: ADJ_CAP, ADJ_RND, and ADJ_ACQ							
Variable	Predicted Sign	(7)		(8)		(9)	
		Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.
$E3_t$	+	0.873***	16.33	0.830***	14.99	0.805***	14.40
$E3_t$ * HHI_t	+	0.179***	4.25			0.185***	4.36
$E3_t$ * $EPCM_t$	+			0.130***	4.10	0.136	4.33
$E3_t$ * ADJ_CAP_t	−	−0.008	−0.30	−0.013	−0.51	−0.026	−0.95
$E3_t$ * ADJ_RND_t	−	−0.095**	−2.28	−0.092**	−2.15	−0.090**	−2.02
$E3_t$ * ADJ_ACQ_t	−	0.027	1.39	0.022	1.12	0.021	1.07
Adj. R^2		0.272		0.271		0.273	
Panel D. Using an alternative measure of capital expenditure in Biddle et al. (2009)*: CAPEX*							
Variable	Predicted Sign	(10)		(11)		(12)	
		Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.
$E3_t$	+	1.085***	20.64	1.045***	19.15	1.007***	18.03
$E3_t$ * HHI_t	+	0.136***	3.39			0.139***	3.45
$E3_t$ * $EPCM_t$	+			0.124***	4.00	0.127***	4.13
$E3_t$ * $CAPEX_t$	−	−0.005	−0.17	−0.009	−0.32	−0.007	−0.27
$E3_t$ * $NONCAP_t$	−	−0.234***	−5.53	−0.236***	−5.49	−0.224***	−5.30
Adj. R^2		0.274		0.275		0.276	

This table provides the results of the following FERC model with control variables. Only the coefficients on the main and interaction effects of future earnings ($E3_t$) are reported for simplicity.

$$R_t = \alpha_0 + \alpha_1 E_{t-1} + \alpha_2 E_t + \alpha_3 E3_t + \alpha_4 R3_t + \beta_0 X_t + \beta_1 E_{t-1} * X_t + \beta_2 E_t * X_t + \beta_3 E3_t * X_t + \beta_4 R3_t * X_t + \gamma_0 Z_t + \gamma_1 E_{t-1} * Z_t + \gamma_2 E_t * Z_t + \gamma_3 E3_t * Z_t + \gamma_4 R3_t * Z_t + YEAR + \varepsilon_t,$$

where X_t is a vector of economic fundamental variables and Z_t is a vector of control variables. X_t includes the Herfindahl-Hirschman index (*HHI*), excess price-cost margin (*EPCM*), capital expenditure (*CAP* or *CAPEX*), non-capital expenditure (*NONCAP*), R&D expenditure (*RND*), acquisition expenditure (*ACQ*), and industry-adjusted investment variables (*ADJ_CAP*, *ADJ_NONCAP*, *ADJ_RND*, and *ADJ_ACQ*). Z_t includes firm size (*SIZE*), book-to-market ratio (*BTM*), loss occurrence (*LOSS*), and earnings volatility (*EVOL*). *YEAR* is year dummy variables. See the appendix for details of the measurement of the variables. The t-statistics are adjusted for heteroskedasticity and double (firm and year) clustering. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively, in the two-tailed test.

Gaspar and Massa, 2006; Irvine and Pontiff, 2009; Peress, 2010; Datta et al., 2011). Industry deregulation encourages new competitors to enter a product market and weakens the incumbents' power in the market. Therefore, firms in deregulated industries are expected to show a significant decline in the informativeness of current returns about future earnings.

Among the deregulated industries in Irvine and Pontiff (2009), the following analysis focuses on utilities industry deregulated in 1992 (SIC 4990-4999) and banking industry deregulated in 1994 (SIC 6000-6036).[26] The two industries are selected because other

[26] Although Irvine and Pontiff (2009) do not present *HHI* and *PCM* of their sample, they show in Table 10 that the idiosyncratic return volatility of banks and utilities increases significantly after deregulation. Therefore, the two industries experience a sharp increase in firm-specific risk following the decrease in product market power.

industries that experienced industry-wide deregulation have a much smaller number of observations. In addition, this time-series analysis provides out-of-sample evidence because utilities and banking industries are not included in the main sample used for the pooled cross-sectional analysis in Section 5.

