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How Do Earnings Numbers Relate to Stock Returns? A Review of Classic Accounting Research with Updated Evidence

D. Craig Nichols and James M. Wahlen

SYNOPSIS: An extensive body of academic research in accounting develops theory and empirical evidence on the relation between earnings information and stock returns. This literature provides important insights for understanding the relevance of financial reporting. In this article, we summarize the theory and evidence on how accounting earnings information relates to firms' stock returns, particularly for the benefit of students, practitioners, and others who may not yet have been exposed to this literature. In addition, we present new empirical evidence on the relation between earnings and returns by replicating and extending three classic studies using data from 1988 through 2002. Specifically, we first demonstrate the relation between earnings changes and stock returns, replicating Ball and Brown (1968), and we compare that relation to the relation between changes in cash flows from operations and stock returns. Second, we demonstrate the impact of earnings persistence on stock returns, extending findings from studies such as Kormendi and Lipe (1987), and highlighting the effects of differences in persistence across earnings increases and decreases. Third, we provide evidence to assess the efficiency with which the capital markets impound quarterly earnings information into share prices, showing that the post-earnings-announcement-drift results of Bernard and Thomas (1989) extend to recent data.

INTRODUCTION

Earnings (or more precisely, accounting net income) represents the "bottom-line" accounting measure of firm performance. A firm's earnings number is an accrual accounting measure of the firm's profit or loss from business activities and events during a quarter or annual period. A firm's earnings number represents an accounting measure of the change in the value of the firm to common equity shareholders during a period (apart from the effects of direct transactions with shareholders, such as paying dividends or issuing shares). A firm's stock return, which equals the change in the firm's market value over a period of time plus any dividends paid, represents the

D. Craig Nichols is a Ph.D. student and James M. Wahlen is a Professor, both at Indiana University Bloomington.

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Corresponding author: James M. Wahlen
Email: jwahlen@indiana.edu

capital market's measure of the firm's "bottom line" performance over a period of time. How do these "bottom lines" relate? How do accounting earnings numbers relate to stock returns?

This is an important question for accountants and capital markets participants alike. Not surprisingly, the answer to this question provides deep insights into the economic relevance of financial accounting and reporting as a source of information about firm performance and value.[1] Accounting academics have pursued the answer to this question since the landmark study of Ball and Brown (1968). Ball and Brown's (1968) study of the association between accounting income numbers and changes in share prices in the capital markets triggered a shift in the accounting research paradigm.[2] Since then, accounting academics have developed a large body of theory and assembled a wealth of empirical evidence on the relation between earnings and stock returns.

In this article, our goal is to provide those who have not been previously exposed to this literature a straightforward introduction to the theory, research methods, and empirical evidence on the relation between accounting earnings and stock returns in the capital markets.[3] Unlike other review papers that summarize applied research related to a particular accounting topic (e.g., Healy and Wahlen (1999) on earnings management, Lipe (2001) on lease accounting, and Nelson (2003) on principles versus rules), we review a basic research question and use current data to replicate and extend several key findings from the prior literature. We use the updated empirical analysis to assess the extent to which the findings in three seminal papers still hold, and provide some additional results that do not appear in the original work. This paper can serve as a resource for those interested in a deeper appreciation for the capital market consequences associated with accounting earnings.

We organize this review using the three theoretical links between earnings and share prices developed by Beaver (1998). These "three links" are:

1) current period earnings provides information to predict future periods' earnings, which
2) provide information to develop expectations about dividends in future periods, which
3) provide information to determine share value, which represents the present value of expected future dividends.

We describe how this theoretical structure provides a practical framework for analyzing and understanding the valuation implications of earnings information in the capital market.

We then provide empirical evidence on the relation between earnings and stock returns by extending three classic studies using data from 1988 through 2002. Our first set of empirical results provides evidence on links 1–3 by showing a significant relation between the sign of annual earnings changes and annual stock returns, replicating Ball and Brown (1968). Our sample firms' stock returns during years in which earnings increase beat similar-size firms' returns by an average of 19.2 percent, whereas our sample firms' returns underperform similar-size firms by an average of 16.4 percent during years in which earnings decrease. These results suggest that the difference in the sign of the change in earnings (whether annual earnings increase or decrease) relates to a difference of *over 35 percent* in the average firm's annual stock returns during this period. When we extend this analysis to examine the magnitude of the change in earnings, we find that the stock returns of the 10 percent of firms with the largest earnings increases outperform the 10 percent of firms with the largest earnings decreases by an average of *over 72 percent* per year. We further extend the analysis to consider cash flows from operations. We find that changes in annual earnings

[1] Of course, financial accounting information plays important roles in many other contexts too, including lending, contracting, corporate governance, management compensation, mergers and acquisitions, and regulation. In this article, we focus specifically on the role of accounting information, particularly earnings information, in firm valuation within the capital market.

[2] Prior to Ball and Brown (1968), accounting research was generally concerned with theoretical (rather than empirical) analysis of the usefulness of accounting information *vis-à-vis* conceptual models for usefulness or desirable attributes of accounting numbers. While this approach can be useful, it is limited because it generally cannot provide empirical evidence for evaluating the validity of the author's conjectures.

[3] For more detailed surveys of the research on the relation between earnings and returns, see Lev (1989), Bernard (1989), Beaver (1998), Kothari (2001), Lee (2001), and Scott (2003).

contain substantially more value-relevant information than changes in annual cash flows from operations, highlighting the importance of the information contained in accounting accruals. Together, these results reinforce the important consequences of earnings information for share prices, and reveal why capital market participants devote so much time and effort to forecasting earnings.

Our second set of empirical results demonstrates the importance of earnings persistence (link 1) extending Kormendi and Lipe (1987).[4] We predict and find that stock returns associated with earnings increases are much higher for firms with high earnings persistence than for firms with low earnings persistence. This result demonstrates that stock returns react more strongly to changes in earnings that are likely to recur than to changes likely to be transitory. We extend this analysis to predict and find that stock returns associated with earnings decreases are nearly identical for firms with high and low earnings persistence, because earnings decreases are typically not persistent.

Our third set of results examines when the capital market responds to new earnings information. The results show that stock returns anticipate earnings information in the weeks prior to earnings announcements, and returns react significantly during the days surrounding quarterly earnings announcements (encompassing links 1–3). However, our results also show that the market's reactions to earnings news are not complete. Stock returns continue to drift up for firms with positive earnings changes and drift down for firms with negative earnings changes during the 60 trading days *after* the release of quarterly earnings, replicating Bernard and Thomas (1989). These results suggest the capital market is *still* not completely efficient with respect to quarterly earnings, despite the substantial incentives in the capital markets to exploit this apparent anomaly.

We organize the remainder of this paper in three sections. In the next section we describe accounting and finance theory, linking accounting earnings to stock prices in an efficient market. In the section following, we present empirical evidence on the relation between earnings and stock returns. In the last section, we offer some concluding remarks.

THE RELATION BETWEEN EARNINGS AND STOCK RETURNS

In this section, we describe theory underlying the relation between earnings and stock returns. We also discuss earnings persistence, unexpected earnings, and the role of market efficiency.

The Three Links Relating Earnings to Stock Returns

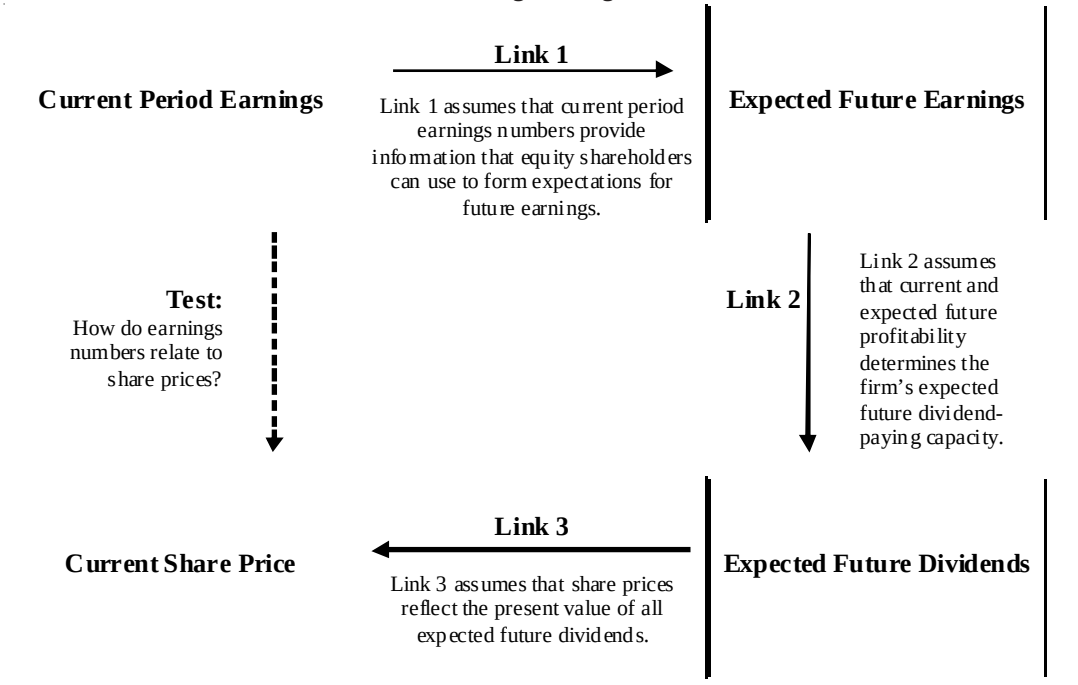
The theory linking the firm's earnings numbers to changes in the firm's market value (i.e., stock returns) depends on three assumptions about the information contained in earnings and share prices.[5] First, the theory assumes that earnings (or more broadly, financial reporting) provides information to equity shareholders about current and expected future profitability. Second, the theory assumes that current and expected future profitability provides shareholders with information about the firm's current and expected future dividends. Third, the theory assumes share price equals the present value of expected future dividends to the shareholder. These links imply that new accounting earnings information that triggers a change in investors' expectations for future dividends should correspond with a change in the market value of the firm. To test these theories with empirical data, researchers examine the associations between accounting earnings numbers and share prices (encompassing links 1–3), as well as the associations implied by each of the three links. Figure 1 depicts these three theoretical links, each of which we describe in more detail below.

