An Explanation for Why Prior Stock Returns and Analysts' Earnings Forecast Revisions Predict Earnings Management and Forecast errors

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Abstract

We propose that the combination of prior stock returns *and* analyst forecast revisions of current earnings can predict subsequent firm earnings manipulations and analyst forecast "errors" in a setting in which investors, analysts, and managers are rational and do not behave opportunistically. We find empirical support for the prediction that firms that earn large positive abnormal returns and for which contemporaneous analyst earnings forecast revisions are positive are more likely to manage earnings up or down to beat analyst forecasts, whereas firms that earn large negative abnormal returns and for which analyst forecast revision are negative are more likely to engage in extreme income-decreasing earnings management. When combined with the argument that analysts forecast an earnings number that excludes transitory and managed components, such forms of earnings manipulations will contribute to the presence of two well-documented asymmetries in cross-sectional distributions of analysts' forecast errors; a higher incidence and magnitude of extreme bad news surprises than extreme good news surprises, and a higher incidence of small, good news surprises than small, bad news surprises. We discuss the implications of the empirical support we find for our hypotheses for interpreting prior findings, developing hypotheses, and designing empirical tests in the analyst forecast rationality, earnings management, and earnings response coefficient literatures.

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1. Introduction

In this paper we propose a framework to explain how the combination of prior abnormal stock returns and revisions of analysts' current earnings forecasts can predict subsequent firm earnings manipulations and specific types of analysts' forecast "errors", in a setting where analysts and managers do not behave opportunistically or irrationally.

The basic intuition underlying our analysis is that abnormal returns generated in the period prior to the earnings announcement are associated with transitory earnings shocks that do not predict future dividends and permanent or core earnings shocks that do predict future dividends. Because abnormal returns provide a noisy signal about a change in core earnings, a contemporaneous revision of an analyst forecast of core (i.e., unmanaged) earnings will affect uninformed investors' posterior probability that stock price moved because of a core earnings shock. In particular, when prior abnormal returns and analyst forecast revisions are both positive, investors' posterior belief of an increase in core earnings is relatively strong. In this case, firms that have actually experienced an increase in core earnings (but are limited in their ability to communicate this information directly) are more likely to manipulate reported earnings up or down to beat forecasts. Because analysts exclude both transitory and managed components of earnings from their forecasts of core earnings, such earnings manipulations will result in small, apparently pessimistic forecast errors. Conversely, when prior abnormal returns and analyst forecast revisions are both negative, firms that have actually experienced a decrease in core earnings growth are more likely to engage in earnings manipulations that create large accounting reserves, simultaneously revealing their private information and creating flexibility to inflate earnings to reveal private information in the future. Again, because analysts do not forecast managed components of earnings, such manipulations will result in large, apparently optimistic forecast errors.

In addition to developing and testing the preceding predictions, we also employ our framework to examine two forecast "horizon" effects documented in the prior literature. The first horizon effect is the phenomenon of a decrease in mean optimism in the cross-section of distributions of analysts' forecasts as the announcement date approaches. The second horizon effect is the phenomenon of an increasing incidence of apparent good-news forecast errors (i.e., apparent analyst pessimism) as the earnings announcement date approaches. We demonstrate that the first horizon effect is associated with analysts pinpointing over the horizon firms that experience large economic losses and that are likely to fully recognize these losses in reported earnings under conservative accounting rules. Thus, analysts' revisions over the period lead to a reduction in the incidence of extreme apparently optimistic forecasts among a subset of firms from the initial to the ending forecast rather than to the elimination of generalized optimism in forecasts for all firms. This reduction explains why mean apparent optimism declines in the cross-section as the announcement date approaches.[1] We show that the second horizon effect, the increase in the incidence of good news forecast errors as the announcement date approaches, is concentrated among firms whose stock price has performed well during the period and for which analysts revised their forecasts of core earnings upward. Such firms, as indicated earlier, are more likely to report earnings that slightly beat analysts' forecasts. Thus, it is the increase in the incidence of small, good-news forecast errors among good performers rather than general increase in good news forecast for all firms that gives rise to the second horizon effect.

Predictable errors in analysts' forecasts and firm earnings manipulations are commonly construed in the prior literature to be evidence that analysts intentionally or unwittingly bias their forecasts and that managers opportunistically manipulate earnings to fool naïve investors. A distinguishing feature of our analysis is that our predictions are based on the assumptions that analysts' forecasts are not biased, managers' reporting incentives are not misaligned with investors' incentives, and investors are not fooled by firm earnings manipulations. Nevertheless, we still expect to observe several salient features of cross-sectional distributions of analysts' forecast errors, including asymmetry in the middle of the distribution (i.e., a higher incidence of small good news compared to small bad news surprises), and asymmetry in the tails of the distribution (i.e., a higher incidence and the greater magnitude of extreme bad news forecast errors than extreme good news

[1] Nevertheless, analysts' revisions do not fully anticipate actions by firms, especially among the poorest performers, to "overstate" their economic losses to create reserves, ensuring that apparent mean optimism is never completely eliminated even in the distribution of forecasts outstanding at the end of the period.

errors). Abarbanell and Lehavy [2003b] document persistent evidence of these two asymmetries in cross-sectional distributions of analyst forecast errors and demonstrate how such asymmetries have generated contradictory conclusions concerning both the existence and the form of analysts' forecast bias and inefficiency in nearly four decades of research.

Our analysis also provides an earnings management-based explanation for the evidence reported in Abarbanell and Lehavy [2003b] that the presence of both notable asymmetries in analyst forecast error distributions is strongly associated with realizations of unexpected accruals embedded in firms' reported earnings. While reported earnings is the benchmark that empirical researchers have been implicitly assuming is analysts' forecasting objective, the empirical evidence we present in this paper suggests that analysts' forecasting objective is more aptly described as an earnings number that excludes both transitory items (that do not predict future earnings) *and* the effects of earnings manipulations undertaken by management.

The arguments and evidence we present in this paper in no way preclude the possibility that cognitive biases or incentives can lead analysts to intentionally or unintentionally bias their forecasts, or that managers engage in earnings management for opportunistic reasons. However, they do raise questions about what the appropriate null hypothesis should be in empirical tests of these possibilities and suggest the need for sharper alternative hypotheses, more demanding test designs, and/or more extensive controls for omitted variables in empirical investigations of them. The point is reinforced by the fact that the predictions we offer are pertinent to observable variables researcher often rely on to infer irrational or opportunistic behavior across different literatures, and all of them are supported by the empirical evidence. Finally, to the extent that the framework we present is descriptively valid, it offers a starting point for generating new hypotheses and identifying relevant independent and dependent variables in the analyst forecast, earnings management, and earnings response coefficient literatures.

The remainder of the paper is organized as follows. In the next section we develop our empirical predictions. Section 3 describes the data and variables used in empirical tests. The results of our empirical tests are presented in section 4. We present additional empirical results in section 5 concerning the evolution of analysts' forecast errors over the forecast horizon that are relevant to evaluating our earlier findings. Section 6 provides a summary and a discussion of some implications of our findings.

2. Hypothesis development

2.1 Overview

Timeline

Although we do not present a formal model, our hypotheses are developed with the following sequence of events in mind: 1) Analysts forecast earnings at the beginning of the period, 2) new private and public information is impounded in stock returns during the period, 3) analysts collect information about current earnings during the period and revise their forecasts of these earnings before an earnings announcement, 4) firms choose reported earnings at the end of the period after observing the realization of prior returns and analysts' forecasts revisions. Our predictions below are based on the following set of assumptions that have an intuitive appeal as well as analytical and empirical support in the prior literature.

Assumptions about prices and earnings

First, we assume stock returns observed during the period reflect information about transitory earnings shocks that do not predict future dividends or cash flows, as well as shocks to permanent or "core" earnings that do predict them (see e.g., Ohlson 1999). The likelihood of positive or negative transitory shocks to earnings is assumed to be the same across firms. We also assume that some investors are uniformed as to whether observed abnormal returns reflect a transitory or a permanent change in core earnings and that uninformed investors would benefit from acquiring new information that distinguishes between the two types of earnings changes. Managers are assumed to be as well informed as the most informed investor.

Relying on the arguments and evidence presented in Abarbanell and Lehavy [2003a and 2003b], we argue that stock prices of firms that earn large positive abnormal returns over the period will be more sensitive to earnings news than firms that earn large negative returns over the period. Accordingly, stock prices of firms with a high sensitivity to earnings news are likely to exhibit stronger price reaction for a given magnitude of surprise than stock prices of firms with a low sensitivity. A formal argument that aligns well with this characterization and relevant empirical evidence in the literature is presented in Veronesi [1999]. He analyzes a dynamic model of price formation in which risk-averse investors' uncertainty about underlying asset growth yields a pricing function that is an increasing and convex function of investors' posterior probability that a firm is in a high or a low growth state. He demonstrates that in high expected growth states, *bad* news reduces expected dividends and increases uncertainty about true growth, leading to larger price declines than would be predicted in a standard present value model. In low expected growth states, *good* news increases expected dividends as well as uncertainty about true growth, leading to smaller price increase than would be predicted in a standard present value model.

The implications of Veronesi's model also align well with a substantial body of evidence that demonstrates prior abnormal returns are positively associated with expected earnings growth (see e.g., Stickel 1995, and Finger and Landsman 1998) and that the proportionality of price responses to earnings news is a function of expected growth (e.g., Skinner and Sloan 2002). In addition to serving as an imperfect proxy for expected earnings growth in the context of the Veronesi model, an empirical analysis based on prior abnormal returns over a reporting period allows us to reinterpret evidence in extant literature of an association between realizations of prior economic variables and apparent analyst forecast errors.[2] While such associations have been construed as evidence that analysts under or overreact to prior information as a result of cognitive biases they suffer from or asymmetric incentives they face, our analysis suggest an alternative interpretation; that realizations of prior returns are informative about both the likelihood and the form of earnings management firms will subsequently engage in that is rationally unanticipated in analysts' forecasts of core earnings. Conceptually, linking abnormal returns (which foreshadow earnings changes) to the incentives of firms to manage earnings and to analyst apparent forecast errors also provides a foundation for furthering our understanding of price responses to earnings announcements in particular, and equilibria involving communication among investors, analysts, and managers in general.

[2]The rank of prior returns, prior earnings changes, P/E ratios, Market-to-book ratios, and outstanding stock recommendations have all been shown in the literature to distinguish empirically between firms with high and low growth expectations (see, e.g., Skinner and Sloan 2002, and Abarbanell and Lehavy 2003a).

Assumptions about the role of earnings management and the impact of conservative accounting

We assume that both investors and managers consider the creation or conservation of accounting reserves valuable because such reserves provide flexibility for firms to manipulate earnings to convey private information over multiple periods.[3] All else equal, firms are more likely to create valuable accounting reserves (alternatively, to pay back past instances of borrowing from future earnings) when their stock price sensitivity to earnings news is low. Conversely, firms are more likely to use or forego the creation of accounting reserves in order to report earnings that fulfill investors' expectations when their stock price sensitivity to earnings news is high. The manager uses publicly observable prior abnormal stock returns and analysts' forecast revisions to decide when and how to reveal his private information to uninformed investors about the permanence of earnings shocks through his choice of a reported earnings number. The relative weight that uninformed investors wish managers to place on the competing objectives of inflating earnings versus creating accounting reserves in a given period is internalized by the manager. Thus, in our setting, managers' may not always report "true" earnings; for example, when they manipulate earnings to offset transitory components of earnings and better reflect core earnings, or when they manipulate earnings to create large accounting reserves, but their earnings manipulations are not undertaken strategically.[4]

Finally, firms must operate under the reporting constraints of conservative accounting rules. Conservative accounting rules, all other things equal, facilitate the recognition of economic losses and constrain the recognition of economic gains in current income. This fact has lead to the widely accepted view (adopted in our analysis) that under certain circumstances firms are inclined to exploit

[3] We are not the first study to rely on the notion that managers are limited in their ability to publicly reveal their private information. Motivation for this assumption can be found in the analytical literature that examines violations of the conditions necessary to invoke the revelation principle, the existence of proprietary costs, and separating equilibria in a signaling setting. We stress that we do not argue that earnings management is the best or only method available to managers for informing the market of their private information, only that it is a viable method for some of them.

[4] Lacking a formal model, we must be silent on two important issues. First, justifying earnings management undertaken to inform investors requires a multi-period model with which it can be shown how some party—e.g., uninformed investors, informed investors or managers—are made better off in a world where earnings are manipulated than in a world where they are not. Second, it is possible that the introduction of analysts in our setting may lead to welfare gains to some parties at the expense of others. In this regard our setting does not differ from others that imply wealth transfers will occur between parties when additional information or communication mechanisms are introduced, especially those that the potential injured parties for institutional reasons may not be able to preclude. Allowing for strategic behavior on the part of management has the potential to complicate, reinforce or alter some of our predictions.

opportunities to "over charge" income in some periods in order to payback prior period "borrowings" from future earnings or to create reserves that can be used to inflate earnings in the future. Our predictions and empirical results are consistent with the idea that there will be a limited number of firms in the cross-section for which discretionary manipulations of accruals under conservative accounting rules will have a discernable impact on the cross-sectional distribution of firms' reported earnings numbers (see, Watts 2002).