This deregulation test employs a matched sample difference-in-differences methodology, which is less sensitive to omitted variable problems than are cross-sectional tests (e.g., Bertrand and Mullainathan, 2003; Cohen et al., 2013; Dhaliwal et al., 2014). The deregulation sample from utilities and banking industries is constructed for five years before and after the deregulation event (year $t-5$ to $t-1$ and year $t+1$ to $t+5$ where year t is the deregulation year). The control sample is selected from non-regulated industries over the ten-year period around the corresponding deregulation year. Each control firm is matched with a deregulation firm in the same size decile (measured by $SIZE_t$) having the closest profitability ratio (measured by E_t) in the same year.[27]

Table 5 reports the results for the difference-in-differences analyses.[28] Columns (1) and (2) present the regressions for utilities and banking industries, respectively. The coefficient on $E3_t * POST_t$ is significantly negative in both deregulated industries. This result indicates that the price informativeness about future earnings decreases following industry-level deregulations, which is in line with the positive association between product market power and price informativeness in the pooled cross-sectional regressions of Tables 2–4. Columns (3) and (4) report the regressions for the deregulation sample (including both utilities and banking industries) and its control sample, respectively. While the coefficient on $E3_t * POST_t$ in the deregulation sample is significantly negative, its counterpart in the control sample is statistically indifferent from zero. The difference between the two coefficients is statistically significant at the 5 percent level (t-stat. = −2.11). This evidence suggests that the deregulation sample experiences a significant decrease in FERC in the post-deregulation period even after controlling for the concurrent change in FERC for the control sample in non-regulated industries. This is consistent with the view that firms show a significant decrease in price informativeness because industry-level deregulation weakens incumbents' market power. The evidence from the deregulation test lends further support to H1 that firms with strong market power have more informative stock prices about future earnings.

6.2. The change in long-term investment and price informativeness

This subsection further examines whether the change in long-term investment influences the association between current returns and future earnings. This analysis focuses on a large change in investment activities because a small amount of change might reflect the maintenance expense or regular replacement (Masulis et al., 2009). Six indicator variables, INC_INVEST_t, DEC_INVEST_t, INC_CAP_t, DEC_CAP_t, INC_NONCAP_t, and DEC_NONCAP_t, are constructed for at least 5 percentage point change (either increase or decrease) in $INVEST_t$, CAP_t, and $NONCAP_t$, respectively. The measurement of the indicator variables is described in the appendix.[29]

Table 6 presents the regression results for the relation between the change in long-term investment and price informativeness. In column (1), the FERC decreases significantly as long-term investment increases by at least 5 percentage point, but it does not change significantly for the same amount of decrease in long-term investment. This indicates that stock prices reflect less forward-looking information about future earnings when the uncertainty about future cash flows rises with a large increase in long-term investment. In column (2), the FERC decreases significantly as non-capital investment increases by at least 5 percentage point, but it does not change significantly for the same amount of decrease in non-capital investment. The FERC is not significantly (or marginally significantly) associated with the increase or decrease in capital investment. The overall results are consistent with the findings from the pooled cross-sectional analysis in Section 5, suggesting that the price informativeness about future earnings decreases with the intensive investment in intangible assets.

7. Conclusion

This study identifies firm fundamentals that determine the uncertainty about future cash flows and thus explains the cross-sectional and time-series variations in the extent to which future earnings information is capitalized into stock prices. Product market power and long-term investment in the value-creation process are hypothesized to explain the price informativeness about future earnings (measured by the FERC). Cross-sectional analyses show that firms with strong product market power have more informative stock prices about future earnings and that firms investing heavily in long-term assets, especially R&D-related intangibles, have less informative stock prices about future earnings. Further analyses reveal that firms that experience industry-level deregulation show a significant decrease in price informativeness and firms that substantially increase long-term investment exhibit a significant decline in price informativeness. The results are robust to employing alternative measures of product market power and long-term investment and controlling for various omitted variables that prior studies document as potential explanatory variables of the price informativeness about future earnings.