Link 1 in the three-links framework assumes that a current period earnings number provides two important elements of information useful for developing dividends expectations: (1) information about current period wealth creation and (2) information about future earnings. First, firms measure earnings using accrual accounting principles, which measure the effects of transactions and events on

[4] The term earnings "persistence" refers to the likelihood current earnings levels will recur in future periods. We discuss the role of earnings persistence more fully in the next section.

[5] This section relies heavily on the seminal text, *Financial Reporting: An Accounting Revolution* (Beaver 1998, Chap. 4, 69–74).

FIGURE 1
The Three Links Relating Earnings to Stock Returns



shareholders' equity (apart from capital transactions with shareholders). Therefore, the current period earnings number summarizes important information about the wealth created by the firm for equity shareholders during the period. Second, current period earnings and related financial statement data provide useful information to predict future earnings. For example, firms' income statements commonly distinguish between operating income, which captures the results of the firm's ongoing operations that will likely recur in the future, and special items (e.g., nonrecurring gains or losses, extraordinary items, discontinued operations), which are not part of ongoing operations and therefore are less likely to affect the firm's performance in future periods. In fact, firms depend on financial reporting to convey credible information about their ability to generate future wealth for equity shareholders and other stakeholders. More generally, the FASB's Conceptual Framework states that an important objective of financial accounting is to provide information useful for assessing the amounts, timing, and uncertainty of future dividends and cash flows.[6]

Link 2 in the three-links framework assumes that current and future earnings represent wealth created by the firm that will ultimately be distributed to equity shareholders through dividends. Thus, current earnings and forecasts of future earnings indicate future dividend-paying ability, which shareholders can use to develop expectations of future dividends. Shares of stock entitle the shareholder to share in any dividend distributions. Link 3 therefore represents the classical approach to equity valuation, which views share value as the present value of the future dividends the shareholder

[6] In the Conceptual Framework, the Financial Accounting Standards Board (1977) states the objectives of financial reporting. Statement of Financial Accounting Concepts No. 1 states, "Financial reporting should provide information to help present and potential investors, creditors, and other users in assessing the amounts, timing, and uncertainty in prospective cash receipts from dividends or interest and the proceeds from the sale, redemption, or maturity of securities or loans."

expects to receive over the remaining life of the firm.[7] Current period earnings numbers (and related financial reports) provide shareholders with information to develop expectations for those future earnings, which aid in developing expectations of future dividends, which ultimately form the basis for share value. These three links from current earnings to future earnings to future dividends to share value provide an intuitive framework for understanding the relation between earnings and share value.[8]

As a simple analogy for the earnings-dividends-value links, suppose the "firm" consists of nothing more than a simple bank account with $1,000. Suppose that at the end of a period, accrual accounting measures the earnings of the firm this period to be $50, informing the shareholder that the account is earning 5 percent interest, which the shareholder expects will continue in perpetuity. Measuring the earnings of $50 provides information to the shareholder that the firm can pay a $50 dividend this period without consuming any of the capital in the firm. If the shareholder plans to withdraw a $50 dividend each year equivalent to each year's earnings (a 100 percent dividend payout rate), then the value of the firm equals the present value of a perpetuity of $50 in earnings per year discounted at 5 percent, which equals the present value of a perpetuity of $50 in dividends per year discounted at 5 percent, both of which equal $1,000 as of the beginning of the year.[9] Notice, though, that even if the firm plans to reinvest all of the earnings each year and pay no dividends until the final liquidating dividend (closing the account), then the present value of this firm as of the beginning of the year is still $1,000 assuming that the reinvested earnings will earn the same (5 percent) rate of return.[10] This analogy demonstrates that accounting earnings measures profit or loss from the use of capital, thereby providing information shareholders can use to form expectations for future dividends, and therefore determine firm value.

The theoretical earnings-dividends-value links also implicitly underlie why investors commonly use earnings-based valuation ratios, such as price-earnings ratios. In addition, these links help explain why so many capital markets participants focus so much attention on earnings numbers. Sell-side analysts develop and publish earnings forecasts. The financial press covers daily earnings announcements (e.g., the *Wall Street Journal* publishes a daily section of earnings announcements, the "Earnings Digest"). Firms commonly hold press conferences to announce earnings numbers. Boards of directors and compensation committees use earnings-based bonus plans to reward and punish managers. Indeed, these parties to the capital allocation process could use any performance measures they find to be most relevant. Their common use of accrual accounting earnings is testimony to the relative informativeness of earnings numbers.[11]

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[7] The stream of expected future dividends includes the final liquidating dividend. The liquidating dividend can occur when the firm ceases operations, is acquired, or the shareholder sells the share, thereby creating a liquidating dividend in the form of the selling price.

[8] The three-links framework for the relation between earnings and share value is consistent with Ohlson (1995) and Feltham and Ohlson (1995), which use the classical dividends-based valuation model to derive equivalent formal models of the links between earnings and share value. These papers demonstrate that equity share value depends on book value of equity and forecasts of future "residual income," which is earnings less a charge for the use of capital, as long as accounting for expected future earnings follows the clean surplus relation. Clean surplus accounting assumes that all changes in book value of equity, except for transactions with owners such as dividends and capital contributions, flow through earnings. U.S. GAAP and International Financial Reporting Standards follow clean surplus accounting for most (but not all) transactions and events. Moreover, these papers demonstrate that the persistence of current period residual income is an important determinant of current market values. For additional discussions of valuation based on residual income, see Bernard (1995), Lee (1999), and most contemporary texts on financial-statement-analysis-based valuation.

[9] The present value of this perpetuity is $50/0.05 = $1,000.

[10] This equivalence holds because the final liquidating dividend (when the shareholder closes the account) will amount to $1,000 plus all accumulated interest over the life of the firm, which is $1,000 in present value.

[11] Of course, some parties allocate capital based on adjusted GAAP earnings numbers. Gaver and Gaver (1998) find that firms generally include nonrecurring earnings components (such as special items and extraordinary items) in determining managers' accounting-based compensation in periods when the components are positive, but exclude them when the components are negative. Watts and Zimmerman (1986, 213) suggest that debt covenants for public debt (bonds) have few variations from GAAP earnings whereas debt covenants for private (e.g., bank) debt have more frequent variations from GAAP earnings. While different parties may make different adjustments to GAAP earnings, these parties consistently use earnings measures based on accounting accruals.

The Importance of Earnings Persistence and Unexpected Earnings

Earnings *persistence* refers to the likelihood a firm's earnings level will recur in future periods, an essential element of link 1. For example, if a firm generates one-for-one persistent earnings, then shareholders should expect the firm to generate the same levels of earnings in future years. The brief analogy in the previous section of the $1,000 savings account firm with 100 percent dividend payout illustrates the case of one-for-one persistent earnings—the firm will generate $50 of earnings this period and $50 of earnings in all future periods. On the other hand, a firm might experience unusually high or low earnings in a given period because a component of current period earnings has low or even zero persistence (i.e., transitory earnings); shareholders would not expect such levels of earnings to recur. For example, if a firm recognizes a one-time gain or loss this period, that gain or loss will not likely persist in future periods.[12]

Persistent earnings contribute much more to share value than do transitory earnings. For example, suppose that a newly created firm announces that it generated $1 earnings per share in its first period of operations (but did not pay any dividends). Suppose also that the market expects the firm will continue to generate $1 earnings per share in all future periods (link 1— persistent earnings), and that the earnings will ultimately be paid as dividends to shareholders (link 2). Share value should equal the $1 per share generated this period plus the present value of $1 per share earnings each period over the remaining life of the firm (link 3). If the firm faces an 8 percent expected rate of return on equity (its cost of equity capital), then current period earnings plus a persistent future stream of $1 earnings per share would be worth $13.50 in present value.[13]

Now suppose that same firm announces a one-time gain of $0.50 per share this period, in addition to the persistent $1.00 earnings per share. Using the three links, the one-time gain creates new wealth for shareholders this period, but that gain is not persistent (it is not expected to recur in any future periods); thus, the firm can ultimately pay out additional dividends worth $0.50 in present value to shareholders. After shareholders learn of the one-time gain, a share of stock should increase in value by $0.50, to $14.00 ($13.50 + $0.50).

The three-links framework, therefore, provides a useful structure for analyzing the valuation implications of earnings information. Under this framework, share value reflects the present value of expected future dividends, which are determined by current and expected future earnings. When firms announce earnings that unexpectedly differ from the market's expectations, share prices generally react to the "earnings news." Generally speaking, if earnings beat expectations, share prices increase, and likewise, if earnings fall short of expectations, share prices fall. By how much? That depends on many factors, but an important factor is the persistence of the unexpected earnings.[14] When a firm announces an unexpected change in earnings that is not likely to persist, then share prices will likely change by the amount of the one-time earnings change. On the other hand, when the firm announces an unexpected change in earnings that will likely persist in the future, share prices will generally move up or down by a larger amount due to the link between current and future earnings—persistence. Thus, when a firm announces earnings that differ from expectations (unexpected earnings), the three-links framework provides a set of steps one can follow to analyze the implications of an unexpected change in earnings for future earnings (persistence), future dividends, and share value.