Assumption about analysts' forecasting objective

An important element in our analysis is the assumption that analysts' objective is to forecast the permanent or core earnings and not reported earnings which may include transitory items and/or managed earnings components. The assumption that analysts do not forecast transitory items is consistent with commercial forecast data provider descriptions of analysts' forecasting objectives, which leads to the exclusion of transitory items in the reported earnings numbers they provide along with analysts' forecasts (see Abarbanell and Lehavy 2002).[5] Note also that, to the extent that abnormal stock returns over the period reflect private or public information about changes in core earnings and analysts acquire and truthfully report their information, this assumption implies that stock returns and analysts' forecast revisions will be positively correlated. If, however, stock returns reflect information about transitory changes in earnings, there should be no correlation between stock returns and analysts' forecast revisions over the period. In our setting the analyst is motivated to uncover information about core earnings and report it non-strategically.[6]

Our explicit assumption concerning the analyst forecasting objective differs from the implicit assumption made in the overwhelming majority of studies on analyst forecast rationality and price responses to earnings. These studies implicitly assume that the proper benchmark to the forecasts is the reported (and potentially managed) earnings. Abarbanell [2002] offers a challenge to the

[5] We use Zacks reported earnings for our empirical tests, which like forecasts, should be free of transitory items, leaving only the core earnings and any earnings management undertaken with manipulations of real investment and operating decisions, and accounting manipulations in their version of firms' reported earnings.

[6] We emphasize that we are not discounting the possibility that analysts behave strategically in some settings (e.g., where investment banking relations exist between the firm and analysts) or suffer from cognitive biases. Rather, we are arguing that any empirical test of a generalizable theory that involves analysts' incentives should first be clear on what is the analysts' assumed forecasting objective.

standard assumption in the literature.[7] He points out that the assumption that firms' reported earnings number is the target of analysts' forecasts implicitly accepted over the last four decades, has never been motivated theoretically, empirically, or anecdotally, and offers several reasons to believe that such an assumption may not be descriptive. One reason that analysts may not be able or induced to anticipate earnings management in their forecasts is that managers have multiple objectives for managing earnings, the priorities of which are not completely transparent to outsiders. This argument is consistent with the analysis in Fischer and Verrecchia [2000] which demonstrates that even though investors can, on average, properly price the cost of earnings manipulations, unobservability of the managers' objective function will prevent them from unraveling the actual manipulation in individual cases. This, however, is exactly the task required of analysts if they are to avoid forecast errors that result from firms' strategic manipulation of earnings.

A second reason for why analyst forecasts may not anticipate strategic earnings management is that analysts may have a disincentive to adjust every individual forecast they issue for the probability that a firm is going to engage in extreme income decreasing manipulations or in manipulations that leave earnings equal to or slightly above a relevant earnings target. While it may be possible for analyst to adjust forecasts using information in prior return realizations, the question of what type of adjustment to make poses a dilemma for the analyst. For example, it is possible for individual analysts to adjust each forecast for an estimate of possible discretionary biases in reported earnings. This strategy would be optimal if it analysts' objective was to minimize the mean error of *all* the forecasts they issue. It would not be the case, however, under alternative assumed loss functions. At a minimum, this approach will lead to an increase in the number of non-zero forecast errors committed by analysts, a scenario that is potentially at odds with analysts' actual loss functions, about which relatively little is known.[8]

[7] An empirical challenge to the descriptiveness of the standard assumption made in the literature is raised by the findings in Abarbanell and Lehavy [2003b], which demonstrate a link between unexpected accruals and forecast errors that comprise two asymmetries in forecast error distributions whose influence on the statistical inferences in the forecasting literature has been substantial.

[8] Gu and Wu (2002), for example, propose the possibility that analysts are motivated to minimize the mean absolute forecast error. Under this assumption, it is optimal for analysts to report a forecast of the median of possible earnings outcomes for individual firms. Such a strategy will result in the smallest expected mean absolute forecast error for each firm but the appearance of optimistic (pessimistic) bias in forecast in cases where the distribution of a firm's earnings is negatively (positively) skewed.

Finally, and most relevant to our setting, even if analysts are capable of unraveling manipulations and have no disincentive to adjust individual forecasts for an estimate of potential earnings manipulations, they may have no incentive to include such an estimate in their forecast. This would be the case if firms' earnings manipulations are undertaken relative to analysts' expectations of unmanaged earnings as a means of revealing managers' private information in a manner that is in the best interest of investors (see, e.g., Verrecchia 1986).[9]

We rely on the preceding assumptions to formulate our hypotheses below. The first set of predictions concerns the impact of equity market incentives of firm earnings manipulations to beat forecasts. The second set of predictions concerns the impact of equity market incentives for firms to create accounting reserves.

2.2. Predictions concerning firm earnings manipulations to beat forecasts

Based on the assumptions discussed above, we offer a set of predictions concerning earnings management as a function of firms' prior abnormal returns and contemporaneous analyst revisions of their core earnings forecasts. Our first hypothesis is formalized as follows:

> H_{1a}: Firms that earn large positive abnormal returns during the period are more likely to manipulate reported earnings up or down to slightly beat analysts' earnings expectations than firms that earn large prior negative abnormal returns.

H_{1a} relies only on the ability of prior stock returns to proxy for changes in expected core earnings. Uninformed investors will infer a higher likelihood that there has been an increase in expected core earnings growth when they observe abnormally large positive returns during the period than when they observe large negative abnormal returns.[10] If manager and investor incentives

[9] In fact if there is an element of randomness in unraveling earnings manipulations at the individual firm level before the fact, investors may be unable to completely disentangle noise applicable to forecasting core earnings from noise associated with forecasting reporting biases when both elements are combined in a single earnings estimate. This would be problematic for investors who both wish to make investment decisions based only on forecasts of core earnings and wish to learn from observing the difference between the earnings firms report and outstanding forecasts of core earnings (e.g., when the bias in reported earnings is informative about managers' private information).

[10] It is possible that investors infer from a large abnormal return that there was a large transitory shock associated with a change in firm risk rather than expected dividends. It is also possible that investors infer a greater likelihood of a transitory earnings shock after observing an extreme return, e.g., if the variance of transitory shocks exceeds the variance of core earnings shocks. In either case, as long as the sign of prior abnormal returns are informative about the sign of a

are aligned but managers are limited in their ability to communicate their private information, then firms that actually experienced an increase in core earnings have a stronger incentive to "confirm" the information reflected in prior abnormal returns and to ensure reported earnings fulfill market expectations than other firms. This is because the costs of failing to meet or beat analysts' forecasts (i.e., reporting bad news) are larger in states previously inferred to be high, as bad news results in both a lower expectation of future cash flows and greater uncertainty about the firm's true earnings growth state. Put differently, managers and investors implicitly agree that when prior stock returns suggest that the firm is in a higher expected core earnings, the cost of failing to, say, to offset a transitory negative shock by inflating reported earnings to beat forecasts, is relatively high compared to the foregone benefits of creating reserves.[11] It is the act of reporting earnings that beat expectations by small amounts rather than, say, providing detailed disclosures that dissect and interpret the composition of unmanaged earnings, which reveals the manager's private information. The fact that firms that earn large positive abnormal returns during the period are more likely to have had an increase in expected core earnings than other firms leads to the prediction in H_{1a}.[12]

The prediction in H_{1a} suggests a reason for why one might expect to observe a relatively small asymmetry near the middle of cross-sectional forecast error distributions in the form of a higher concentration of small good news than bad news forecast errors. Furthermore, it suggests a reason for why the asymmetry would be expected to be larger for firms that earned positive prior abnormal returns, an empirical finding documented in Abarbanell and Lehavy [2003b].

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core earnings shock, our predictions will hold. Focusing on *large* positive and negative returns in our analysis could, in either case however, reduce the power of our tests because of noise in our proxy for core earnings changes. On the other hand, if extreme abnormal price changes are more likely to be caused by core earnings changes focusing on extreme returns should result in a more powerful test.

[11] To the extent accounting reserves are valuable to firms and investors, the cost of using or foregoing their creation to inflate earnings to beat expectations rises relative to the benefit as the magnitude of inflation increases. The argument reinforces the idea that earnings management is limited to *meeting or slightly beating* expectations in situations where the failure to do so can have disproportional impacts on price.

[12] Note that we use abnormal returns and forecast revisions measured from the beginning of the period up to the analysts' final forecasts as partitioning variables in developing our predictions and carrying out our tests. We have no reason to suspect that the amount of accounting reserves available to a firm at the beginning of the period will vary as a function of the sign or magnitude of either variable. That is, if analysts forecast core earnings and available accounting reserves can not predict future abnormal returns, there is no *ex ante* reason to believe that systematic differences in available accounting reserves at the beginning of the period will be associated with returns or revisions in a manner that would confound our predictions or the interpretation of our empirical results.

Because stock returns can reflect components of earnings that are transitory and uninformative about future earnings growth, as well as components of earnings that are permanent and are predictive of future earnings growth, uninformed investors have an incentive to generate a signal from an orthogonal source that provides information that distinguishes between the two possibilities before earnings are announced.[13] A cost effective way for investors to generate such a signal for many securities would be to enlist the services of analysts to produce forecasts of core earnings that will help them disentangle transitory and permanent earnings shocks. Adding analysts to the mix leads to the following refinement of H_{1a}:

> H_{1b}: The likelihood that a firm will manipulate reported earnings up or down to slightly beat outstanding forecasts following a positive forecast revision is greater for firms that earn large positive prior abnormal returns than large negative prior abnormal returns.

H_{1b} refines the prediction in H_{1a} to reflect the intuition that when prior positive abnormal returns earned over the period are linked to changes in expected core earnings through an informative and "confirmatory" positive revision in analysts' forecasts over that same period, investors have a stronger posterior belief of higher earnings growth. The firm, therefore, has a greater incentive to engage in earnings manipulations to slightly beat forecasts (alternatively, use or forego the creation of reserves).

The prediction in H_{1b} has the flavor of "man bites dog" in that, all else equal, one would expect, *a priori*, that the set of firms for which analysts' revisions over the period were only positive would result, *ex post*, in more optimistic, not more pessimistic, forecasts (or at least no predicted difference in the incidence of each). However, we predict that this potential selection bias will be more than offset by the impact of the positive revision in analysts' forecasts on the incentive of

[13] For example, to the extent that informed investors, whose information drove the abnormal return, do not possess the wherewithal to move price to completely reflect their information, or to the extent prices are not inefficient, a pre-earnings announcement signal that distinguishes between transitory and permanent shocks could be valuable to uninformed investors. This would be true even if they were essentially paying for the same signal that caused the price to move in the first place. A benefit to distinguishing between the two types of earnings shocks may arise even if informed investors had perfect information, no wealth constraints, and prices were completely efficient, if investors wish to rebalance their portfolios as function of the characteristics of individual securities on a timely basis using this information.

managers of firms that earned the largest prior positive returns to report earnings that beat analysts' expectations. That is, among the firms for which investors have inferred a higher likelihood of core earnings growth and for which there has been a confirmatory positive analyst forecast revision, the ones with private information that such growth will actually occur are now obliged to meet or slightly beat an analyst forecasts. It follows that when the sign of the forecast revision coincides with the prior positive abnormal return, it is even more likely that the subsequent forecast error will fall in the asymmetry near the middle of cross-sectional distributions of forecast errors documented in Abarbanell and Lehavy [2003b].

While earnings management of any sign and magnitude can, in principle, result in firms reporting earnings that slightly exceed analysts' forecasts, the arguments that motivate the previous hypotheses involve the cost to the firm of missing forecasts relative to the cost of using valuable accounting reserves. This suggests that, all else equal, the cost of using reserves to inflate earnings to beat forecasts will be lower the closer pre-managed earnings is to outstanding analyst forecasts. If so, it will be relatively more likely that a pre-managed core earnings realization that falls slightly short of analysts' forecasts will be inflated to beat forecasts than other pre-managed earnings outcomes. This leads to our next pair of hypotheses:

> H_{2a}: The likelihood that reported earnings number exceeds versus falls short of analyst earnings forecasts by small amounts is greater for firms that earn large prior positive abnormal returns than large prior negative abnormal returns.

Assuming it is less costly to inflate earnings to beat analyst forecasts for any firm when the shortfall in pre-managed earnings is small, it follows that firms that earn large prior positive abnormal returns and, therefore, have a greater incentive to avoid earnings shortfalls, are more likely to inflate pre-managed earnings (that would have resulted in a slight bad news surprise) to generate a slight good news surprise. Furthermore, if the sign of analyst forecast revision strengthens investors' beliefs about the firm's growth state and therefore the firm's incentives report earnings that beat forecasts, then it follows that:

H_{2b}: Among firms that earn large prior positive returns, the likelihood that reported earnings exceeds versus falls short of analyst earnings forecasts by small amounts is greater following a *positive* analyst forecast revision than a *negative* one.

2.3. Predictions concerning firm earnings manipulations to create large reserves

Our next pair of hypotheses concerns the earnings management tendencies of firms with lower growth expectations, i.e., firms that realize abnormally large negative returns over the period:

H_{3a}: Firms that earn large negative abnormal returns during a reporting period are more likely to manipulate earnings downward by extreme amounts than firms that earn large positive returns.

H_{3a} relies only on the ability of prior stock returns to proxy for changes in core earnings expectations and, therefore, stock price sensitivity to earnings news. Among firms that earn large negative abnormal returns during the period, uninformed investors will infer a higher likelihood of a decrease in expected core earnings growth than they would if they observed a large positive abnormal return. If the manager's incentives are aligned with investors' incentives, then firms that experienced an actual decrease in core earnings have a relatively stronger incentive to manage earnings downward to create valuable reserves and/or pay back borrowing of earnings in prior periods. This is because the value of beating analysts' forecasts (i.e., reporting good news) is small in lower core earnings states as good news leads investors to expect higher dividends in the future, but also greater uncertainty about the firm's true growth state. Put differently, mangers and investors agree that in low expected growth states any earnings news will have a relatively low impact on price, which increases the relative benefit of creating reserves though income-decreasing actions. The fact that firms that earn large negative prior abnormal returns are relatively more likely to have had a decrease in expected core earnings leads to the prediction in H_{3a}.