Overall, this study provides a comprehensive analysis of the relation between current returns and future earnings, and gives several important insights into the stock market's incorporation of earnings information. First, the empirical results suggest that

[27] As an alternative method, the propensity score matching is not feasible because it is difficult to predict when and which industry will be deregulated.

[28] The regressions reported in Table 5 do not include the main and interaction effects of long-term investment because the components of long-term investment (i.e., capital expenditure, R&D expenditure, and acquisition expenditure) are unavailable on Compustat for utilities, banks, or both.

[29] The results are qualitatively similar when the six indicator variables are defined by alternative cut-off points: 3 or 10 percentage point change.

Table 5
The impact of industry-level deregulation on the price informativeness about future earnings.

Variable	Predicted Sign	(1) Utilities		(2) Banks		(3) Deregulation sample		(4) Control sample	
		Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.
Intercept		1.324*	1.71	−2.092***	−3.13	−0.759	−1.37	0.596	0.94
E_{t-1}	−	−21.304***	−4.50	−0.970	−0.78	−5.782**	−2.51	−10.637***	−2.91
E_t	+	29.698***	4.54	7.024**	1.99	19.365***	4.03	19.058***	4.50
$E3_t$	+	0.769	0.64	0.816	1.20	1.349	1.54	2.207*	1.85
$R3_t$	−	0.167	0.31	0.762**	2.20	0.540	1.39	−0.190	−0.54
$POST_t$		0.237***	4.68	−0.194***	−3.21	−0.008	−0.24	0.004	0.07
$E_{t-1} * POST_t$		−0.333	−0.95	0.374*	1.74	−0.217	−1.03	−0.561**	−2.11
$E_t * POST_t$		0.184	0.43	0.272	1.38	0.455*	1.86	0.675**	2.19
$\mathbf{E3_t * POST_t}$	−	**−0.170***	**−1.87**	**−0.229*****	**−3.05**	**−0.205*****	**−3.04**	**−0.012**	**−0.20**
$R3_t * POST_t$		0.071**	2.08	0.097**	2.28	0.100***	3.43	0.003	0.13
$SIZE_t$		−0.108*	−1.66	0.081*	1.95	−0.064	−1.53	−0.083	−1.63
$E_{t-1} * SIZE_t$		0.800	1.49	−0.188	−0.76	0.017	0.06	0.343	0.87
$E_t * SIZE_t$		0.417	0.68	−0.435	−1.41	0.061	0.17	−0.321	−0.75
$E3_t * SIZE_t$	+	−0.182	−1.19	0.212**	2.32	0.095	1.15	0.211	1.56
$R3_t * SIZE_t$		0.116**	2.35	0.090***	2.63	0.097***	3.61	0.007	0.19
BTM_t		0.068	1.61	0.238***	4.20	0.089**	2.11	−0.005	−0.08
$E_{t-1} * BTM_t$		0.531	1.33	−0.085	−0.21	0.071	0.22	0.279	0.72
$E_t * BTM_t$		−1.436**	−2.37	−1.328**	−2.25	−1.147**	−2.54	−1.259***	−2.77
$E3_t * BTM_t$	−	0.131	0.86	−0.412***	−3.18	−0.028	−0.19	−0.110	−0.82
$R3_t * BTM_t$		0.005	0.13	0.061	1.52	0.016	0.48	−0.002	−0.04
$LOSS_t$		−1.207	−1.31	2.048***	2.76	0.683	1.20	−0.346	−0.54
$E_{t-1} * LOSS_t$		19.197***	3.74	−2.434*	−1.76	2.583	1.03	4.600	1.15
$E_t * LOSS_t$		−30.946***	−4.14	−5.176	−1.35	−18.862***	−3.53	−17.054***	−3.61
$E3_t * LOSS_t$	−	−1.636	−1.28	−2.032***	−2.64	−2.555***	−2.69	−0.733	−0.55
$R3_t * LOSS_t$		−0.417	−0.72	−1.013***	−2.59	−0.828*	−1.96	0.036	0.09
$EVOL_t$		−0.284**	−2.14	−0.155***	−3.38	−0.137**	−2.43	−0.045	−0.76
$E_{t-1} * EVOL_t$		2.117**	2.16	3.301***	5.82	3.152***	5.64	5.969***	7.74
$E_t * EVOL_t$		1.716	1.43	0.016	0.02	0.382	0.54	−1.146	−1.40
$E3_t * EVOL_t$	−	−0.632*	−1.74	−0.322***	−2.60	−0.706***	−4.55	−1.450***	−7.64
$R3_t * EVOL_t$		0.114**	2.24	−0.070**	−2.06	0.044	1.31	0.084**	2.35
YEAR		Included		Included		Included		Included	
No. of Obs.		1898		2434		4332		4332	
Adj. R^2		0.370		0.697		0.569		0.243	