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[12] As another example, a firm could also experience greater than one-for-one persistence in earnings if the firm has growth opportunities that will enable it to generate substantial future earnings growth.

[13] The present value of this perpetuity is $1.00/0.08 = $12.50. Adding $1 for current earnings yields $13.50.

[14] Risk is another important determinant of the relation between unexpected earnings and stock returns. Risk affects the cost of equity capital and thus the value of the perpetuity. Collins and Kothari (1989) provide a discussion of additional determinants of the relation between unexpected earnings and returns.

Isolating the Effect of Unexpected Earnings on Stock Returns

The market's use of information to price shares is a complex and dynamic process. As a result, the association between unexpected earnings and stock returns depends on numerous factors, each of which is difficult to precisely specify in empirical tests. Four such factors that researchers consider are:

- earnings information,
- earnings expectations,
- market efficiency with respect to earnings information, and
- asset pricing.

Because of the dynamic nature of these four factors, and because accounting researchers cannot run controlled experiments in the stock market to isolate one factor at a time (unlike, say, a researcher in chemistry who can run carefully controlled experiments in a laboratory), we can never be certain that accounting information *causes* stock market price reactions.[15] Instead, we rely on carefully constructed statistical and econometric tests to isolate and examine the association (the correlation) between unexpected earnings and stock returns.

The first factor above, earnings information, is the central variable of interest. In examining the association between unexpected earnings and stock returns, we test the fundamental question of whether earnings numbers reflect information that the capital markets believe is relevant and reliable. Despite the power of accrual accounting and GAAP, earnings numbers *might not* provide useful information to the capital markets. For example, financial press reports, changes in economic indicators, or firm-specific announcements might preempt accounting earnings as a timely source of information. Also, accounting earnings determined under GAAP may: (1) provide an incomplete measure of firm performance in a given period (e.g., a firm may have developed a promising new product this period, but GAAP will not permit the firm to recognize any revenues until the firm generates sales of that product), or (2) measure performance with a conservative bias (e.g., expensing R&D). Moreover, capital markets participants may be wary that some firms under certain conditions may attempt to manage reported earnings numbers to a point where they are not reliable indicators of economic performance. Indeed, recent popularity of the notion that "cash is king" may reflect (in part) mistrust of the relevance and reliability of earnings information. If factors such as these destroy the usefulness of accounting earnings, then we should observe no association between accounting earnings and stock returns.

The second important element of the relation between accounting earnings and returns is the *new* information communicated by earnings (the unexpected earnings). To isolate the new information in earnings, we subtract the earnings that the (presumably efficient) market expected to occur this period. Researchers and capital market participants often use consensus analysts' earnings forecasts as proxies for earnings expectations in the capital market. Alternately, if analysts' forecasts are not available, then prior-period earnings (or prior-period earnings compounded with an expected growth rate) often serve as an estimate of expected earnings.

The third factor, market efficiency, refers to the scope of the information that prices reflect and the degree to which capital market prices react quickly and completely (e.g., without bias, not consistently under- or over-reacting) to new value-relevant information, such as unexpected changes in earnings. Market efficiency does not assume that the capital markets are omniscient—prices reflect only the information known to the market. Nor does market efficiency assume prices are prescient—surprises happen in our world of uncertainty. Market efficiency is not an absolute—it is not that prices either are or are not efficient. Instead, market efficiency is a matter of degree, which

[15] Some accounting researchers do conduct carefully controlled experimental studies that test psychology-based or economics-based theories about how individuals (or groups of individuals in simulated market settings) process accounting information and use it in decision making. For a review of experimental research in financial accounting, see Libby et al. (2002).

describes how much information prices reflect and how quickly prices react and reach new equilibrium levels. A highly efficient market with respect to accounting earnings numbers would react quickly and completely when new earnings-related information becomes available.

Fourth, asset pricing models in financial economics predict that risky securities, such as shares of stock, should provide a sufficient rate of return to compensate the securities holders for forgoing consumption and bearing risk. As one example, the capital asset pricing model (CAPM) predicts that equity securities will earn the risk-free rate of return plus a risk premium that depends on the nondiversifiable risk of that security (i.e., beta) multiplied by the average risk premium per unit of risk in the economy. Thus, stocks should earn an expected rate of return to compensate investors for forgoing consumption and bearing risk, separate from the change in share value that is attributable to unexpected news about the firm's earnings. Thus, we control for the expected rate of return on each stock in order to isolate and detect the firm-specific incremental return associated with the firm's unexpected earnings.[16]

We turn next to describing results from replicating three classic stock-market-based accounting research studies. These studies each address all four of these factors as they isolate and test the association between unexpected earnings and risk-adjusted stock returns.

EVIDENCE LINKING EARNINGS AND STOCK RETURNS

In this section, we first describe the sample of firms, years, and data we use to conduct our tests. We then present the results from three different sets of tests that provide evidence on: (1) the association between earnings and returns; (2) the effects of earnings persistence on the earnings-returns association; and (3) the quickness and completeness of the market's reaction to earnings news.

Sample Description

We examine samples of firms listed on the NYSE, AMEX, and NASDAQ exchanges during the period from 1988 to 2002. Our samples include all firms with December 31 fiscal year-ends for which we can obtain the data we require for our tests from the S&P Compustat database and the Center for Research in Securities Prices (CRSP) database. Compustat and CRSP provide financial statement data and stock prices and returns data, respectively, for thousands of publicly traded U.S. companies. For the tests of association and persistence, our sample contains annual earnings and returns data for 31,923 firm-year observations over 1988–2001. For the efficiency tests, our sample contains quarterly earnings and daily returns data for 90,470 firm-quarter observations over 1988–2002.

Table 1 provides descriptive statistics for the annual and quarterly data samples. The distributional statistics for market capitalization and total assets suggest our samples represent a wide range of firms of different sizes, from the relatively small to the very large. These descriptive statistics also indicate that during most of the sample period, these firms were profitable (in terms of earnings and earnings changes) and increasing in market capitalization (in terms of returns and abnormal returns).

Our analyses use accounting earnings information to explain differences in firms' stock returns. As mentioned above, to isolate firm-specific abnormal returns that might be attributable to the firm's unexpected earnings, we control for the market-wide systematic-risk factors that affect firms' returns. Firm size (i.e., market capitalization) has been shown to be a systematic risk factor with significant explanatory power for returns (Banz 1981; Fama and French 1992; and others). We therefore compute abnormal returns as cumulative returns for each firm minus the cumulative return

[16] A common approach is to subtract an expected rate of return on a stock from the actual rate of return on the stock in order to determine the risk-adjusted (sometimes called abnormal) return on the stock. Research usually measures expected returns using an asset pricing model such as the CAPM, a simple market-wide benchmark return, or a size-based benchmark return.

TABLE 1
Sample Descriptive Statistics

Annual Sample[a]	Mean	Std. Dev.	1st Quartile	Median	3rd Quartile
Market Capital ($MM)	1946.040	10994.830	40.688	161.025	726.021
Returns	0.187	1.048	–0.243	0.047	0.353
Abnormal returns	0.043	1.015	–0.374	–0.078	0.230
Earnings ($MM)	69.913	505.719	–1.603	4.501	30.293
Earnings changes ($MM)	–1.302	301.623	–4.283	0.657	7.551
Total assets ($MM)	2795.540	19253.390	49.702	191.657	884.981
Quarterly Sample[b]	**Mean**	**Std. Dev.**	**1st Quartile**	**Median**	**3rd Quartile**
Market Capital ($MM)	2928.582	12939.582	134.164	446.199	1598.901
Returns	0.033	0.287	–0.102	0.020	0.141
Abnormal returns	0.026	0.099	–0.034	0.031	0.082
Earnings ($MM)	30.554	191.150	0.395	4.578	21.345
Earnings changes ($MM)	1.722	170.304	–1.809	0.556	4.478
Total assets ($MM)	5941.960	29895.170	155.724	631.522	2737.600

[a] The annual sample includes 31,923 firm-year observations for calendar-year NYSE, AMEX, and NASDAQ firms with statement of cash flows data on Compustat for the period 1988–2001.

Market Capital = number of shares outstanding times market price per share as of the end of the fiscal year;
Returns = daily returns cumulated over the 12 months prior to and including the month of the 4th-quarter earnings announcement. We define month as 21 trading days and the month of the earnings announcement includes the date of the announcement plus the ten days before and the ten days after the announcement of earnings;
Abnormal returns = the cumulative raw returns described above less the cumulative returns over the same period to the size decile to which the firm belongs;
Earnings = income before extraordinary items, as reported on the statement of cash flows; and
Earnings changes = current year earnings minus prior year earnings.

[b] The quarterly sample includes 90,470 firm-quarter observations for calendar-year NYSE, AMEX, and NASDAQ firms with daily returns data available on CRSP, analyst forecast data available on I/B/E/S, and financial statement data available on Compustat for the 1988–2002 period.

Market Capital = number of shares outstanding times market price per share as of the end of the fiscal quarter;
Returns = daily returns cumulated over the 60 trading days up to and including the date of the earnings announcement;
Abnormal returns = the cumulative raw returns described above less the cumulative returns over the same period to the size decile to which the firm belongs;
Earnings = income before extraordinary items; and
Earnings changes = seasonally differenced earnings, calculated as income before extraordinary items for the current quarter minus income before extraordinary items for the same quarter in the preceding year.

to the CRSP size-decile portfolio to which the firm belongs. The research literature commonly refers to this measure as a size-adjusted return because it controls for systematic market risk factors related to firm size.