Analogous to the refinements to the hypotheses above, we argue that uninformed investors have an incentive to acquire information before earnings are announced that distinguishes between the possibilities that large prior negative returns were due to transitory events or changes to core earnings. Adding analysts to the mix to serve this purpose leads to a refinement of the previous hypothesis:

> H_{3b}: The likelihood that a firm will manipulate reported earnings *down* by extreme amounts following a *negative* forecast revision is greater for firms that earn large *negative* prior abnormal returns than large *positive* prior abnormal returns.

H_{3b} refines the prediction in H_{3a} to reflect the intuition that when prior negative abnormal returns earned over the period are linked to declines in expected core earnings growth through an informative, confirmatory negative revision in analysts' forecasts over that same period, there is a greater incentive for firms to engage in earnings manipulations to create reserves. This is because uninformed investors' posterior belief that a lower core earnings state has been reached is stronger after the revision.

We turn next to predictions concerning apparent analyst forecast errors for firms that earn large negative returns during the period. Recall that such firms are expected to have low growth expectations and relatively low stock price sensitivity to earnings news:

> H_{4a}: The likelihood that reported earnings fall short of analysts' earnings forecast by extreme amounts is greater for firms that earn large *negative* abnormal returns during the period than other firms.

H_{4a} follows directly from the predicted tendency identified in H_{3a} of firms that earn large negative abnormal returns to engage in extreme income-decreasing earnings management and the assumption that analysts' objective is to forecast core earnings. The prediction is consistent with the evidence presented in Abarbanell and Lehavy [2003b] and suggests that the firms with large negative prior abnormal returns will be overrepresented in the documented asymmetry in the tails of cross-sectional distributions of analysts' forecast errors, i.e., a higher frequency and magnitude of extreme apparent optimistic than extreme apparent pessimistic errors.

The effect of adding analysts to the sequence of events leads to following prediction concerning analysts' forecast errors:

H_{4b}: Among firms that earn large prior negative returns, the likelihood that an analyst's earnings forecast exceeds the firms reported earnings number by extreme amounts is greater following a negative prior forecast revision than a positive one.

Again, this prediction is counterintuitive. One would expect, *a priori*, that isolating on firms for which analysts' revisions over the period were negative would result, *ex post*, in more pessimistic not more optimistic forecasts. However, we predict that this potential selection bias will be more than offset by the impact of the negative revision in analysts' forecast on the incentive of managers to engage in extreme incoming-decreasing earnings management among firms that earn the largest negative abnormal returns over the period. That is, among firms for which uninformed investors have inferred a higher likelihood of negative core earnings growth, those that have actually experienced negative growth are less constrained to fulfill investors' expectations and are therefore more likely to convey their private information by undertaking extreme income-decreasing actions to create reserves. It follows that when the sign of the forecast revision is consistent with the prior negative abnormal return, it is even more likely that the subsequent forecast error will fall in the negative tail of cross-sectional distributions of forecast errors.

To summarize, the predictions in this section suggests that researchers should expect to observe the following tendencies associated with typical cross-sectional distributions of analysts' forecast "errors": 1) The presence of a relatively small number of extreme negative differences between analyst forecasts of core earnings and reported earnings that will generate a large apparently optimistic mean error in the cross-section, 2) Observations that contribute most to the finding of a large negative mean forecast error in the cross-section are associated with firms that earn the largest negative prior abnormal returns (i.e., apparent extreme underreaction to bad news), 3) The incidence of small, apparently pessimistic errors will exceed the incidence of small, apparently optimistic errors of equal magnitude, 4) Observations that contribute most to the finding of a higher incidence of small good news errors in the cross-section are concentrated among firms that earn large positive prior abnormal returns (i.e., apparent slight underreaction to good news).

The preceding predictions, by providing a reason for observing the two notable asymmetries in forecast error distributions, in turn provides a reason for the often conflicting character of statistical evidence in found in the separately developed literatures on analyst forecast bias and forecast inefficiency.[14] Furthermore, the hypotheses developed in this section suggest that evidence of apparent biases and inefficiencies in analysts' forecasts documented in previous studies will be even more pronounced when the revisions of analysts' forecasts are positively associated with contemporaneous abnormal returns.

3. Data and Sample Description

The empirical evidence in this paper is drawn from a large database of consensus quarterly earnings forecasts provided by *Zacks Investment Research*. The *Zacks* earnings forecast database contains approximately 180,000 consensus quarterly forecasts for the period 1985–1998. Analyst earnings forecast revision are defined as the difference between the consensus earnings forecast outstanding 10 days after the announcement of the previous quarter earnings and consensus earnings forecast outstanding prior to the current quarterly earnings announcement.

For each covered firm, we calculate forecast errors as the actual earnings per share (as reported in *Zacks*) minus the consensus earnings forecast outstanding prior to announcement of quarterly earnings, scaled by stock price at the beginning of the quarter and multiplied by 100. Our results are insensitive to alternative definitions of forecasts such as the last available forecast or average of the last three forecasts issued prior to the quarter end. To ensure comparability of our results to those of other studies, we follow the common practice of winsorizing the distributions of quarterly forecast errors at the 1st and 99th percentiles to mitigate the possible effect of data errors. All tests are performed on the winsorized data. Lack of availability of price data reduces sample size to 123,822 quarterly forecast errors.

[14] See Abarbanell and Lehavy [2003b] for a detailed discussion of how and why inferences concerning analysts' forecast rationality have varied as a function of whether statistical tests employed by researchers were parametric or non-parametric. The studies they review all rely on the implicit, but unmotivated, assumption that analysts' objective is to forecast reported (i.e., potentially managed) earnings.

Unexpected accruals reported in the tables are the measure produced by the modified Jones model (Jones 1991) applied to quarterly data (see the appendix for calculations). To facilitate comparison with our forecast error measure, we express unexpected accruals on a per-share basis scaled by price. The qualitative results are unaltered when employing other estimation techniques found in the literature (including one that excludes nonrecurring and special items).[15]

The data requirements for estimating quarterly accruals further reduce the sample on which our tabled results are based to 33,548 observations. All results presented in the paper pertain to the reduced sample, however, we stress that results concerning forecast errors are statistically stronger for the full sample.

Column 2 of table 1 presents descriptive statistics for the reduced forecast error sample. The mean forecast error over the sample period is -0.126, consistent with prior conclusions in extant literature of general optimism in analysts' forecasts (see, e.g., reviews by Brown 1993 and Kothari 2001). It can be seen in Panel A of figure 1, which presents the percentile values of the pooled quarterly distributions of forecast errors, that the long, fat negative tail, which characterizes the typical distribution of forecast errors accounts for the mean result. While the distribution is negatively skewed and leptokurtic, the median error is zero, and the percentage of positive (good-news), negative (bad-news), and zero forecast errors is 48%, 40%, and 13%, respectively. As noted in Abarbanell and Lehavy [2003b], median errors and frequencies of negative errors in cross-sectional quarterly observed over the relatively long sample period examined in this study are inconsistent with the prevailing wisdom in the business press and many hypotheses in the academic literature that suggest analysts are hard-wired or motivated to produce optimistic forecasts.

Column 3 of table 1 presents selected statistics of cross-sectional distributions of firm quarterly unexpected accruals over the sample period. The mean unexpected accrual over the sample period is equal to -0.217. While the distribution is negatively skewed and leptokurtic, the median accrual is 0.023, and the percentage of positive and negative unexpected accruals is nearly equal. It

[15] For the purposes of sensitivity tests, we also examine a measure of unexpected accruals that excludes nonrecurring and special items (see Hribar and Collins [2002]), and use this adjusted measure in conjunction with *Zacks'* consensus forecast estimates and actual reported earnings, which also exclude such items. All the results involving unexpected accruals reported in the paper are qualitatively unaltered using this alternative measure.

is evident from panel B of figure 1 that, while the unexpected accrual distribution is relatively symmetric in the middle, it is characterized by a longer negative than positive tail as seen through a comparison of the values at the 10th and 90th percentiles. The differences become progressively larger with comparisons of counterpart percentiles farther out in the tails. For example, the average 5th and 3rd percentile values are approximately 1.17 times larger than the average 95th and 97th percentiles, and the average value of the 1st percentile is 1.30 times larger than the average value of the 99th percentile. We emphasize that, although the percentile values of unexpected accruals vary from quarter to quarter, the basic shape of the distribution is similar in every quarter.

4. Empirical Results

4.1. Empirical results concerning firm earnings manipulations to beat forecasts

Table 2 presents the results of tests of $H_{1a.}$ Firms are first ranked and partitioned into quintiles by the sign and magnitude of prior abnormal returns. We calculate prior abnormal returns for the period using returns earned between 10 days after the last quarterly earnings announcement (to align them with the initial analyst forecast outstanding) to the date that analysts' issued their final forecast revision prior to an earnings announcement (on average 12 days). Returns are measured as the difference between the buy-and-hold return over the period minus the value-weighted market portfolio return for the same period. The frequency of observations that fall into small positive (i.e., small apparently pessimistic) forecast error ranges of (0, .05], (0, .10], (0, .20] is indicated in the columns. It can be seen in panel A that a significantly higher number of observations fall into this small good-news range when there is a large prior positive abnormal return than a large prior negative return (e.g., 22.0% versus 14.5% of positive forecast errors that are no larger than .10% of price). Panel B presents the results after dividing the forecast errors in each interval by the sign of unexpected accruals recognized by the firm. The results are qualitatively similar to panel A. Regardless of which direction earnings were managed, the probability of beating forecasts is greater for firms that earn large prior positive abnormal returns than for those that earn large negative abnormal returns.

Table 3 presents results of tests of H_{1b}. The column totals represent, by quintile of prior abnormal return, the number of observations in each interval of slightly positive forecast errors which were preceded by a positive analyst forecast revision. In each interval, the percentage of small positive forecast errors preceded by positive forecast revisions is higher for large positive abnormal returns than large negative prior returns (e.g., 46.5% versus 39.6% of positive forecast errors that are no larger that .10% of price). The differences in percentages are highly significant in the two widest intervals. The evidence is consistent with the prediction in H_{1b} that when analysts revise forecasts in a manner that confirms the information in contemporaneous abnormal returns, there is a stronger incentive for firms to manage earnings to report earnings that slightly exceed the analyst forecast outstanding at the announcement date. The result is particularly notable as no extant theory of analyst behavior predicts that analyst forecast errors are more likely to be pessimistic following a positive forecast revision than a negative forecast revision.

Visual evidence consistent with the prediction in H_{2a} of a higher frequency of small positive versus small negative forecast errors among firms that earned large positive abnormal returns is presented in figure 2. The figure depicts the percentage of forecast errors that fall into symmetric subintervals of 0.05 percent of price, extending out to the values of –.50 to +.50. It is clear from the figure that the incidence of positive forecast errors is greater among firms with the largest positive prior abnormal returns than among firms that earned the largest negative prior return. It is also clear from the figure that the incidence of small negative forecast errors is lower among firms that earned the largest positive prior abnormal returns than among firms that earned the largest negative prior return, indicating a greater shift of otherwise small optimistic errors to actual small pessimistic errors.

Table 4 provides further tests of H_{2a}. This table presents the ratio of positive to negative errors for observations that fall into increasingly smaller symmetric intervals centered on (but excluding) the value of zero. It can be seen that the ratio increases monotonically in each symmetric interval. For example, forecast errors in the interval between -0.1 and 0.1, which comprise 29% of sample observations, yield a ratio of positive to negative forecast errors of 2.09 for firms with the largest positive prior returns compared to 1.23 for those with negative prior returns. All differences between the ratios in the extreme return portfolios are highly significant. It is clear from table 4 that the *ex post* tendency for firms in the cross-section to report earnings that slightly beat analysts' forecasts documented in Matsumoto [2002], Burgstahler and Eames [2000], Degeorge, Patel and Zeckhauser [1999] can be predicted, *ex ante*, using the sign of prior abnormal returns.[16]

Figure 3 offers visual evidence in support of H_{2b}. The figure depicts the incidence of small positive and negative errors among firms with large positive prior abnormal returns partitioned by the sign of the contemporaneous analyst forecast revision. It is evident from the figure that when forecast revisions are positive there is a more pronounced tendency for the firm to report earnings that slightly beat analysts' forecasts and avoid reporting earnings slightly below analysts' forecasts than when analysts' forecast revisions are negative. For example, in unreported results we find that among firms in the highest abnormal prior abnormal return quintile whose forecast errors fall in the forecast error interval [-0.1, 0.1] the ratio of positive errors to negative errors is 2.56, significantly higher than the ratio of 2.09 observed when the test was not conditioned on the sign of the preceding forecast revision.

4.2. Empirical results concerning firm earnings manipulations to create large reserves

Results of tests of H_{3a} are summarized in panel A of figure 4. The test focuses on observations that fall in the lowest decile (most extreme negative) of unexpected accruals. These observations are the same ones shown in the previous section to be larger in magnitude than the most extreme positive unexpected accrual counterparts in the highest decile. After grouping the sample observations into quintiles of ranked prior abnormal returns, we calculate the percentage of extreme negative unexpected accruals observations that fall into each prior return quintile. It is clear from the figure that firms with the most negative prior abnormal returns are associated with the highest frequency of extreme negative unexpected accruals. The 28% frequency in the lowest abnormal return quintile is significantly larger that the 19%, 16%, 16%, and 20% frequencies in the successively more positive prior abnormal return quintiles.