This table provides the results of the following FERC model.

$$R_t = \alpha_0 + \alpha_1 E_{t-1} + \alpha_2 E_t + \alpha_3 E3_t + \alpha_4 R3_t + \beta_0 POST_t + \beta_1 E_{t-1} * POST_t + \beta_2 E_t * POST_t + \beta_3 E3_t * POST_t + \beta_4 R3_t * POST_t + \gamma_0 Z_t + \gamma_1 E_{t-1} * Z_t + \gamma_2 E_t * Z_t + \gamma_3 E3_t * Z_t + \gamma_4 R3_t * Z_t + YEAR + \varepsilon_t,$$

where $POST_t$ is a post-deregulation dummy and Z_t is a vector of control variables including firm size (*SIZE*), book-to-market ratio (*BTM*), loss occurrence (*LOSS*), and earnings volatility (*EVOL*). *YEAR* is year dummy variables. Columns (1) and (2) present the regressions for utilities and banking industries, respectively. Columns (3) and (4) report the regressions for the deregulation sample (including both utilities and banking industries) and its control sample, respectively. The deregulation sample is constructed for five years before and after the deregulation event (year t-5 to $_{t-1}$ and year t + 1 to t + 5 where year t is the deregulation year). Each control firm is matched with a deregulation firm in the same size decile (measured by $SIZE_t$) having the closest profitability ratio (measured by E_t) in the same year. See the appendix for details of the measurement of the variables. The t-statistics are adjusted for heteroskedasticity and double (firm and year) clustering. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively, in the two-tailed test.

product market power and long-term investment are significantly associated with the price informativeness about future earnings even after controlling for financial reporting attributes and information environments, which have been the focus of prior research. This evidence is consistent with the view that firm fundamentals shaping the value-creating process determine the extent to which investors anticipate future earnings, beyond the effect of forward-looking information provided by management and information intermediaries. Second, the results indicate that the trade-off between timeliness and uncertainty of forward-looking information explains how investors use earnings information in different horizons. The significant uncertainty over future benefits from long-term investment diminishes the market's weight on *ex-ante* information about future anticipated earnings and enhances its weight on *ex-post* information from current realized earnings.

This study has several limitations. First, it does not completely exclude the possibility that stock prices may not fully incorporate all publicly available information about future earnings. Although the empirical results are robust to controlling for the impact of information environments and market frictions, potential equity mispricing may have affected the findings of this study. Second, measurement errors of firm fundamental variables may influence the findings, and the weak significance of several sensitivity tests may be related to the noise in the proxies.

Table 6
The impact of the change in long-term investment on the price informativeness about future earnings (N = 67,135).