The Earnings-Returns Association

Replicating the seminal work of Ball and Brown (1968), our first analysis involves the simplest test of earnings information: we assess whether the sign of the change in annual earnings is associated with the sign of abnormal annual stock returns. Do firms with earnings increases (decreases) experience positive (negative) abnormal returns? To assess this association, we first compute the

change in annual earnings, which we measure as the change in income before extraordinary items.[17] We then group all sample firms each year into two portfolios—firms with positive or negative earnings changes. We cumulate abnormal returns to each portfolio each year beginning 11 months prior to and continuing through 6 months after the month in which firms announce annual earnings (which we deem month 0). We summarize the results by averaging the cumulative returns through the end of each month relative to the earnings announcements across all 14 years in our sample period, 1988–2001.

Table 2 and Figure 2, Panel A present the results. For the 12-month period from month –11 through month 0, firms with positive annual earnings changes experience average abnormal returns of 19.2 percent, whereas firms with negative earnings changes experience average abnormal returns of –16.4 percent. These results are striking, suggesting that merely the *sign* of the change in earnings is associated with an average difference of 35.6 percent in abnormal annual returns.[18] By comparison, Ball and Brown (1968) report a difference in annual normal returns of 16.8 percent based on differences in the sign of the change in earnings per share over their 1957–1965 sample period. This comparison suggests that the returns implications of earnings changes have increased substantially since their study period.[19]

Earnings reflect cash flows from operations adjusted for accounting accruals. Accruals reflect the incremental information about firm wealth creation and profitability provided by the accounting process. Thus, we highlight the value-relevant information provided by accrual accounting by comparing the association between earnings changes and returns to the association between changes in cash flows from operations and returns. The results in Table 2 and Figure 2, Panel A indicate that, for the same firm-years, changes in annual cash flows from operations are also significantly associated with abnormal returns, but less strongly than are changes in earnings. For the 12-month period from month –11 through month 0, firms with positive annual changes in cash flows from operations experience average abnormal returns of 11.3 percent, whereas firms with negative changes experience average abnormal returns of –3.7 percent. Not surprisingly, these results suggest annual earnings changes contain more value-relevant information than changes in cash flows from operations. This occurs because, in part, accounting accruals reduce the ambiguity in changes in cash flows from operations as a signal about the firm's wealth creation and profitability in a given period.[20]

We sharpen the analysis by focusing on the firms with the most extreme annual changes in earnings in order to assess the extent to which the *sign and magnitude* of earnings changes explain differences in abnormal returns.[21] For this analysis, we again group firms into two portfolios each year, but this time we scale the change in earnings by lagged total assets to enhance the cross-sectional comparability of this profitability measure. We then rank firms into ten groups (called deciles) based on the magnitude of the scaled earnings changes. The two portfolios we select consist of firms in the

[17] This earnings measure excludes transitory earnings components such as extraordinary items and discontinued operations. Many market participants focus on earnings measures that exclude transitory items because these measures have a stronger relation to future earnings levels (e.g., are more persistent).

[18] This difference is economically significant and statistically significant, with a t-statistic of 13.2 ($p < 0.001$).

[19] In addition to sample periods and earnings measures, our analysis differs from the Ball and Brown (1968) analysis in several ways, such as better data regarding the precise day on which earnings are announced and the use of daily returns data to center the announcement month around the earnings announcement date. Factors such as these could contribute to the differences we observe in the strength of the earnings-returns association across the two analyses.

[20] For example, a negative change in cash from operations could signal good news (a firm used cash to fund growth in operations) or bad news (a firm may face liquidity problems) during that period, whereas a negative change in earnings is more likely to be a clear signal that profitability declined during that period. A number of prior studies provide stock returns-based evidence on the information in earnings versus cash flows, including Bowen et al. (1987) and Dechow (1994).

[21] Beaver et al. (1979) first demonstrate an association between the sign and magnitude of earnings changes and the sign and magnitude of abnormal returns.

TABLE 2
The Association between Annual Earnings Changes and Cumulative Abnormal Returns: A Replication of Ball and Brown (1968)

Months Relative to Earnings Announcement	Cumulative Abnormal Returns for Firms with: Positive Earnings Changes	Negative Earnings Changes	Difference	Cumulative Abnormal Returns for Firms with: Positive Cash Flow Changes	Negative Cash Flow Changes	Difference
–11	0.028	–0.009	0.037***	0.014	0.009	0.005
–10	0.058	–0.023	0.081***	0.029	0.016	0.013
– 9	0.069	–0.032	0.101***	0.041	0.010	0.031***
– 8	0.077	–0.056	0.133***	0.047	–0.006	0.053***
– 7	0.099	–0.080	0.179***	0.054	–0.010	0.064***
– 6	0.107	–0.095	0.202***	0.059	–0.017	0.076***
– 5	0.124	–0.112	0.236***	0.063	–0.017	0.080***
– 4	0.137	–0.137	0.274***	0.062	–0.025	0.087***
– 3	0.139	–0.153	0.292***	0.067	–0.039	0.106***
– 2	0.149	–0.161	0.310***	0.077	–0.046	0.123***
– 1	0.161	–0.166	0.327***	0.087	–0.046	0.133***
0	**0.192**	**–0.164**	**0.356*** **	**0.113**	**–0.037**	**0.150*** **
1	0.205	–0.159	0.364***	0.126	–0.030	0.156***
2	0.210	–0.167	0.377***	0.132	–0.038	0.170***
3	0.215	–0.170	0.385***	0.141	–0.042	0.183***
4	0.223	–0.170	0.393***	0.146	–0.038	0.184***
5	0.224	–0.171	0.395***	0.145	–0.037	0.182***
6	0.235	–0.170	0.405***	0.147	–0.028	0.175***

*, **, *** Denotes statistical significance at the 10 percent, 5 percent, and 1 percent level, respectively, in a two-tailed t-test.

The sample for this Table and Figure 2 includes 31,923 firm-year observations for calendar-year NYSE, AMEX, and NASDAQ firms with statement of cash flows data on Compustat for the period 1988–2001.

Earnings = income before extraordinary items as reported on the statement of cash flows;
Earnings changes = current period earnings minus prior period earnings, scaled by lagged total assets for cross-sectional comparability;
Cash flow changes = current period operating cash flows minus prior period operating cash flows, scaled by lagged total assets for cross-sectional comparability; and
Cumulative abnormal returns = cumulative raw return minus cumulative return to the size decile portfolio to which the firm belongs. The cumulation period starts 11 months before the earnings announcement month.

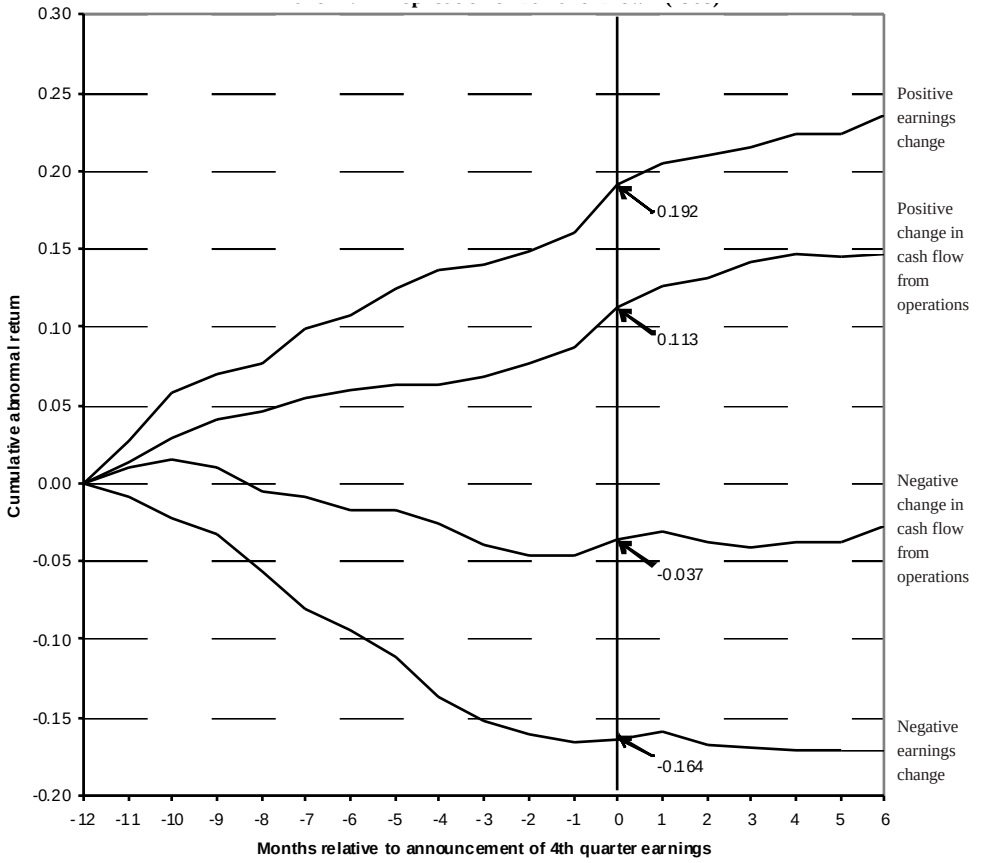
We form portfolios on earnings changes (scaled by lagged total assets) and cash flow changes (scaled by lagged total assets) each period.

highest decile of scaled earnings changes and the firms in the lowest decile of scaled earnings changes. We present the results in Figure 2, Panel B; for sake of comparison, Panel B also contains results for extreme decile portfolios of annual changes in cash flows from operations scaled by lagged total assets. For the 12-month period from month –11 through month 0, the firms in the top decile of annual earnings changes in a given year experience average abnormal returns of 49.8 percent, whereas firms in the bottom decile of annual earnings changes in a given year experience average abnormal returns of –22.4 percent. These results suggest that the most extreme changes in earnings are associated with a 72.2 percent difference in abnormal annual returns on average over 1988–2001.