[16] Abarbanell and Lehavy [2003a and 2003b] report that prior earnings changes and stock recommendations also have the ability to predict which firms in the cross-section are likely to fall into the middle asymmetry in the subsequent forecast error distribution.

The fact that firms with the lowest returns are associated with the most negative unexpected accruals, as seen in panel A of figure 4, may not seem particularly surprising given that stock prices lead earnings. However, it is interesting to note that the relation between the incidence of extreme negative unexpected accruals and prior abnormal returns is not a monotonic. In fact, the incidence of extreme negative unexpected accruals among firms that earned relatively small negative returns (i.e., quintile 2) of 19% is actually lower than the incidence of 20% among firms with the largest positive abnormal accruals. The result is consistent with the argument that firms that perform the most poorly over the period are more likely to choose to recognize extreme negative accruals in excess of what is "justified" by their actual performances than other firms.

Panel B of figure 4 presents visual and statistical results relevant to H_{3b}. The test focuses again on observations in the lowest decile of unexpected accruals. The extreme negative unexpected accruals partitioned by quintiles of ranked prior abnormal returns reported in panel A of figure 4 are further divided into the percentage of observations that were preceded by negative and positive forecast revisions. It is clear from the figure that among firms for which there was a prior negative analyst forecast revision, those with the most negative prior abnormal returns are more likely to recognize an extreme negative unexpected accrual. The 24% frequency in the lowest abnormal return quintile is significantly larger that the 15%, 12%, 11%, and 14% frequencies in the successively more positive prior abnormal return quintiles for which analysts' forecast revisions were negative. It is also clear that the partition of negative revisions accounts for the character of the results in panel A that are not conditioned on the revision, as no difference is evident across the return quintiles for the positive revision partition.

The fact that firms with negative analyst forecast revisions are associated with the most negative unexpected accruals may also not seem surprising given that forecast revisions lead earnings. Once again, however, it is interesting to note that the relation between the incidence of extreme negative unexpected accruals and prior abnormal returns as a function of the sign of the prior forecast revision is not a monotonic. The incidence of extreme negative unexpected accruals among firms that earned relatively small negative accruals (i.e., quintile 2) of 15% is insignificantly higher than the incidence of 14% among firms with the largest positive abnormal accruals. The result is consistent with that argument that firms that perform poorly over the period and whose poor performance is associated with a decline in expected core earnings through a negative analyst forecast revision are more likely to recognize extreme negative accruals in excess of what is "justified" by their actual performances than other firms.

Visual and statistical evidence of tests of H_{4a} that are relevant to the question of whether the preceding results simply reflect prices and revisions leading earnings is presented in panel A of figure 5. The tests focus on the lowest decile (most extreme *ex post* optimistic) analyst forecast errors, shown in the previous section to be larger in magnitude than the most extreme positive *ex post* pessimistic forecast error counterparts in decile 10. As before, observations are grouped into quintiles of ranked prior abnormal returns. Within each prior abnormal return quintile we calculate the percentage of observations that fall into the most extreme negative decile of forecast errors. It is clear from the figure that firms with the most negative prior abnormal returns are associated with the highest frequency of extreme negative forecast errors. The 34% frequency in the lowest abnormal return quintile is significantly larger that the 21%, 15%, 16%, and 14% frequencies in the successively more positive prior abnormal return quintiles. The evidence is consistent with the argument if analysts forecast an unbiased estimate of core earnings, firms with the lower growth expectations are more likely to report an earnings number that includes extreme, income-decreasing manipulations that leave them far below analysts' forecasts than other firms.[17]

Panel B of figure 5 presents results of tests of H_{4b}. The test focuses again on observations in the lowest extreme negative forecast errors decile ranked into the quintiles of prior abnormal returns formed in panel A and further partitioned by the sign of the preceding analyst forecast revision. It is clear from the figure that among firms for which there was a prior negative analyst forecast revision, those with the most negative prior abnormal returns are more likely to be associated with an extreme

[17] A variety of arguments, including analyst irrationality and analyst indifference to poorly performing firms could be raised to explain why analysts fail to revise their earnings forecasts downward sufficiently for firms that earn large negative prior abnormal returns during the period. These arguments however do not reconcile well with the empirical fact reported in Abarbanell and Lehavy [2003b] that among firms with the largest negative prior abnormal returns the probability of an analyst producing a forecast that results in an optimistic error is virtually the same as the probability of producing a forecast that results in a pessimistic error. That is, there is no pervasive tendency for optimism in the forecasts among the poorest performing firms, only a tendency for a relatively small number of optimistic errors to be rather extreme.

negative (apparently optimistic) forecast error. The 28% frequency in the lowest abnormal return quintile is significantly larger that the 16%, 10%, 11%, and 9% frequencies in the successively more positive prior abnormal return quintiles for which analysts' forecast revisions were negative. The tendency for an extremely optimistic forecast error among firms for which analysts' preceding forecast revision was positive is much smaller within each and similar across remaining abnormal return quintiles.

Finally, we present results that directly link extreme optimistic forecast errors to extreme income-decreasing earning management among firms that earned the largest negative return. Figure 6 depicts means and medians of unexpected accruals within portfolios ranked on the basis of forecast errors within the lowest quintile (i.e., the most negative) of prior abnormal return. It is clear from figure 6 that, consistent with the predicted link between earnings management and analysts forecast errors, extreme negative unexpected accruals go hand-in-hand with extreme negative forecast errors of poorly performing firms. In contrast, no clear pattern can be seen in unexpected accruals around moderate forecast error values for such firms. In unreported results we observe a similar link between extreme negative forecast errors and extreme negative unexpected accruals in the other abnormal return quintiles.

5. Additional Empirical Analysis and Interpretations

5.1 Conservative accounting rules, earnings management, and extreme analyst forecast errors

Rational analysts would be aware of the persistent tendency for cross-sectional distributions of *ex-ante* unexpected accruals to have longer and fatter negative than positive tails. Nevertheless, it is unlikely that they will be able to predict at the beginning of a quarter where every firm's specific unexpected accrual will be located in the distribution that is eventually realized. One obvious reason for this is that at the time analysts issue an initial forecast, neither they nor the firms they cover are completely aware of future economic events that might alter the historical relations between sales and accruals during the quarter. It is likely, however, that as the quarter progresses, analysts will have the opportunity to revise their forecasts for new firm-specific information about the unexpected accruals that a firm will recognize.

Panel A of figure 7 sheds light on the question whether analysts adjust their forecasts for new information about individual firms' unexpected accruals over the period. This figure presents the percentile values of forecast errors pertaining to analysts' forecasts of earnings outstanding at the beginning, middle, and end of the quarter. One feature common to all three distributions depicted in this figure is the presence of the tail asymmetry. It is clear, however, that when compared to the distribution of forecast errors based on the last forecast before an announcement, the degree of the tail asymmetry is much larger for distributions of errors based on forecasts issued early in the quarter.

Additional evidence on the nature of analyst forecasts over the horizon is presented in panel B of figure 7. This figure provides a comparison of mean forecast errors associated with forecasts issued at the beginning, middle, and end of the quarter within quintiles formed by the rank of prior abnormal stock returns. The reduction in the tail asymmetry over the horizon is quite large for the set of firms that experienced the most extreme negative abnormal returns over the period. That is, analysts appear to revise downward by extreme amounts forecasts issued early in the period for firms that experience large negative abnormal stock returns during the quarter. This indicates that, consistent with our assumptions, analyst forecast revisions *do* incorporate information about current earnings that is correlated with negative stock returns and that can be fully recognized in earnings at the next earnings announcement date under conservative accounting rules.[18]

Another relevant feature of the evidence in panel B of figure 7 for our analysis is the fact that even after analysts' forecasts are revised for new information about current earnings, the extreme negative tail of forecast error distributions remains in all 5 distributions of forecast errors associated with the individual quintiles of prior returns. The impact of these long negative tails on inferences is

[18] Note that the evidence in figure 7 supports a simple conservative accounting-based explanation for the well-documented phenomenon of declining mean optimism in cross-sectional distributions of analysts' forecast errors as the earnings announcement date approaches. Greater mean optimism in the cross section of forecasts issued earlier in the quarter is consistent with analysts' inability or unwillingness to divine, at the beginning of the period, which firms will experience extremely poor performance during the quarter that can be fully recognized in earnings under conservative accounting rules. The subsequent large decline in mean optimism over the forecast horizon is consistent with analysts' revising their earnings forecasts to account for new information about which firms in the cross section are likely to recognize extreme negative accruals that were unexpected before the returns earned over the period could be observed. The horizon effect has been attributed in prior studies to incentive and cognitive-based arguments such as firms "walking down" analysts' earnings expectations (see, e.g., Richardson, Teoh, and Wysocki [1999]), and "stickiness" in downward revisions of forecasts over the quarter (see, e.g., Abarbanell [1991]).

evident in the optimistic mean error that characterizes each prior abnormal return quintile even when forecast errors are calculated using the last analyst forecast issued before an announcement. The main difference across the forecast error distributions of each prior abnormal return group is that the tail of the most negative quintile is longer and fatter then the negative tails of the other quintile distributions. The combination of evidence in figures 6 and 7 suggests that extreme apparent optimism (alternatively, extreme underreaction to prior returns) in analysts' forecasts among firms that earn extreme negative returns over the period is not pervasive, but rather concentrated among a few such firms with strong incentives to create accounting reserves/payback earnings borrowed from prior periods.[19]

5.2 Horizon effects associated with the middle asymmetry

Panel A of figure 8 depicts another feature of our data relevant to analysts' ability to adjust their forecasts for new information about current earnings gleaned over the forecast horizon in a manner associated with prior abnormal returns. The figure depicts the distribution of forecast errors that fall within the interval of [–.5, .5] when forecast errors are based on forecasts issued at the beginning, middle, and end of the quarter. In contrast with the case of a decline in the tail asymmetry over the horizon, the results indicate that the size of the middle asymmetry actually *increases* as the earnings announcement date approaches. In fact, statistical evidence of the asymmetry is insignificant when forecast errors are based on forecasts outstanding at the beginning of the quarter. For example, the ratio of positive to negative forecasts in the interval [-0.1, 0.1] is 1.06 (1.07) (statistically indistinguishable from 1) for forecasts outstanding at the beginning (middle) of the period, but is 1.63 (reliably different from 1) for forecasts outstanding at the end of the period. While it is intuitive that forecast errors issued closer to earnings announcements will be more accurate than forecasts issued earlier in the quarter, this does not imply that the *incidence of positive errors* should

[19] The fact that even the distribution of forecast errors in the large prior positive abnormal returns quintile displays evidence of long fat negative tail, albeit significantly attenuated relative to the large negative return quintile, suggests that while prior abnormal returns are, on average, positively associated with firms' incentive to engage in extreme income-decreasing actions to create accounting reserves, the relation is not monotonic. The evidence in figure 6 is consistent with the upside-down U-shape in forecast errors found for a variety or prior news variables including stock recommendations (e.g., Abarbanell and Lehavy 2003a), prior earnings changes (Abarbanell and Lehavy 2003b), and P/E ratios (Cornell, Conrad and Landsman 2002).

increase as the announcement date approaches. On the other hand, if firms manage earnings relative to the outstanding forecast at the announcement date, not the forecast outstanding earlier in the quarter, one would expect an increase in the incidence of small positive errors.

Panel B of figure 8 demonstrates that the emergence of the middle asymmetry in forecast error distributions over the horizon is strongly associated with the prior abnormal returns earned by the firm. That is analysts forecast revisions appear to keep pace with large prior abnormal returns up to the point of just falling short of firms' reported earnings. The result is consistent with firms that earn large positive abnormal return over the period having a stronger incentive than other firms to manage their earnings to slightly beat analysts' forecasts.

In summary, the fact that the tail asymmetry, albeit attenuated, still remains when errors are based on forecasts issued late in a quarter, together with the fact that the middle asymmetry only emerges in forecasts issued late in the quarter, is consistent with analysts' inability or their lack of motivation to forecast the impact of managerial discretion in the recognition of accruals at the end of the quarter.

6. Summary and Conclusions

The analysis in this paper suggests that two forms of earnings management undertaken by firms—manipulating earnings to beat analysts' forecasts and engaging in extreme income-decreasing actions— will contribute to the two well-documented asymmetries in the tail and in the middle of distributions of analysts' forecast errors. Our analysis also provides an explanation for why such asymmetries are associated with reported earnings (commonly used to benchmark forecasts) that embed systematic unexpected accruals. Moreover, the ability of prior abnormal returns and analyst forecast revisions to reflect new information about expected growth in core earnings and therefore firms' incentives to manage earnings provides an explanation for why forecast error observations of firms that earn large positive (negative) abnormal returns are more likely to be included in (excluded from) the middle asymmetry, and firms that earn large negative (positive) abnormal returns are more likely to be included in (excluded from) the tail asymmetry.