Variable	Predicted Sign	(1) Change in *INVEST*		(2) Change in *CAP* and *NONCAP*	
		Coef.	t-stat.	Coef.	t-stat.
Intercept		0.164***	11.07	0.164***	11.10
E_{t-1}	−	−4.041***	−25.41	−4.046***	−25.39
E_t	+	1.698***	9.52	1.686***	9.44
$E3_t$	+	0.890***	19.24	0.890***	19.28
$R3_t$	−	−0.111***	−10.69	−0.112***	−10.85
HHI_t		−0.103***	−7.50	−0.099***	−7.20
$E_{t-1} * HHI_t$		0.674***	4.82	0.661***	4.71
$E_t * HHI_t$		−0.052	−0.38	−0.042	−0.31
$E3_t * HHI_t$	+	0.160***	3.77	0.148***	3.51
$R3_t * HHI_t$		−0.002	−0.16	−0.002	−0.12
$EPCM_t$		0.043***	3.99	0.044***	4.06
$E_{t-1} * EPCM_t$		−0.105	−1.10	−0.103	−1.08
$E_t * EPCM_t$		−0.004	−0.04	−0.007	−0.08
$E3_t * EPCM_t$	+	0.118***	3.86	0.111***	3.66
$R3_t * EPCM_t$		−0.026***	−3.17	−0.026***	−3.23
INC_INVEST_t		0.016**	1.99		
$E_{t-1} * INC\_INVEST_t$		0.117	1.43		
$E_t * INC\_INVEST_t$		−0.025	−0.34		
$\mathbf{E3_t * INC\_INVEST_t}$	−	**−0.059****	**−2.80**		
$R3_t * INC\_INVEST_t$		0.008	1.19		
DEC_INVEST_t		−0.025***	−3.72		
$E_{t-1} * DEC\_INVEST_t$		0.031	0.47		
$E_t * DEC\_INVEST_t$		0.064	1.02		
$\mathbf{E3_t * DEC\_INVEST_t}$	+/−	**−0.018**	**−0.87**		
$R3_t * DEC\_INVEST_t$		0.005	1.08		
INC_CAP_t				0.003	0.25
$E_{t-1} * INC\_CAP_t$				0.234***	2.57
$E_t * INC\_CAP_t$				0.004	0.05
$\mathbf{E3_t * INC\_CAP_t}$	−			**−0.041***	**−1.66**
$R3_t * INC\_CAP_t$				0.006	0.77
DEC_CAP_t				−0.035***	−4.44
$E_{t-1} * DEC\_CAP_t$				0.059	0.77
$E_t * DEC\_CAP_t$				0.197**	2.42
$\mathbf{E3_t * DEC\_CAP_t}$	+/−			**0.007**	**0.32**
$R3_t * DEC\_CAP_t$				0.017***	3.09
INC_NONCAP_t				0.024**	2.42
$E_{t-1} * INC\_NONCAP_t$				0.177*	1.80
$E_t * INC\_NONCAP_t$				0.015	0.14
$\mathbf{E3_t * INC\_NONCAP_t}$	−			**−0.128****	**−4.53**
$R3_t * INC\_NONCAP_t$				0.006	0.82
DEC_NONCAP_t				−0.017*	−1.89
$E_{t-1} * DEC\_NONCAP_t$				−0.050	−0.45
$E_t * DEC\_NONCAP_t$				0.022	0.22
$\mathbf{E3_t * DEC\_NONCAP_t}$	+/−			**−0.055**	**−1.56**
$R3_t * DEC\_NONCAP_t$				−0.005	−0.73
$SIZE_t$		−0.221***	−20.11	−0.221***	−20.08
$E_{t-1} * SIZE_t$		0.450***	4.90	0.468***	5.08
$E_t * SIZE_t$		−0.581***	−6.16	−0.580***	−6.17
$E3_t * SIZE_t$	+	0.051*	1.73	0.056*	1.90
$R3_t * SIZE_t$		0.048***	5.28	0.049***	5.39
BTM_t		0.178***	15.67	0.174***	15.00
$E_{t-1} * BTM_t$		−0.615***	−5.39	−0.665***	−5.93
$E_t * BTM_t$		0.269***	2.73	0.264***	2.60
$E3_t * BTM_t$	−	−0.013	−0.45	0.014	0.46
$R3_t * BTM_t$		−0.031***	−3.59	−0.031***	−3.53
$LOSS_t$		−0.069***	−7.20	−0.069***	−7.25
$E_{t-1} * LOSS_t$		0.094*	1.69	0.084	1.54
$E_t * LOSS_t$		−1.362***	−17.10	−1.366***	−16.85
$E3_t * LOSS_t$	−	−0.084***	−4.45	−0.074***	−3.94
$R3_t * LOSS_t$		0.005	1.02	0.005	0.95
$EVOL_t$		−0.203***	−14.12	−0.203***	−14.13
$E_{t-1} * EVOL_t$		3.802***	23.75	3.814***	23.81
$E_t * EVOL_t$		−0.329*	−1.72	−0.338*	−1.77
$E3_t * EVOL_t$	−	−0.930***	−20.65	−0.934***	−20.78
$R3_t * EVOL_t$		0.053***	5.42	0.053***	5.43