The evidence in Table 2 and Figure 2 suggests that earnings numbers contain information that relates to changes in the market's expectation of future dividends and thus changes in contemporaneous market values. This evidence provides an interesting implication for the returns associated with forecasting earnings changes. During our sample period, if one could have forecasted the sign and magnitude of our sample firms' earnings changes with perfect accuracy 12 months in advance, and if one then could have taken long positions in the firms with top decile earnings increases and short positions in the firms with bottom decile earnings decreases, then that portfolio would have earned an average abnormal return of 72.2 percent annually over 1988–2001. Of course, this interpretation of the evidence is extreme because perfect forecast accuracy is impossible, but the evidence suggests that the abnormal returns to investing on the basis of accurate forecasts of future earnings changes are potentially large. This is part of the explanation for why so many investors and analysts devote so much time and energy to forecasting earnings. In spite of the limitations of generally accepted accounting principles and the potential for earnings management, accounting earnings appear to measure relevant and reliable information.

FIGURE 2
The Association between Annual Earnings Changes and Cumulative Abnormal Returns

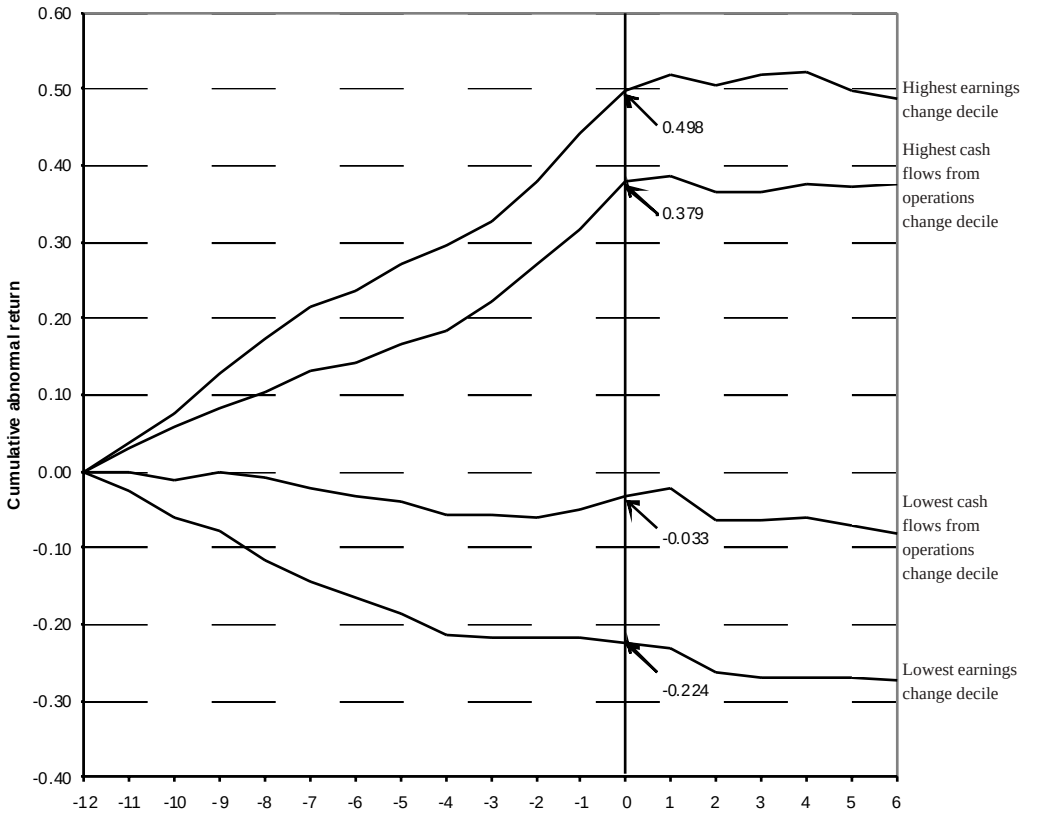
Panel A: Replication of Ball and Brown (1968)



(continued on next page)

FIGURE 2 (continued)

Panel B: Analysis of Highest and Lowest Earnings Changes



See notes to Table 2 for variable definitions and measurements.
Portfolio formation:
Panel A: We form portfolios each year based on the sign of changes in earnings (cash flows).
Panel B: We form portfolios each year based on the top and bottom deciles of changes in earnings (cash flows).
Sample size: Panel A: 31,923 firm-year observations. Panel B: 6,384 firm-year observations.

The Importance of Persistence

The first link in Beaver's (1998) three-links framework highlights the importance of current earnings as predictive information for future earnings. The classic study by Kormendi and Lipe (1987) explicitly models and tests this link by examining the relation between earnings persistence and stock returns. We extend their analysis with a triple-sort approach. We first sort sample firms each year into two portfolios—firms with earnings increases and earnings decreases. We then sort those two partitions each year into ten deciles based on the magnitude of earnings changes (scaled by lagged total assets). Finally, we sort each earnings change decile portfolio into ten deciles based on firm-specific earnings persistence parameters.[22] The triple-sort procedure allows a clean assessment of the stock return implications of earnings persistence by holding constant the magnitude of the change in earnings.

[22] For the interested reader, we provide a more complete and detailed description of these methods in the notes to Table 3 and Figure 3, where we present the results.

We then repeat the earnings-returns association analysis presented in the prior section, but we focus specifically on the differences in abnormal returns associated with earnings changes across the top and bottom earnings persistence decile portfolios. We predict that, following Kormendi and Lipe (1987), abnormal returns for earnings increases will be greater for high persistence firms than for low persistence firms. Unlike Kormendi and Lipe, we predict that there will be relatively little difference in abnormal returns for earnings decreases for high persistence versus low-persistence firms, because by their nature, earnings decreases tend to have low persistence (firms that suffer earnings decreases likely change strategies and improve operations, or do not survive).[23]

We present the results in Table 3 and Figure 3. As predicted, the evidence suggests that, on average during years with earnings increases, high persistence firms experience abnormal returns of roughly 25.3 percent while low-persistence firms experience abnormal returns of only 13.6 percent.[24] Also as predicted, we observe very little difference in abnormal returns across high and low persistence firms during years with earnings decreases, because they tend to be transitory rather than persistent. Finally, our triple-sort procedure appears to successfully control for the effects of the magnitude of the earnings change; the average earnings changes across the highest and lowest persistence deciles are nearly identical within the earnings increase partition and within the earnings decrease partition. This suggests that the returns differences we observe are attributable to differences in earnings persistence rather than differences in the magnitude of the earnings changes, supporting link 1.

Do Earnings Numbers Provide New Information to the Market?

The evidence presented above suggests that earnings contains some of the information that the market uses in forecasting future earnings, developing expectations of future dividends, and in determining stock prices. However, these results provide little evidence of whether earnings numbers provide *new* value-relevant information to the capital markets. For reasons discussed previously, we can never be sure that earnings numbers cause stock price reactions. To develop greater confidence that this is the case, our next analysis examines stock price reactions during days immediately surrounding earnings announcements to assess whether earnings numbers convey new information to the capital markets.

For this analysis, we make a number of refinements. First, we shift to quarterly earnings information because U.S. firms release earnings information quarterly. We also sharpen our measure of the new information in the earnings announcement by computing unexpected earnings as actual earnings per share less analysts' consensus forecast earnings per share. We compute the analysts' consensus forecast using the average of recent analysts' forecasts (collected from the Institutional Brokers Estimates System, or I/B/E/S, database). We then scale each firm's unexpected earnings by stock price.[25] We group firms each quarter into ten portfolios, ranging from the lowest decile unexpected earnings firms that quarter to the highest decile unexpected earnings firms that quarter. Finally, we focus the analysis on the ten days surrounding the release of firms' quarterly earnings. We collect daily returns from CRSP and we compute cumulative size-adjusted returns through each day during the ten days surrounding earnings announcements, beginning four trading days prior to the earnings announcement and continuing through five trading days after the announcement. Our sample for this analysis includes 90,470 firm-quarter observations, described in Table 1. If the sign and magnitude of abnormal returns at the time of the earnings announcement are associated with the sign

[23] Hayn (1995) shows the difference in returns associated with positive earnings versus negative earnings (losses). She shows that losses, which are generally not persistent, have a smaller impact on share prices than positive earnings, which are more persistent.

[24] This difference in abnormal returns is statistically significant (t-statistic = 2.27; $p < 0.032$).

[25] For consistency with the analysis in the next section, we select the three most recent forecasts released at least 60 days before the announcement and we scale unexpected earnings by price 60 days before the announcement.