Failure to appreciate the effects we document can contribute to the potentially incorrect conclusion that analyst forecasts are biased and inefficient with respect to prior abnormal returns, as inferred in the vast majority of prior studies. Conversely, attempts by researchers to question the claim of analyst irrationality by means of analytical models that assume analysts' loss functions that are different from those assumed in the prior literature, or by adopting econometric methods that inherently eliminate or mitigate the impact of observations that comprise the asymmetries, fail to allow for the possibility that analysts' incentives or cognitive biases may contribute to their presence. For example, Gu and Wu [2002] argue that if it is analysts' objective to forecast the *ex ante* median rather than the mean reported earnings number, then negative (positive) skewness in the distribution of earnings that is not accounted for by analysts can lead to the appearance of optimism (pessimism) in analysts' forecasts. Their argument implies empirical researchers should ignore the magnitude of some observations in the negative tail of forecast error distributions when assessing analyst forecast biases. Keane and Runkle [1998], like previous studies in the literature, rely on results of regression tests and arrive at the conclusion that analysts' forecasts are efficient with respect to prior earnings changes. However to arrive at this conclusion, they first truncate extreme observations in the negative tail of forecast error distributions, and then refine their ordinary least squares tests to control for cross-sectional correlation in forecast errors; forecast errors which may actually be induced by analysts' and/or firms incentives regarding the use of earnings management to fine-tune earnings reports relative to outstanding analysts' forecasts in consecutive periods. Basu and Markov [2003] move away from OLS regression, which assumes a quadratic analyst loss function, and employ an alternative econometric approach that reflects a linear analyst loss function. Their approach inherently reduces the influence of the relatively small number of observations that create the tail asymmetry in forecast error distributions, as well as the observations that create the middle asymmetry, which affects their conclusion that analysts' forecasts are not inefficient with respect to prior news.

What is common to the all studies in the debate over analyst forecast rationality is that reported earnings is assumed to be the target at which analysts' forecast are aimed. It should be evident that the debate over whether analysts' forecasts are rational is unlikely to be settled by studies that fail to appreciate the salient features of forecast error distributions or, conversely, adopt approaches that inherently minimize the impact of these asymmetries to arrive at their conclusions. Our analysis represents a first step in developing an approach that neither unwittingly ignores nor deliberately eliminates the impact of important concentrations of observations in analysts' forecast error distributions, but rather attempts to explain their existence. The approach offers the potential of identifying more appropriate null hypotheses in designing tests of analysts' forecast rationality, as well as control variables that must be considered when carrying out tests of alternative hypotheses. More important, the approach offers the potential to further our understanding of the role and function of analysts as an intermediary between firms and investors.

The potential value of our approach is reinforced by the recognition that, to the extent our predictions are descriptively valid, we have identified a means of detecting earnings management. That is, by focusing on capital market incentives for firms to manipulate earnings and by identifying the target of analysts' forecast as an unmanaged earnings number, we have uncovered evidence of the "smoking gun" that has, by many accounts, eluded researchers in the earnings management literature (see reviews by Healy and Wahlen [1999] and Dechow and Skinner [2000]).

Finally, our analysis suggests the both prior returns and prior analyst forecast revisions can be used to predict non-liner price responses to earnings surprise. For example, our analysis suggests that firms that earned large prior negative returns and for which there was a contemporaneous negative analyst forecast revision are likely to have small price responses to very large negative earnings surprises because investors expect firms in this setting to be more likely to create extreme reserves (e.g., take an earnings bath). Similarly, it could be expected that there will be an asymmetric response to small good news versus small bad news earnings surprises among firms that earned large prior positive returns and for which there was a contemporaneous positive analyst forecast revision. Small bad news surprises should cause much larger price declines than the price increases that result for small good news surprises among these firms (see e.g., and Skinner and Sloan [2002]). Preliminary findings suggest these predictions are supported by the data.

Appendix
Calculation of Unexpected Accruals

Our proxy for firms' earnings management, quarterly unexpected accruals (DA), is calculated using the modified Jones (1991) model (Dechow, Sloan, and Sweeney [1995]); see Weiss (1999) and Han and Wang (1998) for recent applications of the Jones model to estimate quarterly unexpected accruals). All required data (as well as earnings realizations) are taken from the 1999 Compustat Industrial, Full Coverage, and Research files.

According to this model, unexpected accruals (scaled by lagged total assets) equal the difference between the predicted value of the scaled expected accruals (*NDAP*) and scaled total accruals (*TA*). Total accruals are defined as:

$$TA_t = (\Delta CA_t - \Delta CL_t - \Delta Cash_t + \Delta STD_t - DEP_t) / A_{t-1}$$

where,

ΔCA_t = change in current assets between current and prior quarter,
ΔCL_t = change in current liabilities between current and prior quarter,
$\Delta Cash_t$ = change in cash and cash equivalents between current and prior quarter,
ΔSTD_t = change in debt included in current liabilities between current and prior quarter,
DEP_t = current quarter depreciation and amortization expense, and
A_t = total assets.

The predicted value of expected accruals is calculated as:

$$NDAP_t = a_1(1/A_{t-1}) + a_2(\Delta REV_t - \Delta REC_t) + a_3 PPE_t$$

where,

ΔREV_t = change in revenues between current and prior quarter scaled by prior quarter total assets,
ΔREC_t = change in net receivables between current and prior quarter scaled by prior quarter total assets, and
PPE_t= gross property plant and equipment scaled by prior quarter total assets.

We estimate the firm-specific parameters, α_1, α_2, and α_3, from the following regression using firms that have at least ten quarters of data:

$$TA_{t-1} = a_1(1/A_{t-2}) + a_2 \Delta REV_{t-1} + a_3 PPE_{t-1} + e_{t-1}$$

The modified Jones model resulted in 35,535 firm-quarter measures of quarterly unexpected accruals with available forecast errors on the *Zacks* database.

Table 1

Descriptive Statistics on Forecast Errors and Unexpcted Accruals

This table provides descriptive statistics on forecast errors and unexpcted accruals. Forecast error is reported earnings (per Zacks) minus the last consensus forecast of quarterly earnings issued prior to earnings announcement scaled by price. Unexpcted accruals are the measure produced by the modified Jones Model (expressed as a per share scaled by price).

Statistics (1)	**Forecast Errors** (2)	**Unexpcted Accruals** (3)
Number of Observations	33,548	33,548
Mean	-0.126	-0.217
Median	0.000	0.023
Standard Deviation	0.995	5.600
Skewness	-6.976	-1.399
Kurtosis	102.307	16.454
% Positive	47.6	50.8
% Negative	39.9	49.2
% Zero	12.5	0.0
P1	-4.202	-20.820
P3	-1.983	-11.547
P5	-1.333	-8.386
P10	-0.653	-4.574
P25	-0.149	-1.349
P75	0.137	1.350
P90	0.393	4.185
P95	0.684	7.148
P97	0.939	9.891
P99	1.594	15.945

Table 2

Percentage of Small Positive Forecast Errors that Fall within Ranks of Prior Market Adjusted Return Unconditionally (Panel A) and by Sign of Unexpected Accruals (Panel B)

This table reports the percentage of small positive forecast errors (greater than zero and smaller or equal 0.05, 0.1, and 0.2, respectively) that fall within ranks of prior market adjusted return (panel A) and similar percentage by sign of unexpected accruals (panel B). Forecast error is reported earnings minus the last consensus forecast of quarterly earnings issued prior to earnings announcement scaled by price. Unexpected accruals are the measure produced by the modified Jones model as described in the appendix (expressed as unexpected accrual per share scaled by price). Prior market adjusted return is the return between 10 days after the last quarterly earnings announcement to 10 days prior to current quarterly earnings announcement minus the return on the value-weighted market portfolio for the same period. Each rank of prior market adjusted returns comprise 6,117 observations.

Panel A: Percentage of small positive forecast errors that fall within ranks of prior return

Rank of prior market adjusted return	Percentage of small positive forecast errors		
	$0<FE\leq 0.05$	$0<FE\leq 0.1$	$0<FE\leq 0.2$
Lowest	13.4%	14.5%	15.2%
2	19.3%	19.1%	18.9%
3	21.3%	21.5%	21.1%
4	23.8%	23.0%	21.9%
Highest	22.1%	22.0%	23.0%
Highest - Lowest	8.7%	7.5%	7.9%
p-value for difference in proportions	0.000	0.000	0.000
Num. of obs. in small positive forecast error region	2,724	5,446	8,704

Panel B: Percentage of small positive forecast errors that fall within ranks of prior market adjusted return, by sign of unexpected accruals

Rank of prior market adjusted return	Percentage of small positive forecast errors by sign of unexpected accruals (UA)					
	$0 < FE \leq 0.05$		$0 < FE \leq 0.1$		$0 < FE \leq 0.2$	
	Negative UA	Positive UA	Negative UA	Positive UA	Negative UA	Positive UA
Lowest	5.9%	7.6%	6.8%	7.7%	7.2%	7.9%
2	9.4%	10.0%	9.1%	9.9%	8.7%	10.2%
3	10.2%	11.2%	10.6%	10.9%	10.4%	10.7%
4	11.8%	12.0%	11.0%	12.0%	10.4%	11.4%
Highest	11.4%	10.7%	10.6%	11.3%	11.3%	11.8%
Highest - Lowest	5.5%	3.2%	3.9%	3.6%	4.0%	3.8%
p-value for difference in proportions	0.000	0.000	0.000	0.000	0.000	0.000
Num. of obs. in small positive forecast error region	1,323	1,401	2,619	2,827	4,177	4,527

Table 3

Percentage of Small Positive Forecast Errors that Fall within Ranks of Prior Market Adjusted Return for Positive vs. Negative Forecast Revisions

This table reports the percentage of small positive forecast errors (greater than zero and smaller than 0.05, 0.1, and 0.2, respectively) by rank of prior market adjusted return for positive relative to negative forecast revisions. Forecast error is reported earnings minus the last consensus forecast of quarterly earnings issued prior to earnings announcement scaled by price. Prior market adjusted return is the return between 10 days after the last quarterly earnings announcement to 10 days prior to current quarterly earnings announcement minus the return on the value-weighted market portfolio for the same period. Sign of forecast revision is determined by the sign of the difference between the first consensus forecast of quarterly earnings issued after the prior quarter earnings announcement and the last forecast issued prior to current quarter earnings announcement. Each rank of prior market adjusted returns comprise 5,530 observations.

Rank of prior market adjusted return	**% of small positive forecast errors for *positive* forecast revision**		
	0<FE≤ 0.05	**0<FE≤ 0.1**	**0<FE≤ 0.2**
Lowest	42.1%	39.6%	36.9%
2	39.8%	41.1%	40.5%
3	39.8%	38.9%	39.4%
4	41.6%	40.6%	40.7%
Highest	45.3%	46.5%	46.7%
Highest - Lowest	3.2%	6.9%	9.8%
p-value for difference in proportions	0.171	0.002	0.000
Number of obs. in small positive forecast error region	1,082	2,119	3,311

Table 4

Ratio of Small Positive to Small Negative Forecast Errors in Small Regions Centered on Zero Forecast Errors by Rank of Prior Market Adjusted Returns

This table reports the ratio of small positive to small negative forecast errors in small regions centered on zero forecast errors (between zero and negative and positive 0.05, 0.1, and 0.2, respectively) by rank of prior market adjusted return. Forecast error is reported earnings minus the last consensus forecast of quarterly earnings issued prior to earnings announcement scaled by price. Prior market adjusted return is the return between 10 days after the last quarterly earnings announcement to 10 days prior to current quarterly earnings announcement minus the return on the value-weighted market portfolio for the same period. Each rank of prior market adjusted returns comprise 6,117 observations.

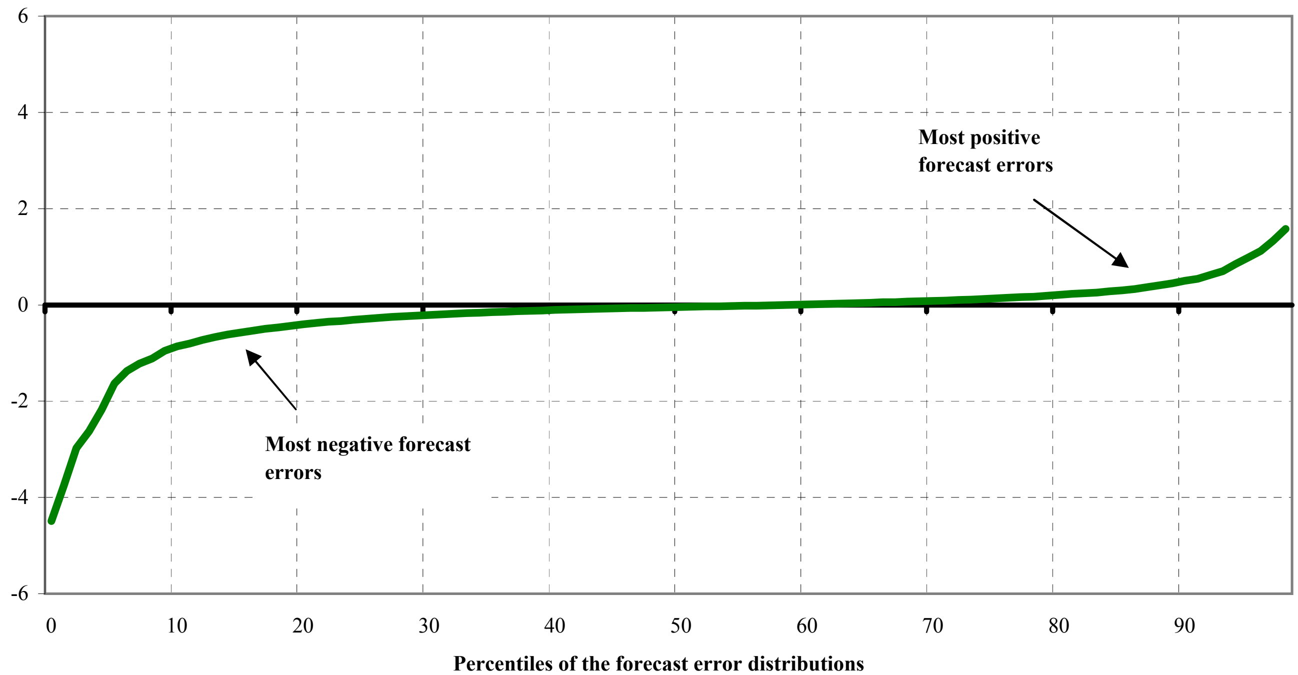
Rank of prior market adjusted return	**Ratio of positive to negative forecast errors**		
	-0.05≤FE≤ 0.05	-0.1≤FE≤ 0.1	-0.2≤FE≤ 0.2
Lowest	1.46	1.23	1.19
2	1.47	1.43	1.36
3	1.51	1.57	1.55
4	1.74	1.70	1.63
Highest	1.99	2.09	2.24
Highest - Lowest	0.54	0.86	1.05
p-value for difference in proportions	0.002	0.000	0.000
N	4,393	8,866	14,270

Figure 1

Percentiles of Quarterly Distributions of Forecast Errors and Unexpected Accruals

This figure presents percentiles of quarterly distributions of analyst forecast errors (panel A) and unexpected accruals (panel B). Forecast error equals reported earnings minus consensus forecast of quarterly earnings issued prior to earnings announcement scaled by beginning of period price. Unexpected accruals are the measure produced by the modified Jones model as described in the appendix (expressed as unexpected accrual per share scaled by price).