(*continued on next page*)

Table 6 (*continued*)

Variable	Predicted Sign	(1) Change in *INVEST*		(2) Change in *CAP* and *NONCAP*	
		Coef.	t-stat.	Coef.	t-stat.
YEAR		Included		Included	
Adj. R^2		0.270		0.267	

This table provides the results of the following FERC model.

$$R_t = \alpha_0 + \alpha_1 E_{t-1} + \alpha_2 E_t + \alpha_3 E3_t + \alpha_4 R3_t + \beta_0 X_t + \beta_1 E_{t-1} * X_t + \beta_2 E_t * X_t + \beta_3 E3_t * X_t + \beta_4 R3_t * X_t + \gamma_0 Z_t + \gamma_1 E_{t-1} * Z_t + \gamma_2 E_t * Z_t + \gamma_3 E3_t * Z_t + \gamma_4 R3_t * Z_t + YEAR + \varepsilon_t,$$

where X_t is a vector of economic fundamental variables including the change in long-term investment and Z_t is a vector of control variables. X_t includes indicator variables for a large increase in long-term investment (*INC_INVEST*), a large decrease in long-term investment (*DEC_INVEST*), a large increase in capital expenditure (*INC_CAP*), a large decrease in capital expenditure (*DEC_CAP*), a large increase in non-capital expenditure (*INC_NONCAP*), and a large decrease in non-capital expenditure (*DEC_NONCAP*) along with the Herfindahl-Hirschman index (*HHI*) and excess price-cost margin (*EPCM*). Z_t includes firm size (*SIZE*), book-to-market ratio (*BTM*), loss occurrence (*LOSS*), and earnings volatility (*EVOL*). *YEAR* is year dummy variables. See the appendix for details of the measurement of the variables. The t-statistics are adjusted for heteroskedasticity and double (firm and year) clustering. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively, in the two-tailed test.

Appendix A. Measurement of the variables

Stock Return and Accounting Income Variables

R_t = the buy-and-hold return for year *t*, measured over a 12-month period that starts three months after the beginning of year *t*;
$R3_t$ = the buy-and-hold return for the three-year period following year *t*, starting three months after the end of year *t*;
E_t = the income before extraordinary items available to common shareholders in year *t* divided by the market value of equity (common share price multiplied by common shares outstanding from the CRSP database) three months after the beginning of year *t*; and
$E3_t$ = the sum of the income before extraordinary items available to common shareholders for the three years following year *t* divided by the market value of equity three months after the beginning of year *t*.