TABLE 3
The Association between Annual Earnings Changes and Cumulative Abnormal Returns for High and Low Earnings Persistence Firms: An Extension of Kormendi and Lipe (1987)

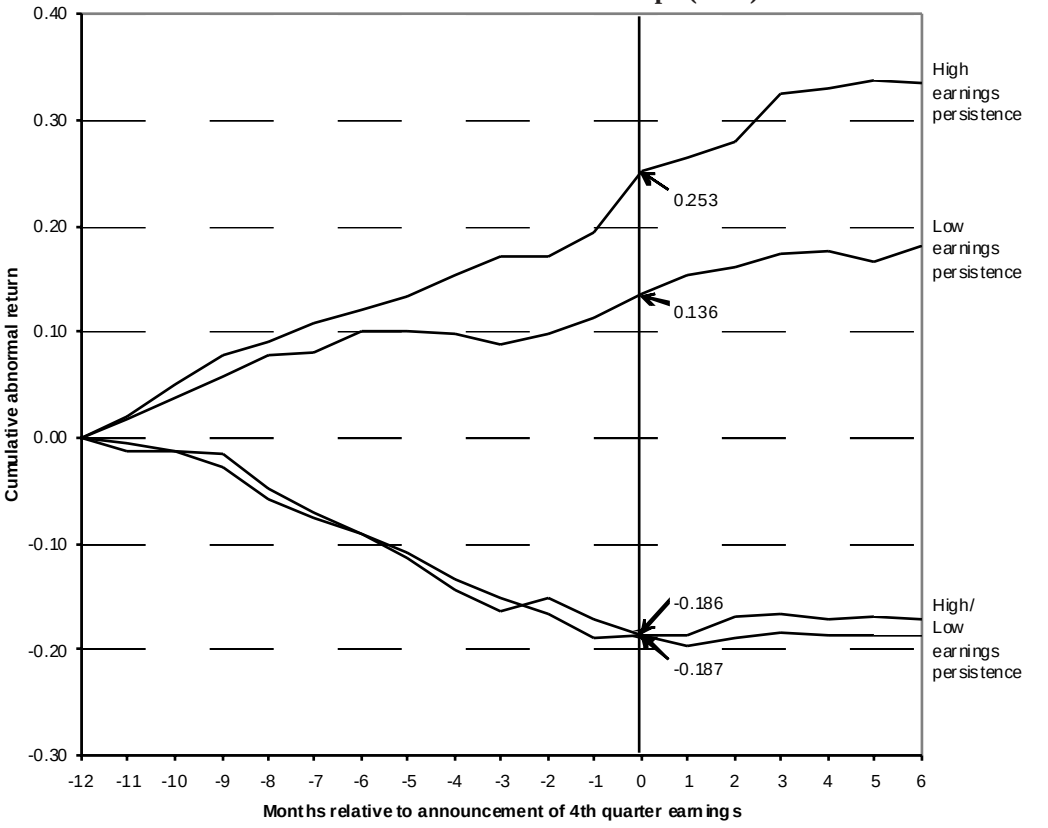
Months Relative to Earnings Announcement	Abnormal Returns to Firms with Positive Earnings Changes			Abnormal Returns to Firms with Negative Earnings Changes		
	High Earnings Persistence	Low Earnings Persistence	Difference	High Earnings Persistence	Low Earnings Persistence	Difference
–11	0.021	0.018	0.003	–0.012	–0.004	–0.008
–10	0.051	0.037	0.014	–0.013	–0.013	0.000
– 9	0.079	0.058	0.021	–0.014	–0.026	0.012
– 8	0.092	0.079	0.013	–0.048	–0.058	0.010
– 7	0.108	0.082	0.026	–0.071	–0.075	0.004
– 6	0.120	0.100	0.020	–0.091	–0.090	–0.001
– 5	0.133	0.101	0.032	–0.114	–0.108	–0.006
– 4	0.153	0.099	0.054	–0.144	–0.132	–0.012
– 3	0.171	0.090	0.081**	–0.164	–0.151	–0.013
– 2	0.172	0.099	0.073*	–0.151	–0.166	0.015
– 1	0.194	0.113	0.081*	–0.170	–0.188	0.018
0	**0.253**	**0.136**	**0.117****	**–0.186**	**–0.187**	**0.001**
1	0.264	0.154	0.110*	–0.187	–0.196	0.009
2	0.280	0.161	0.119*	–0.169	–0.189	0.020
3	0.325	0.174	0.151**	–0.165	–0.184	0.019
4	0.329	0.175	0.154**	–0.172	–0.187	0.015
5	0.337	0.166	0.171**	–0.168	–0.187	0.019
6	0.336	0.183	0.153**	–0.171	–0.185	0.014
Average earnings changes	0.063	0.062	0.001	–0.082	–0.080	–0.002

*, **, *** Denotes statistical significance at the 10 percent, 5 percent, and 1 percent level, respectively, in a two-tailed t-test.

The primary sample for this Table and Figure 3 consists of 31,923 firm-year observations for calendar year NYSE, AMEX, and NASDAQ firms from 1988 through 2001. From this sample, we exclude firms without at least ten annual observations of earnings changes for the 1980 through 2001 period. We estimate firm-specific earnings-change autoregressions for the remaining sample firms using all available observations from the 1980 through 2001 period. Each year from 1988 through 2001, we first sort firms into earnings increasers and earnings decreasers. Then, within the earnings increase/decrease partitions, we sort firms into deciles based on the magnitude of the earnings change. Within each earnings change decile, we further sort firms into earnings persistence deciles based on the firm-specific earnings persistence parameters estimated in the autoregressions. We then form portfolios taking the top and bottom earnings persistence deciles from each earnings change decile. This procedure ensures that the difference in returns across high versus low earnings persistence firms is attributable to earnings persistence instead of differences in the magnitude of earnings changes.

High earnings persistence = the top earnings persistence decile taken from each earnings change decile;
Low earnings persistence = the bottom earnings persistence decile taken from each earnings change decile;
Earnings = income before extraordinary items as reported on the income statement;
Earnings changes = current period earnings minus prior period earnings, scaled by lagged total assets for cross-sectional comparability; and
Cumulative abnormal returns = cumulative raw return minus the cumulative return to the size decile portfolio to which the firm belongs. The cumulation period starts 11 months before the earnings announcement month.

FIGURE 3
The Association between Annual Earnings Changes and Cumulative Abnormal Returns for Firms with High and Low Earnings Persistence: An Extension of Kormendi and Lipe (1987)



See notes to Table 3 for variable definitions and measurements.
Portfolio formation: Each year from 1988 through 2001, we first sort firms into earnings increasers and earnings decreasers. Then, within the earnings increase/decrease partitions, we sort firms into deciles based on the magnitude of the earnings change. Within each earnings change decile, we further sort firms into earnings persistence deciles based on the firm-specific earnings persistence parameters estimated in the autoregression. We then form portfolios taking the top and bottom earnings persistence deciles from each earnings change decile. This procedure ensures that the difference in returns across high versus low earnings persistence firms is attributable to earnings persistence instead of differences in the magnitude of earnings changes.
The sample includes 3,514 firm-year observations.

and magnitude of unexpected earnings, this suggests that earnings numbers communicate new information that triggers the market to establish new share prices.

Table 4 and Figure 4 present results for the ten unexpected earnings decile portfolios for the ten trading days immediately surrounding quarterly earnings announcements.[26] The results suggest the market reacts swiftly and significantly to quarterly earnings surprises. Day 0 represents the day on which firms release quarterly earnings information. By the end of day +1 that information has had a chance to appear in the financial press (e.g., the *Wall Street Journal's* "Earnings Digest") and market

[26] A seminal study by Beaver (1968) examines changes in trading volume as indicators of market reactions to earnings announcements. Beaver's results (which we do not replicate here) show that trading volume is 33 percent greater than normal during earnings announcement weeks.

TABLE 4
Cumulative Abnormal Returns during the Ten Days Surrounding Earnings Announcements

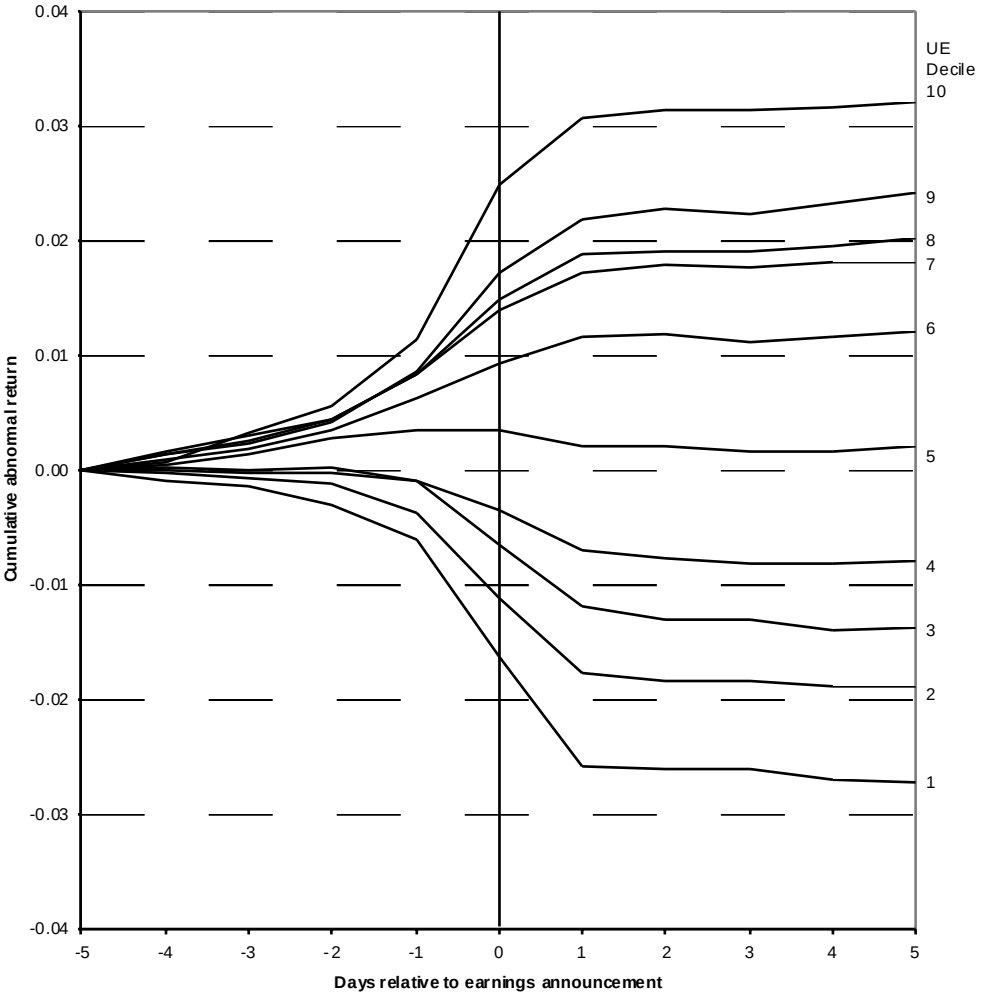
Days Relative to Earnings Announcement	Cumulative Abnormal Returns for UE Decile Portfolios										Highest Minus Lowest
	Lowest UE	2	3	4	5	6	7	8	9	Highest UE	
–4	–0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.002***
–3	–0.002	–0.001	0.000	0.000	0.001	0.002	0.003	0.003	0.002	0.003	0.005***
–2	–0.003	–0.001	0.000	0.000	0.003	0.003	0.004	0.004	0.004	0.006	0.009***
–1	–0.006	–0.004	–0.001	–0.001	0.004	0.006	0.008	0.008	0.009	0.011	0.017***
0	**–0.016**	**–0.011**	**–0.007**	**–0.004**	**0.004**	**0.009**	**0.014**	**0.015**	**0.017**	**0.025**	**0.041*** **
1	–0.026	–0.018	–0.012	–0.007	0.002	0.011	0.017	0.019	0.022	0.031	0.057***
2	–0.026	–0.018	–0.013	–0.008	0.002	0.012	0.018	0.019	0.023	0.031	0.057***
3	–0.026	–0.018	–0.013	–0.008	0.002	0.011	0.018	0.019	0.022	0.031	0.057***
4	–0.027	–0.019	–0.014	–0.008	0.002	0.011	0.018	0.019	0.023	0.032	0.059***
5	–0.027	–0.019	–0.014	–0.008	0.002	0.012	0.018	0.020	0.024	0.032	0.059***