Panel A: Percentiles of quarterly distributions of forecast errors



Panel B: Percentiles of quarterly distributions of unexpected accruals

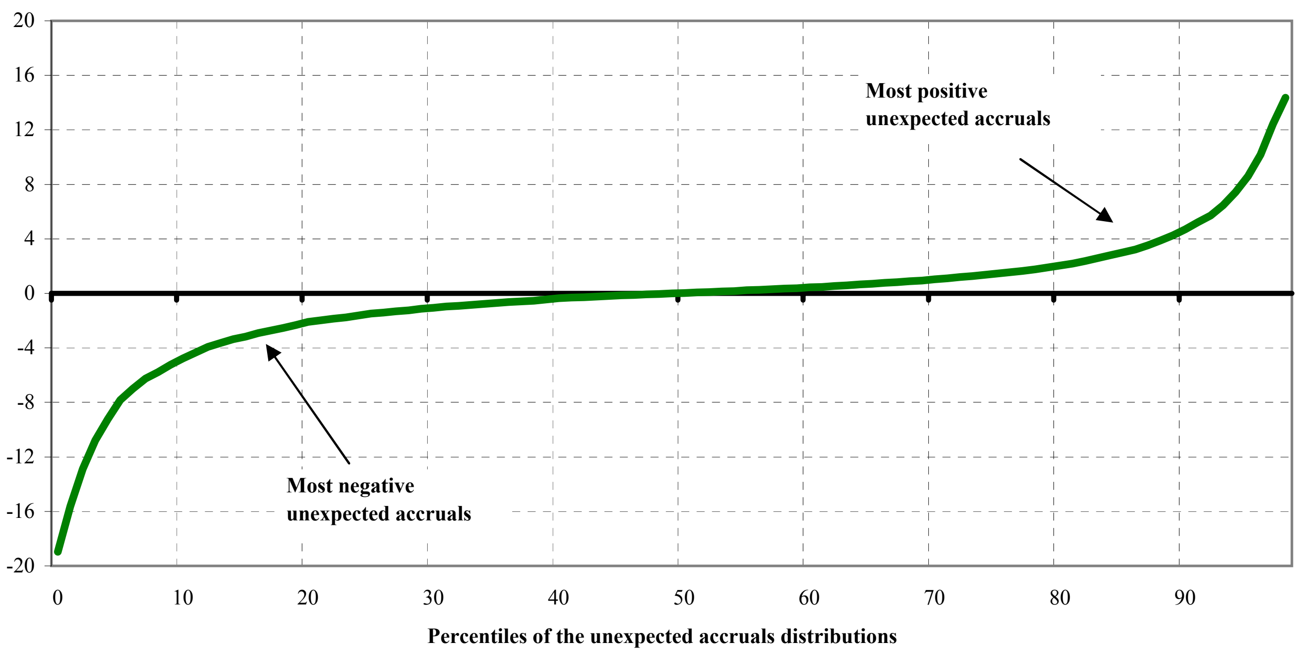


Figure 2

Histogram of Forecast Errors for Highest and Lowest Quintiles of Prior Market Adjusted Return

Percent of forecast error values in histogram intervals for observations within forecast error of -.5 to +.5, for first and fifth quintiles of prior market adjusted return. Forecast error is reported earnings (per Zacks) minus the last consensus forecast of quarterly earnings issued prior to earnings announcement scaled by beginning of period price. Prior market adjusted return is the return between 10 days after the last quarterly earnings announcement to 10 days prior to current quarterly earnings announcement minus the return on the value-weighted market portfolio for the same period.

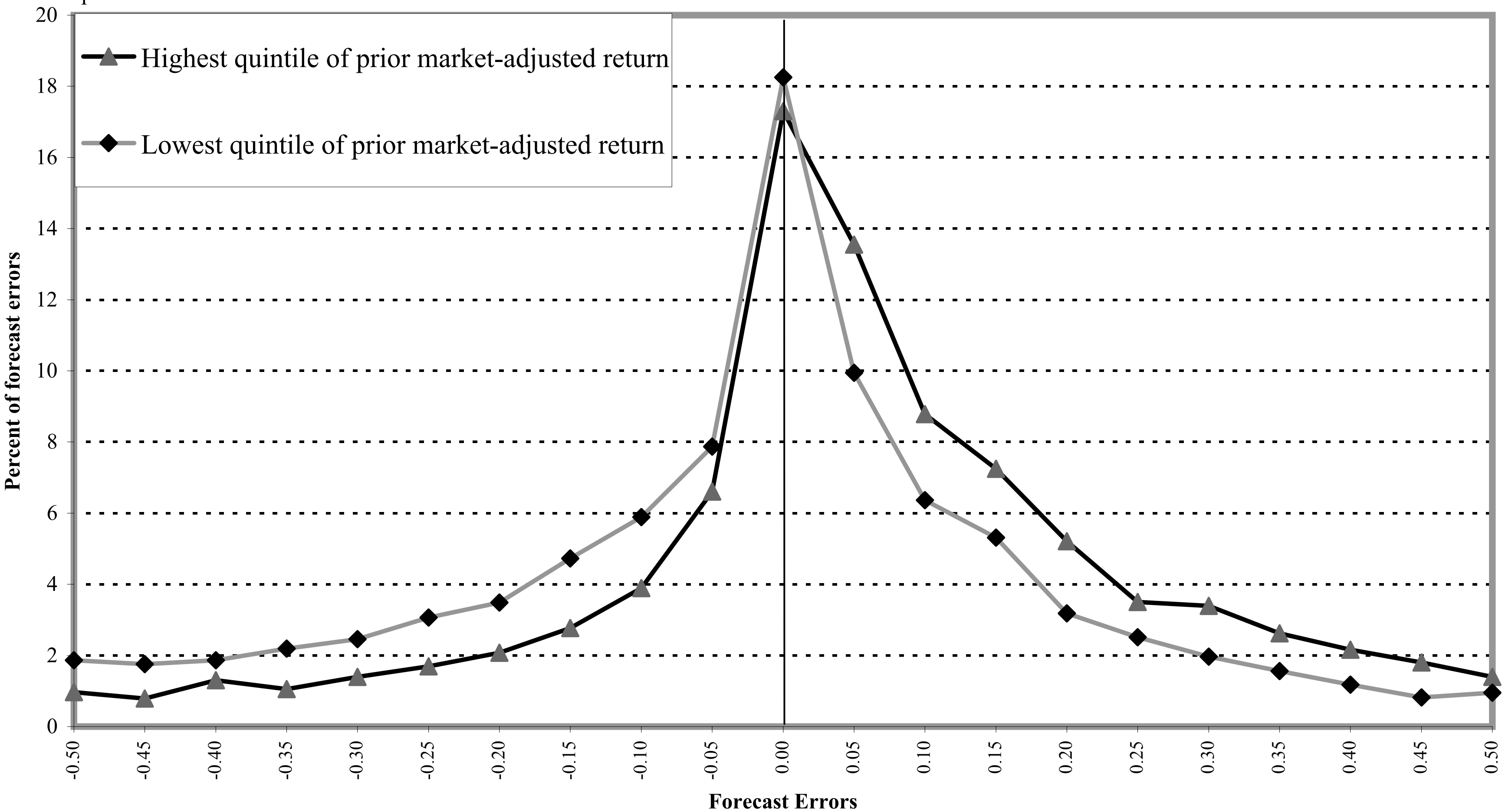


Figure 3

Histogram of Forecast Errors for *Highest* Quintile of Prior Market Adjusted Return by Sign of Forecast Revision

Percent of forecast error values in histogram intervals for observations within forecast error of -.5 to +.5 for *highest* quintile of prior market adjusted return and then separated by the sign of the forecast revision. Forecast error is reported earnings (per Zacks) minus the last consensus forecast of quarterly earnings issued prior to earnings announcement scaled by beginning of period price. Prior market adjusted return is the return between 10 days after the last quarterly earnings announcement to 10 days prior to current quarterly earnings announcement minus the return on the value-weighted market portfolio for the same period. Sign of forecast revision is determined by sign of the first consensus forecast of quarterly earnings issued after prior quarter's earnings announcement and the last forecast issued prior to the current quarter earnings announcement.

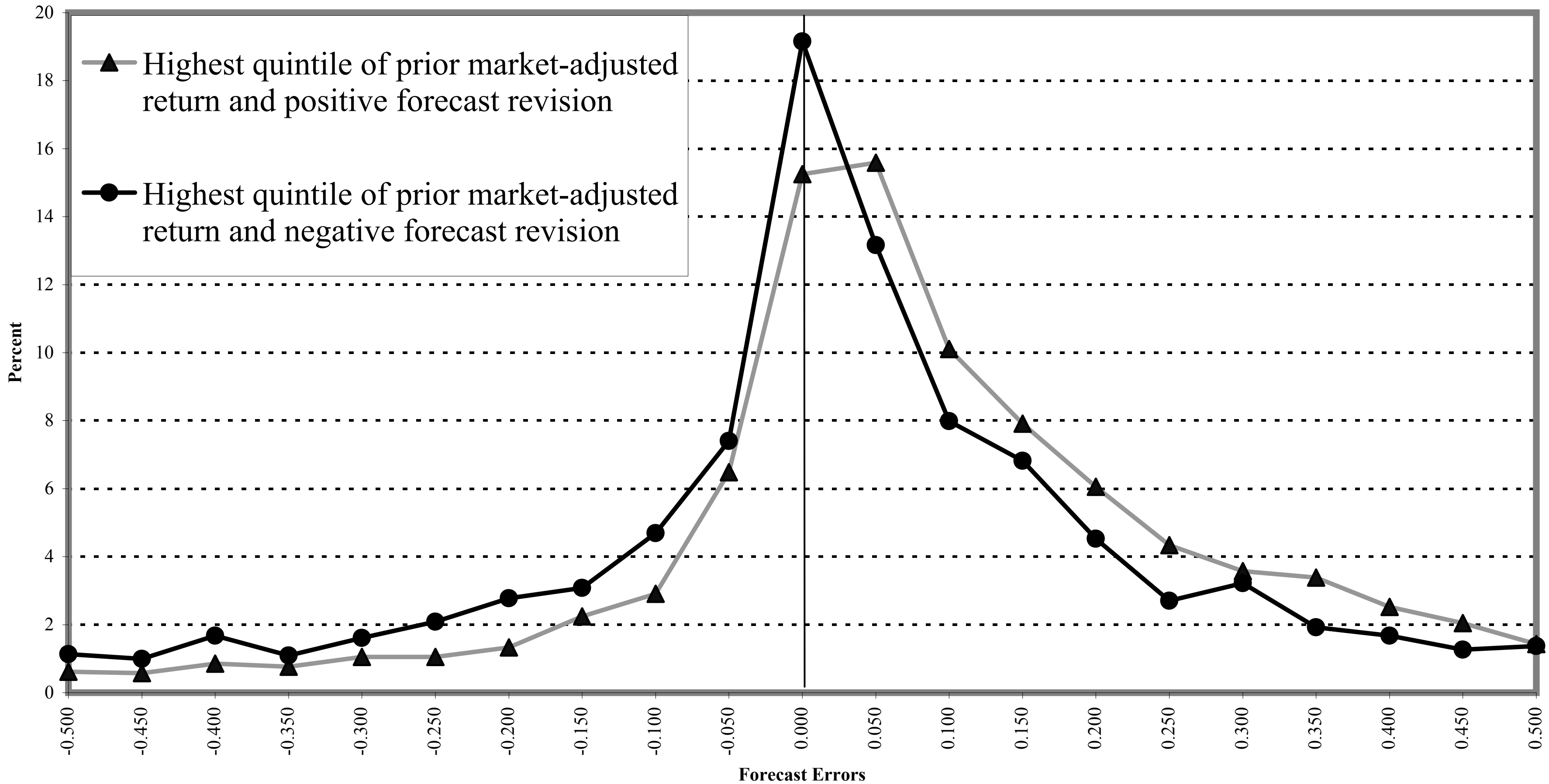
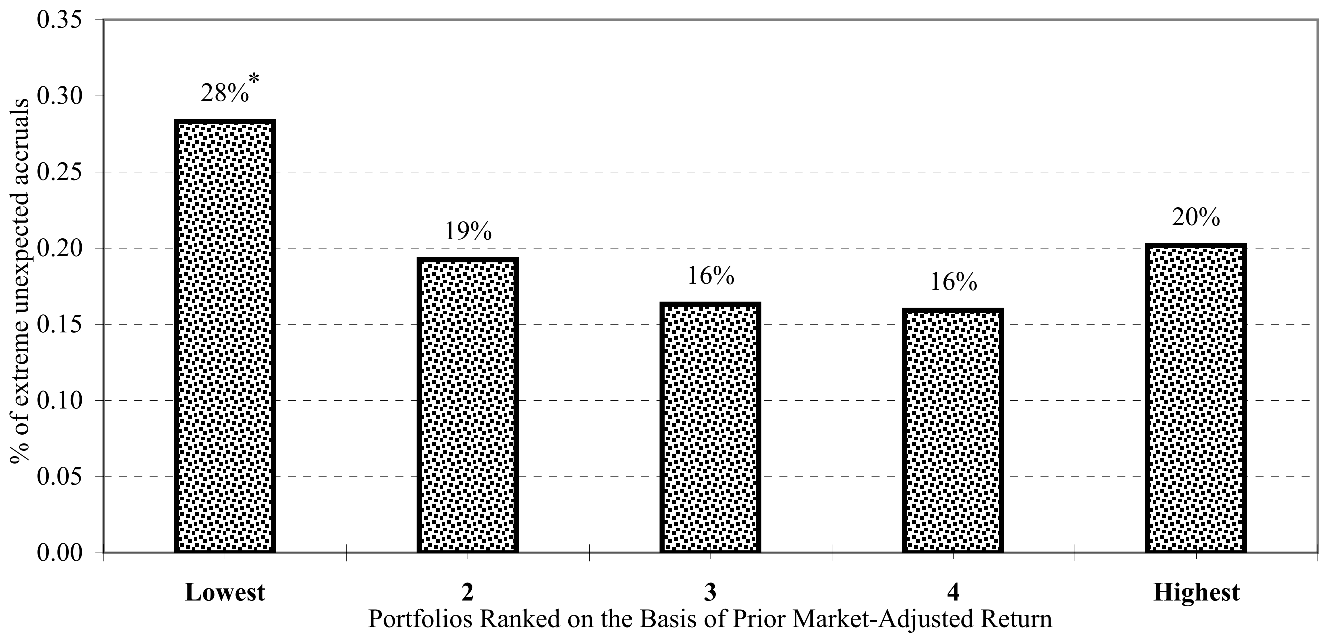