Economic Fundamental Variables

HHI_t = Herfindahl-Hirschman index, which is measured by the sum of the squared market shares of firms competing in each industry. Industry membership is classified by the three-digit SIC code;
$EPCM_t$ = excess price-cost margin, which is defined as a firm's price-cost margin minus its industry average price-cost margin. A firm's price-cost margin is measured by net sales divided by operating costs. Operating costs include cost of goods sold and selling, general, and administrative expense (Karuna, 2007; Gaspar and Massa, 2006);
$INVEST_t$ = long-term investment, which is measured by capital expenditure minus cash receipts from sale of property, plant, and equipment plus R&D expenditure plus acquisition expenditure in year *t*, divided by total assets at the beginning of year *t* (Biddle et al., 2009; Richardson, 2006);
CAP_t = capital investment, which is measured by capital expenditure minus cash receipts from sale of property, plant, and equipment in year *t*, divided by total assets at the beginning of year *t* (Biddle et al., 2009);
$CAPEX_t$ = an alternative measure of capital investment, which is measured by capital expenditure in year *t* divided by property, plant, and equipment at the beginning of year *t* (Biddle et al., 2009, page 125);
$NONCAP_t$ = non-capital investment, which is measured by R&D expenditure plus acquisition expenditure in year *t*, divided by total assets at the beginning of year *t* (Biddle et al., 2009);
RND_t = R&D investment, which is measured by R&D expenditure in year *t*, divided by total assets at the beginning of year *t* (Biddle et al., 2009). This variable is set to zero if the R&D expenditure information is unavailable or coded as insignificant on Compustat;
ACQ_t = acquisition investment, which is measured by cash expenditure for the acquisition of other firms in year *t*, divided by total assets at the beginning of year *t* (Biddle et al., 2009). This variable is set to zero if the acquisition expenditure information is unavailable or coded as insignificant on Compustat;
$POST_t$ = post-deregulation indicator, which is equal to one if the year *t* belongs to the post-deregulation period, and zero otherwise;
INC_INVEST_t = indicator variable for a large increase in long-term investment, which is equal to one if the annual change in long-term investment ($INVEST_t - INVEST_{t-1}$) is greater than 0.05, and zero otherwise;
DEC_INVEST_t = indicator variable for a large decrease in long-term investment, which is equal to one if the annual change in long-term investment ($INVEST_t - INVEST_{t-1}$) is less than −0.05, and zero otherwise;
INC_CAP_t = indicator variable for a large increase in capital expenditure, which is equal to one if the annual change in capital expenditure ($CAP_t - CAP_{t-1}$) is greater than 0.05, and zero otherwise;

DEC_CAP_t = indicator variable for a large decrease in capital expenditure, which is equal to one if the annual change in capital expenditure ($CAP_t - CAP_{t-1}$) is less than −0.05, and zero otherwise;
INC_NONCAP_t = indicator variable for a large increase in non-capital expenditure, which is equal to one if the annual change in non-capital expenditure ($NONCAP_t - NONCAP_{t-1}$) is greater than 0.05, and zero otherwise; and
DEC_NONCAP_t = indicator variable for a large decrease in non-capital expenditure, which is equal to one if the annual change in non-capital expenditure ($NONCAP_t - NONCAP_{t-1}$) is less than −0.05, and zero otherwise.

Firm-level Control Variables

$SIZE_t$ = firm size, which is measured by the natural log of the market value of equity at the beginning of year t (Lundholm and Myers, 2002);
BTM_t = book-to-market ratio as an inverse measure of growth opportunities, which is measured by the book value of equity divided by the market value of equity at the beginning of year t (Tucker and Zarowin, 2006);
$LOSS_t$ = loss indicator, which is equal to one if the income before extraordinary items in year t is negative, and zero otherwise (Lundholm and Myers, 2002);
$EVOL_t$ = earnings volatility, which is measured by the standard deviation in income before extraordinary items available to common shareholders divided by the market value of equity three months after the year-end over five years from year $t - 1$ to year $t + 3$ (Tucker and Zarowin, 2006);
$OPCYCLE_t$ = operating cycle, which is measured by average receivables divided by net sales plus average inventories divided by cost of goods sold (Dechow, 1994);
$BACKLOG_t$ = order backlog, which is measured by the backlog divided by net sales. This variable is set to zero if the backlog information is missing;
AF_t = analyst following, which is measured by the average number of a firm's analyst forecasts that are included in the monthly I/B/E/S consensus during year t. (Ayers and Freeman, 2003; Tucker and Zarowin, 2006);
$INST_t$ = institutional ownership, which is measured by the average proportion of a firm's shares that are held by institutional investors at the end of each quarter of year t. (Jiambalvo et al., 2002; Tucker and Zarowin, 2006);
CON_t = accounting conservatism, which is measured by the incremental sensitivity of accounting earnings to negative stock returns at the firm-year level as estimated using the Khan and Watts (2009) model;
IS_t = earnings smoothing, which is measured by the negative value of the correlation coefficient between the change in discretionary accruals and the change in prediscretionary earnings (operating cash flows plus nondiscretionary accruals) over five years from year $t - 4$ to year t (Tucker and Zarowin, 2006); and
EQ_t = earnings quality, which is measured by the standard deviation of residuals as estimated using the Dechow and Dichev (2002) model, extended by McNichols (2002), over five years from year $t - 4$ to year t (Haw et al., 2012; Francis et al., 2005).

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