*, **, *** Denotes statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

The sample for this Table and Figure 4 includes 90,470 firm-quarter observations with analysts' earnings forecasts on I/B/E/S and daily returns data on CRSP. We rank firms into deciles each quarter based on unexpected earnings.

Unexpected earnings (UE) = actual earnings per share minus analysts' consensus forecast of earnings per share, scaled by price per share as of 60 trading days prior to the earnings announcement (for cross-sectional comparability); and
Analysts' consensus forecast = the average of the three most recent forecasts as of 60 trading days prior to the earnings announcement.
Cumulative abnormal returns = cumulative raw returns minus the cumulative return to the size decile to which the firm belongs. The cumulation period begins four days before the earnings announcement.

FIGURE 4
The Association between Quarterly Unexpected Earnings and Cumulative Abnormal Returns around Earnings Announcements



See notes to Table 4 for variable definitions and measurements.
We form portfolios each quarter based on the magnitude of unexpected earnings per share scaled by price per share as of 60 trading days before the earnings announcement.
The sample includes 90,470 firm-quarter observations.

participants have had an opportunity to react. Between day –4 and the end of day +1, cumulative abnormal returns amount to an average of 3.1 percent for the highest decile of surprises and –2.6 percent for the lowest decile of surprises. The difference in abnormal returns across highest positive and lowest negative earnings surprises during this short window amounts to an average of 5.7 percent (which is statistically significant, $p < 0.001$).[27] To put this difference in context, consider that

[27] Over 70 percent of this reaction occurs during the day of and the day after the announcement ((5.7 – 1.7)/5.7).

the average market capitalization of firms in our quarterly sample is $2,928.6 million; thus the difference between a top decile and bottom decile earnings surprise triggers a $166.9 million difference in market value ($2,928.6 million $\times$ 0.057) by day +1.[28]

The evidence in this section has two important implications. First, the results suggest earnings numbers communicate new information to capital markets that has important consequences for future earnings forecasts, expectations of future dividends, and current market values. Second, the stock price consequences of new earnings information provide substantial incentives for market participants to trade on that information quickly—stock prices appear to incorporate the new information by day +1. The strong reaction to unexpected earnings provides additional insight into why capital market participants place so much emphasis on earnings.

Market Efficiency with Respect to Earnings News

The quick response to earnings news documented in the prior section is one facet of market efficiency. Our final analysis extends the seminal work of Bernard and Thomas (1989) and examines two additional dimensions of market efficiency with respect to earnings information—the extent to which prices anticipate earnings information and the completeness with which prices react to earnings news. The stock price consequences of new earnings information suggest that capital market participants have enormous incentives to efficiently use all sources of available information to predict earnings, including information useful for anticipating changes in earnings before they are announced, such as analysts' forecasts or economic indicators.[29] In addition, capital market participants presumably have incentives to react completely once firms announce earnings, such that no abnormal returns can be earned consistently on earnings information *after* it is publicly available.

Because of our interest in the timing of the market's reaction to the information in unexpected earnings, we again examine daily stock returns surrounding earnings announcements. We collect daily returns from CRSP and we compute cumulative abnormal (size-adjusted) returns through each day in the preannouncement period starting 60 trading days prior to the earnings announcement.[30] We make similar computations of cumulative abnormal returns over the 60 days following the earnings announcement. We group firms into deciles based on unexpected earnings per share (scaled by share price as of 60 days prior to the earnings announcement) and we summarize each decile portfolio's performance by averaging the abnormal returns for the firms in each decile each quarter. We then average each decile-quarter's return across the 58 quarters in our sample (the first quarter of 1988 through the second quarter of 2002, or 58 quarters).[31] Our sample for this analysis includes 90,470 firm-quarter observations, described in Table 1. We present the results in Table 5 and Figure 5.

Does the capital market anticipate the information in quarterly earnings announcements? The preannouncement portfolio returns indicate the answer is yes. Beginning 60 trading days prior to quarterly earnings announcements and continuing through the day of the announcement (day 0), abnormal returns move significantly with the sign and magnitude of quarterly unexpected earnings. By the end of day 0, the lowest unexpected earnings portfolio has suffered an average abnormal

[28] In this analysis, the decile 4 portfolio contains firms that "just miss" analysts' earnings expectations. This decile contains a majority of observations with small negative unexpected earnings (mean and median unexpected earnings are –.00121 and –.00485, respectively). In contrast to market lore that firms that "just miss" earnings expectations experience severely negative reactions, the results in Table 4 and in Figure 4 suggest that on average the market reacts only slightly negatively when firms "just miss" earnings expectations.

[29] Prior research documents that prices reflect much information before the information appears in accounting earnings. Research examining the information content of security prices include Beaver et al. (1980) and Beaver et al. (1987).

[30] The size adjustment uses the return to the size decile portfolio to which the firm belongs 60 days prior to the earnings announcement.

[31] At the time of our analysis, returns data for 2003 were not available on CRSP. Consequently, we could not collect the full 60 days of postannouncement returns data for the third and fourth quarters of 2002.

TABLE 5
Cumulative Abnormal Returns during the 60 Days before and 60 Days after Earnings Announcements