Figure 4

Percentage of *extreme* unexpected accruals within portfolios ranked on the basis of prior market-adjusted return (Panel A) and by sign of forecast revision (Panel B)

Panel A depicts the percentage of extreme unexpected accruals that fall within portfolios ranked on the basis of prior market-adjusted return. Panel B depicts the percentage of extreme unexpected accruals that fall within these prior return portfolios by sign of analyst earnings forecast revision. Extreme unexpected accruals observations are observations in the most negative (unconditional) decile of unexpected accruals. Unexpected accruals are the measure produced by the modified Jones model as described in the appendix (expressed as unexpected accrual per share scaled by price). Prior market adjusted return is the return between 10 days after the last quarterly earnings announcement to 10 days prior to current quarterly earnings announcement minus the return on the value-weighted market portfolio for the same period. Sign of forecast revision is determined by the sign of the difference between the first consensus forecast of quarterly earnings issued after the prior quarter earnings announcement and the last forecast issued prior to current quarter earnings announcement.

Panel A: Percentage of *extreme* unexpected accruals that fall within ranks of prior market-adjusted returns



* Percentage of extreme accrual significantly different from all other portfolios.

Panel B: Percentage of *extreme* unexpected accruals within ranks of prior returns, by sign of forecast revision

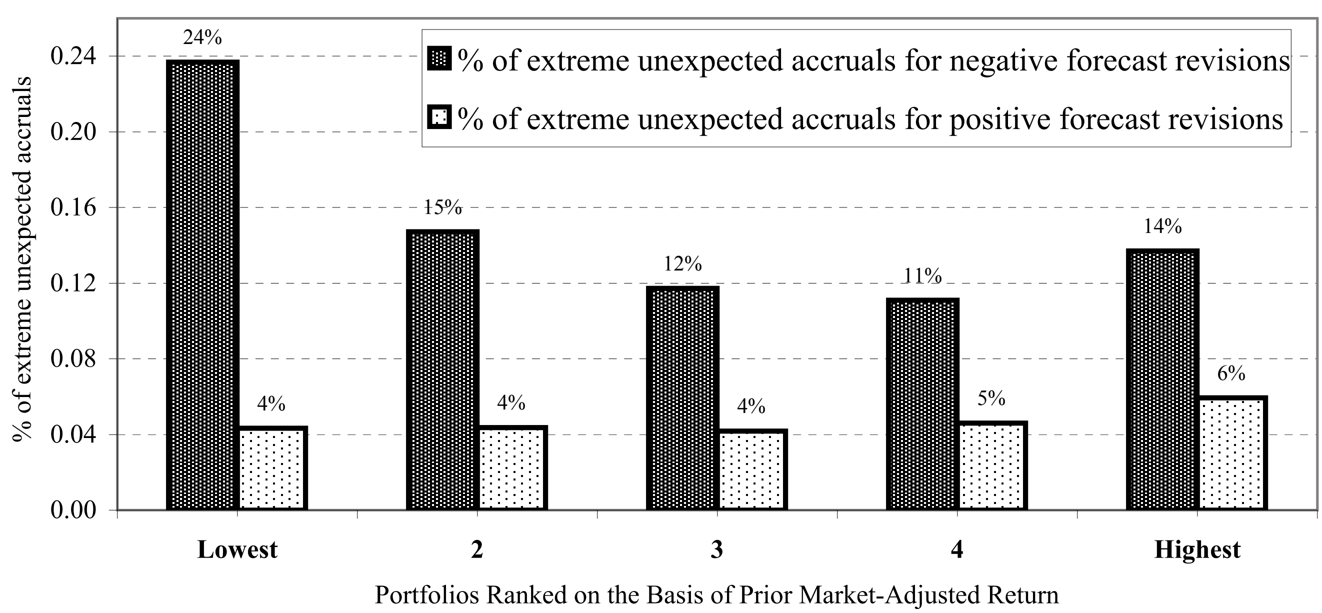
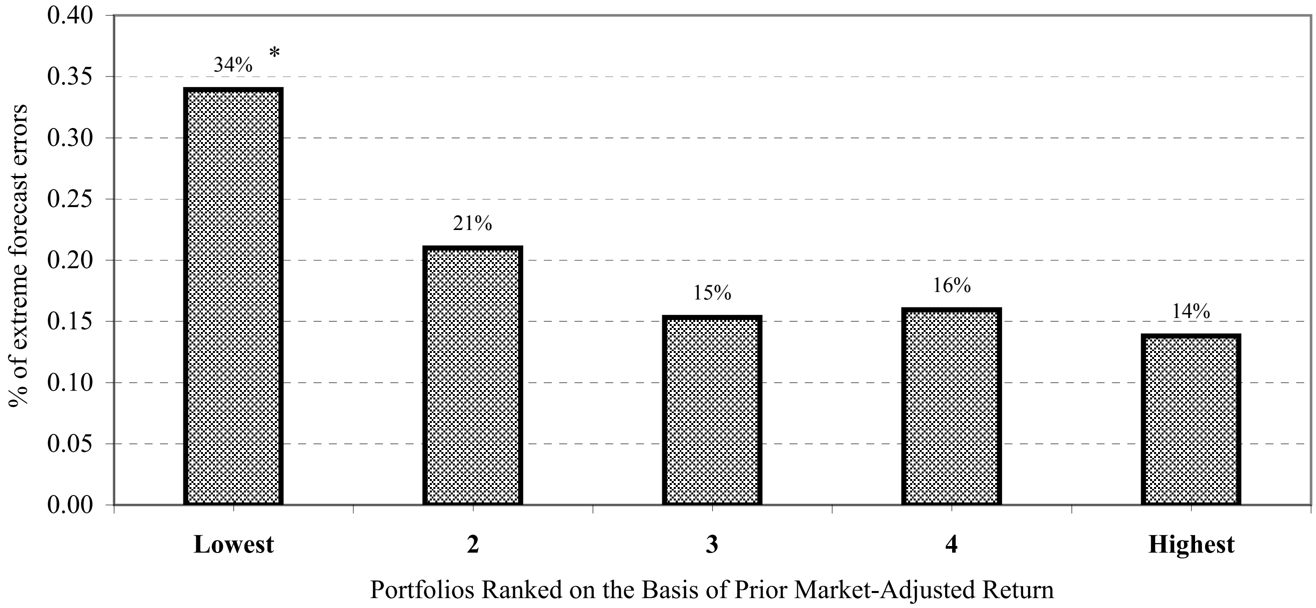


Figure 5
Percentage of *extreme* forecast errors for portfolios ranked on the basis of prior market-adjusted return (panel A) and by sign of forecast revision (Panel B)

Panel A depicts the percentage of extreme forecast errors that fall within portfolios ranked on the basis of prior market-adjusted return. Panel B depicts the percentage of extreme forecast errors that fall within these prior return portfolios by sign of analyst earnings forecast revision. Extreme forecast errors observations are observations in the most negative (unconditional) decile of forecast errors. Prior market adjusted return is the return between 10 days after the last quarterly earnings announcement to 10 days prior to current quarterly earnings announcement minus the return on the value-weighted market portfolio for the same period. Sign of forecast revision is determined by the sign of the difference between the first consensus forecast of quarterly earnings issued after the prior quarter earnings announcement and the last forecast issued prior to current quarter earnings announcement. Forecast error is reported earnings minus the last consensus forecast of quarterly earnings issued prior to earnings announcement scaled by price.

Panel A: Percentage of *extreme* forecast errors within ranks of prior market-adjusted returns



* Percentage is significantly different from percentages in all other portfolios.

Panel B: Percentage of *extreme* forecast errors within ranks of prior returns, by sign of forecast revision

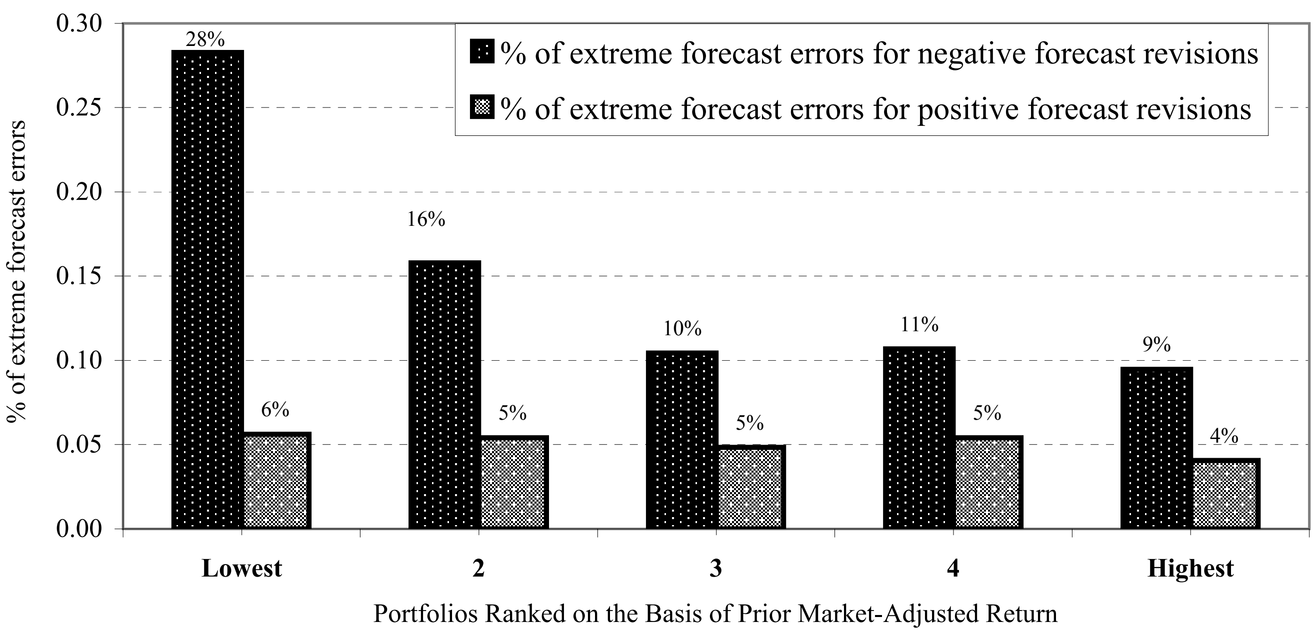


Figure 6

Mean and median unexpected accruals for portfolios ranked on the basis of forecast errors within the *lowest* quintile of prior market-adjusted return

This figure depicts means and medians of unexpected accruals for portfolios ranked on the basis of forecast errors within the lowest quintile of prior market-adjusted return. Unexpected accruals are the measure produced by the modified Jones model as described in the appendix (expressed as unexpected accrual per share scaled by price). Prior market adjusted return is the return between 10 days after the last quarterly earnings announcement to 10 days prior to current quarterly earnings announcement minus the return on the value-weighted market portfolio for the same period.