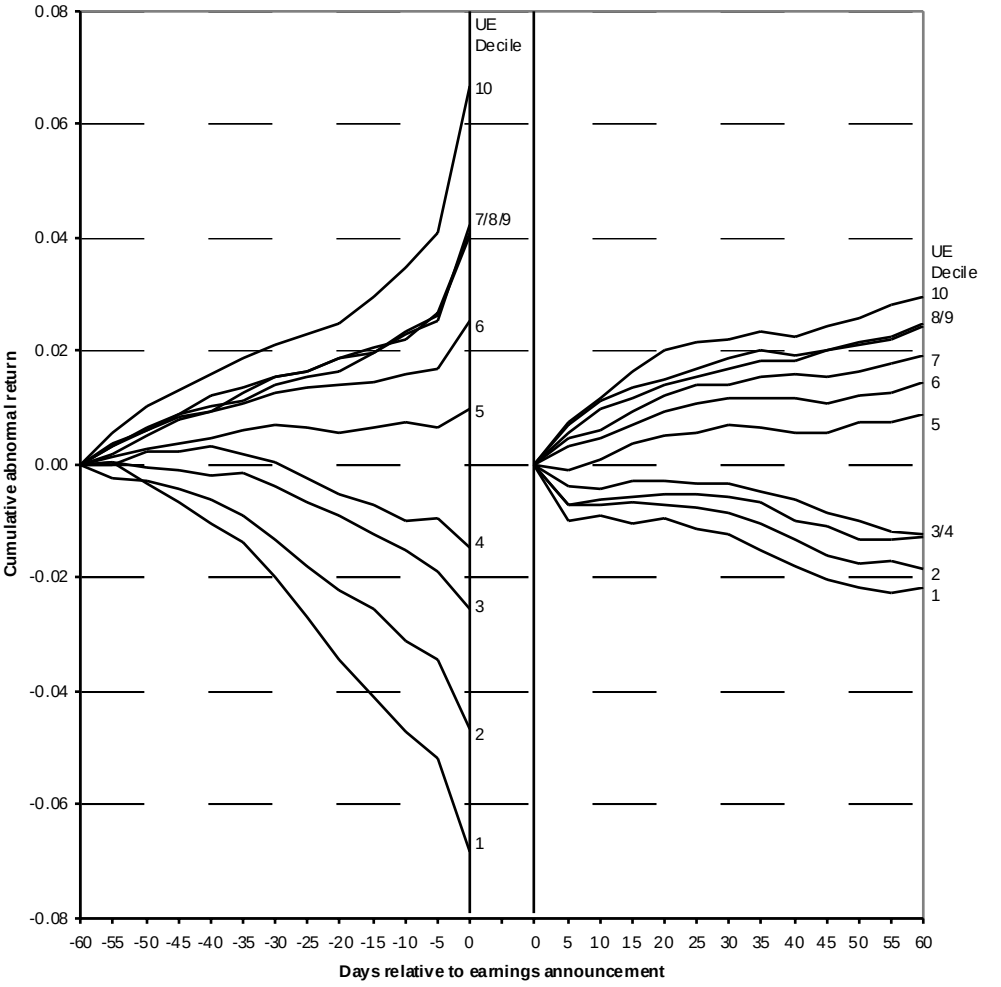
Days Relative to Earnings Announcement	Cumulative Abnormal Returns for UE Decile Portfolios										Highest Minus Lowest
	Lowest UE	2	3	4	5	6	7	8	9	Highest UE	
–55	0.000	–0.002	0.000	0.000	0.001	0.003	0.003	0.002	0.003	0.005	0.005***
–50	–0.003	–0.003	0.000	0.002	0.003	0.006	0.007	0.005	0.006	0.010	0.013***
–45	–0.007	–0.004	–0.001	0.002	0.004	0.008	0.009	0.008	0.009	0.013	0.020***
–40	–0.010	–0.006	–0.002	0.003	0.004	0.009	0.012	0.009	0.010	0.016	0.026***
–35	–0.014	–0.009	–0.002	0.002	0.006	0.011	0.013	0.012	0.011	0.019	0.033***
–30	–0.020	–0.013	–0.004	0.000	0.007	0.013	0.015	0.015	0.014	0.021	0.041***
–25	–0.027	–0.018	–0.007	–0.003	0.006	0.013	0.016	0.016	0.015	0.023	0.050***
–20	–0.035	–0.022	–0.009	–0.005	0.006	0.014	0.019	0.018	0.016	0.025	0.060***
–15	–0.041	–0.026	–0.012	–0.007	0.006	0.014	0.019	0.021	0.020	0.030	0.071***
–10	–0.047	–0.031	–0.015	–0.010	0.007	0.016	0.023	0.022	0.023	0.035	0.082***
– 5	–0.052	–0.034	–0.019	–0.010	0.006	0.017	0.026	0.027	0.025	0.041	0.093***
0	**–0.068**	**–0.047**	**–0.026**	**–0.015**	**0.010**	**0.025**	**0.040**	**0.041**	**0.042**	**0.067**	**0.135*****
5	–0.010	–0.007	–0.007	–0.004	–0.001	0.003	0.004	0.006	0.007	0.007	0.017***
10	–0.009	–0.007	–0.006	–0.004	0.001	0.005	0.006	0.010	0.011	0.012	0.021***
15	–0.010	–0.007	–0.006	–0.003	0.004	0.007	0.009	0.012	0.013	0.016	0.026***
20	–0.010	–0.007	–0.005	–0.003	0.005	0.009	0.012	0.014	0.015	0.020	0.030***
25	–0.011	–0.008	–0.005	–0.003	0.005	0.011	0.014	0.015	0.017	0.021	0.032***
30	–0.013	–0.009	–0.006	–0.003	0.007	0.011	0.014	0.017	0.019	0.022	0.035***
35	–0.015	–0.010	–0.007	–0.005	0.007	0.012	0.015	0.018	0.020	0.023	0.038***
40	–0.018	–0.014	–0.010	–0.006	0.006	0.012	0.016	0.018	0.019	0.023	0.041***
45	–0.021	–0.016	–0.011	–0.009	0.005	0.011	0.015	0.020	0.020	0.024	0.045***
50	–0.022	–0.018	–0.013	–0.010	0.007	0.012	0.016	0.022	0.021	0.026	0.048***
55	–0.023	–0.017	–0.013	–0.012	0.008	0.013	0.018	0.022	0.022	0.028	0.051***
60	**–0.022**	**–0.019**	**–0.013**	**–0.012**	**0.009**	**0.014**	**0.019**	**0.025**	**0.024**	**0.030**	**0.052*****

*, **, *** Denotes statistical significance at the 10 percent, 5 percent, and 1 percent level, respectively.

The sample for this Table and Figure 5 includes 90,470 firm–quarter observations with analysts' earnings forecasts on I/B/E/S and daily returns data on CRSP. We rank firms into deciles each quarter based on unexpected earnings.

Unexpected earnings = actual earnings per share minus analysts' consensus forecast of earnings per share, scaled by price per share as of 60 trading days prior to the earnings announcement (for cross-sectional comparability);
Analysts' consensus forecast = the average of the three most recent forecasts as of 60 trading days prior to the earnings announcement; and
Cumulative abnormal return = cumulative raw return minus the cumulative return to the size decile to which the firm belongs. For preannouncement returns, the cumulation period starts 59 days before the earnings announcement. For postannouncement returns, the cumulation period starts the day after the earnings announcement.

FIGURE 5
Cumulative Abnormal Returns Pre- and Post-Earnings Announcements: A Replication of Bernard and Thomas (1989)



See notes to Table 5 for variable definitions and measurements.

We form portfolios each quarter based on the magnitude of unexpected earnings per share scaled by price per share as of 60 trading days before the earnings announcement.

The sample includes 90,470 firm-quarter observations.

return of –6.8 percent, whereas the highest unexpected earnings portfolio has enjoyed an average abnormal return of 6.7 percent—a difference of 13.5 percent. The average abnormal returns increase monotonically across the ten unexpected earnings decile portfolios. Note that the difference in returns across the extreme decile portfolios is 9.3 percent by the end of day –5. Thus, more than two-thirds of the preannouncement returns (9.3 percent at day –5 divided by 13.5 percent at day 0) have been earned by one week before the earnings announcements. This preannouncement returns evidence, graphically depicted in Figure 5, presents a striking picture of a market that anticipates and reacts quickly to quarterly earnings information.

While the market anticipates and reacts quickly to earnings information, is the reaction complete? Does the market fully react to the new information in earnings when it is announced, so that stock returns *after* earnings announcements are unrelated to the "old" earnings surprise? The post-announcement returns in Table 5 and Figure 5 indicate the answer is no. Beginning on day +1 and continuing through day +60 after the announcement, *abnormal returns continue to drift* significantly with the sign and magnitude of the prior quarter unexpected earnings. By the end of day +60, the lowest unexpected earnings portfolio suffered an additional average abnormal return of –2.2 percent, whereas the highest unexpected earnings portfolio enjoyed an additional average abnormal return of 3.0 percent. The average post-announcement abnormal returns increase monotonically across the ten unexpected earnings decile portfolios. The returns evidence in Figure 5 implies that a large portion of the reaction to information reflected in earnings happens quickly, with a substantial portion occurring weeks before the earnings announcement. However, a small but significant portion of the market's reaction to the *new* information in earnings occurs after the announcement, which implies that the market is not completely efficient, especially when quarterly unexpected earnings are extreme. These results suggest that a hedge fund that took long positions in the top-decile unexpected earnings firms and short positions in the bottom-decile unexpected earnings firms on day +1 each quarter would have earned abnormal returns of 5.2 percent per quarter (before transactions costs) on average over this study period.

This phenomenon has become known as "post-earnings-announcement drift," and it remains one of the most puzzling anomalies in accounting- and financial-economics-based tests of capital market efficiency with respect to earnings information. Ongoing research studies continue the search for explanations, but thus far the post-earnings-announcement drift anomaly has defied all attempts at rational explanation. Post-earnings-announcement drift has been tested against a host of widely established risk-based asset pricing models, against various models for quarterly earnings expectations, against various models for market frictions like transactions costs, and across firms of different size, on different exchanges, and in different countries. To date, none of these tests has produced a rational explanation for post-earnings-announcement drift. The evidence consistently points to the possibility that, even in a highly efficient market with substantial incentives to exploit this anomaly, share prices still react with some delay to extreme quarterly unexpected earnings.

CONCLUSION

In this article, we review theory that links accounting earnings and stock returns. We describe the three theoretical links developed by Beaver (1998) as an intuitive framework for understanding the relation between earnings and returns. The links assume that current period earnings summarizes important information useful for forecasting future earnings (link 1), forecasts of future earnings provide important inputs in developing dividend expectations (link 2), and the present value of expected future dividends determines share price (link 3). This theoretical structure provides a useful framework to understand the value-relevance of earnings, and how to analyze the valuation implications in earnings information.

We then provide empirical evidence on the relation between earnings and stock returns by extending three classic studies using data from 1988 through 2002. Our results cover three major points:

- Annual stock returns are significantly related to the sign of annual earnings changes (Ball and Brown 1968). Our extensions of this analysis reveal that the magnitudes of the earnings changes also contain important information and that annual changes in cash flows from operations have a significant but weaker relation with annual stock returns relative to the earnings-returns relation.
- Earnings persistence helps to explain differences in the relation between stock returns and earnings (Kormendi and Lipe 1987). In our extensions of this analysis, we predict and find that returns

associated with earnings increases are significantly greater for high persistence firms than for low persistence firms, whereas returns associated with earnings decreases do not differ across high and low persistence firms. We conjecture that this occurs because earnings decreases generally do not persist.

- Share prices react rapidly to the arrival of new information in quarterly earnings. We find the market anticipates much of the information in earnings in the weeks before earnings announcements. When earnings surprises are extreme, however, market reactions tend to be incomplete as the earnings news relates to abnormal returns *after* the earnings announcements (Bernard and Thomas 1989).

This article describes theory and empirical evidence on the capital market consequences associated with earnings information. The strong association between earnings and returns explains (in part) why investors, managers, boards of directors, analysts, the financial press, auditors, securities regulators, and others place so much importance on accounting earnings. In addition, our empirical results confirm that these classic research findings still hold over current samples.

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