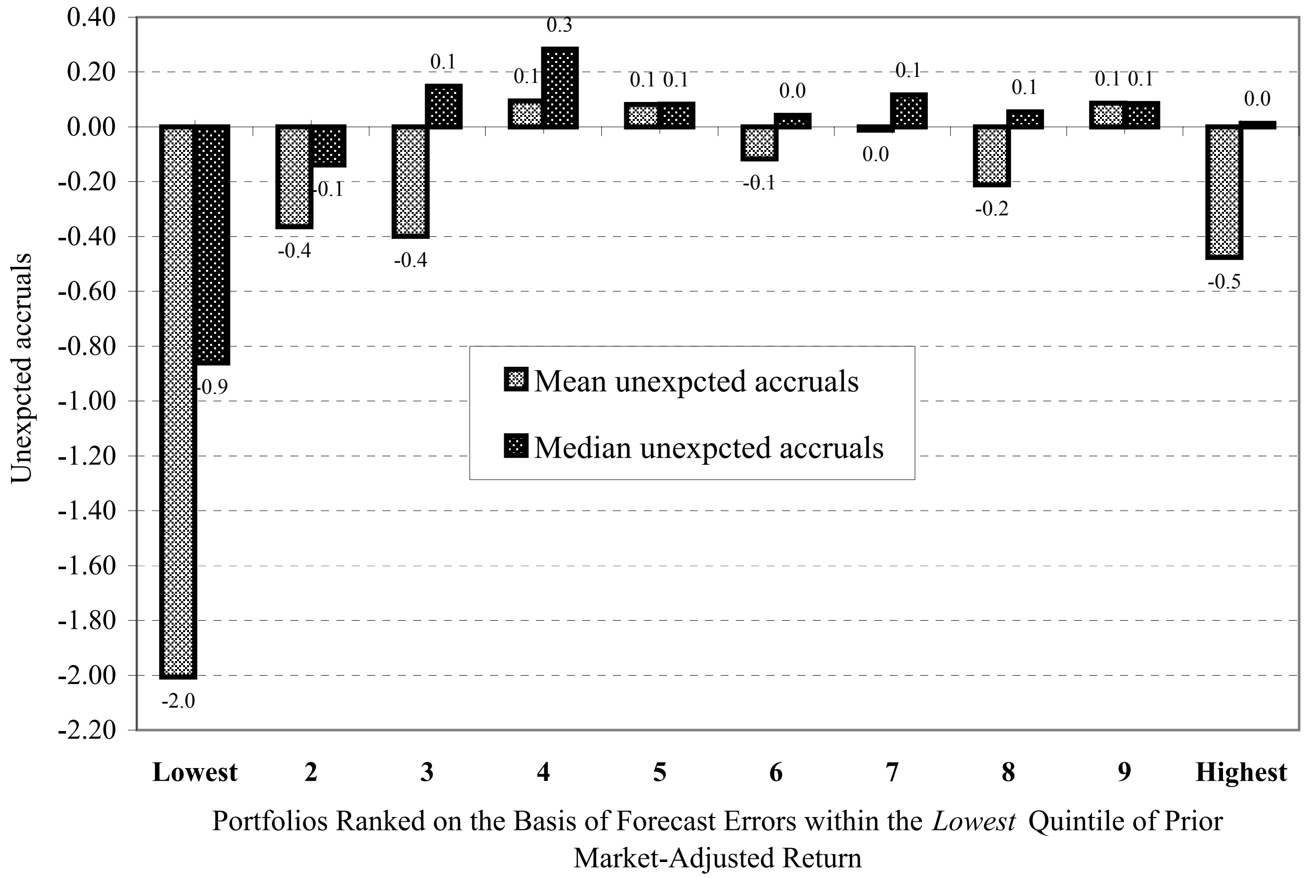
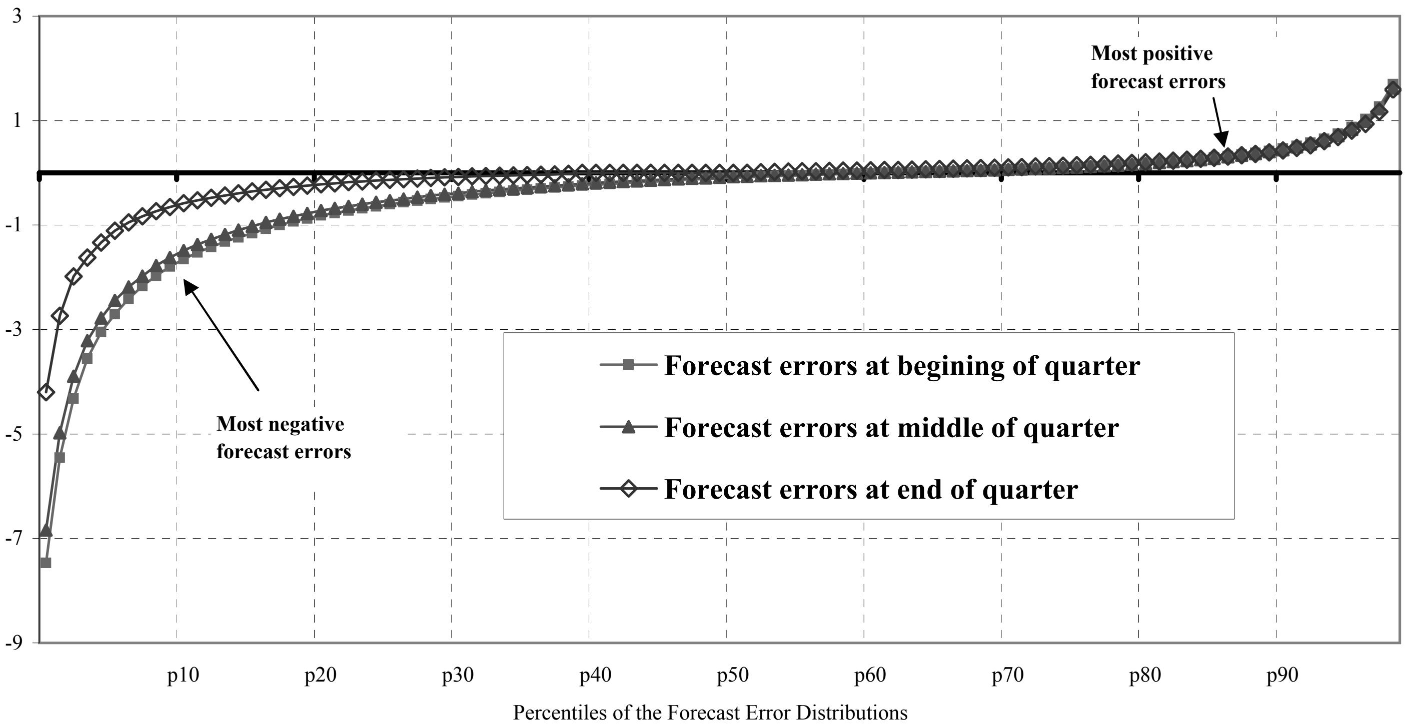


Figure 7

Percentiles of Quarterly Distributions of Forecast Errors (Panel A) and Means of Forecast Errors at the Beginning, Middle, and End of the Quarter for Portfolios Ranked on the Basis of Prior Market-Adjusted Return (Panel B)

Panel A of this figure presents percentiles of quarterly distributions of analysts' forecast errors at different horizons. Panel B depicts mean forecast errors at different horizons for portfolios ranked on the basis of prior market-adjusted return. Forecast errors equal, alternatively, reported earnings minus consensus forecast of quarterly earnings issued at the beginning of the quarter, the middle of the quarter, and prior to earnings announcement scaled by beginning of period price. Prior market adjusted return is the return between 10 days after the last quarterly earnings announcement to 10 days prior to current quarterly earnings announcement minus the return on the value-weighted market portfolio for the same period.

Panel A: percentiles of quarterly distributions of forecast errors



Panel B: Mean forecast errors for portfolios ranked on the basis of prior market-adjusted return

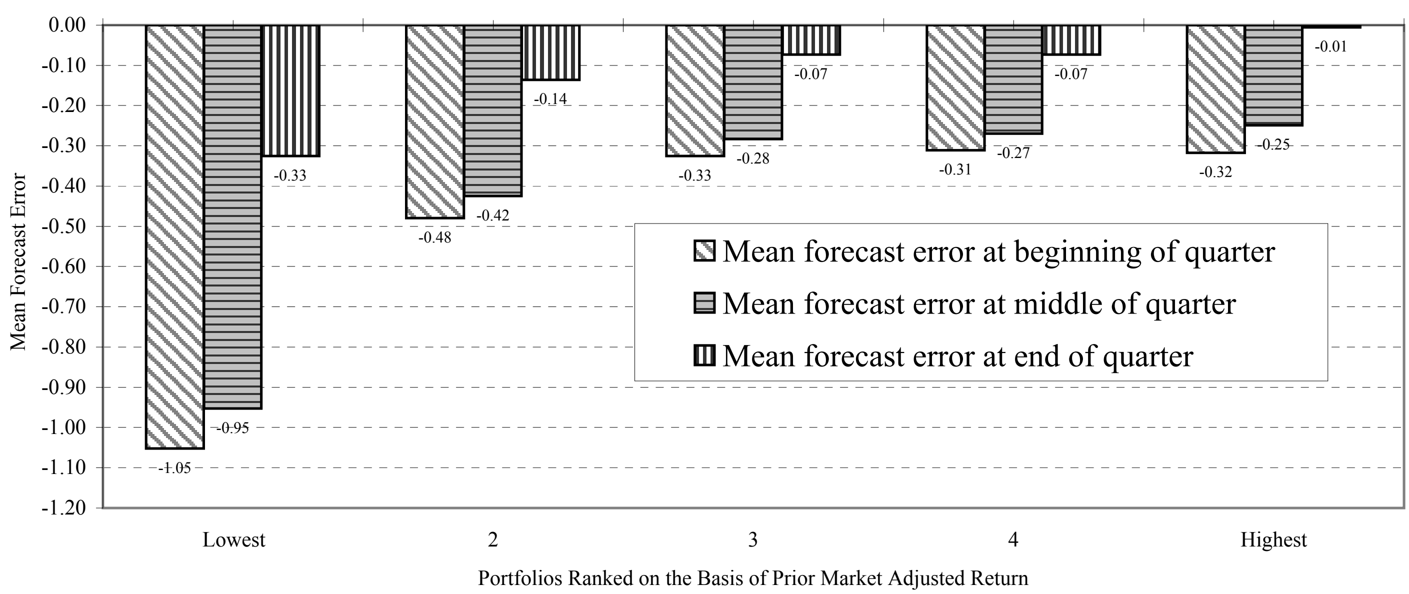
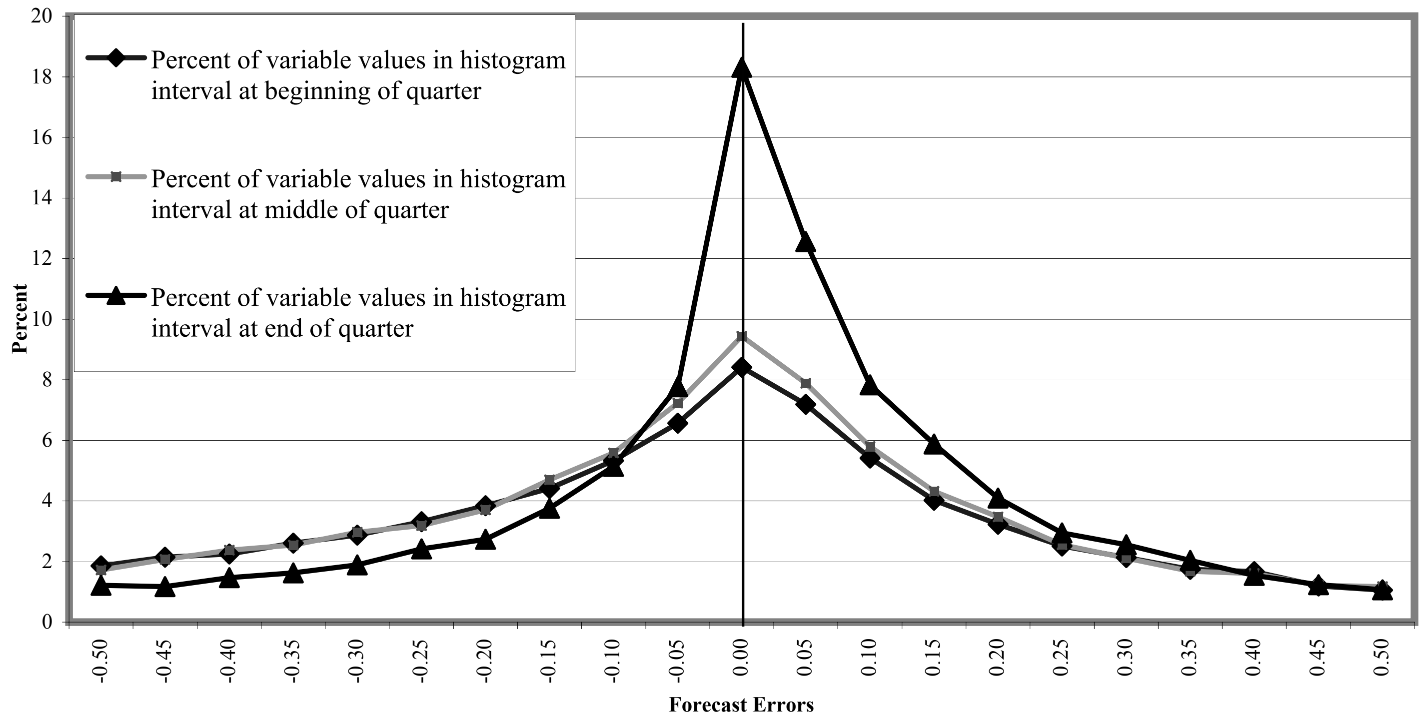


Figure 8

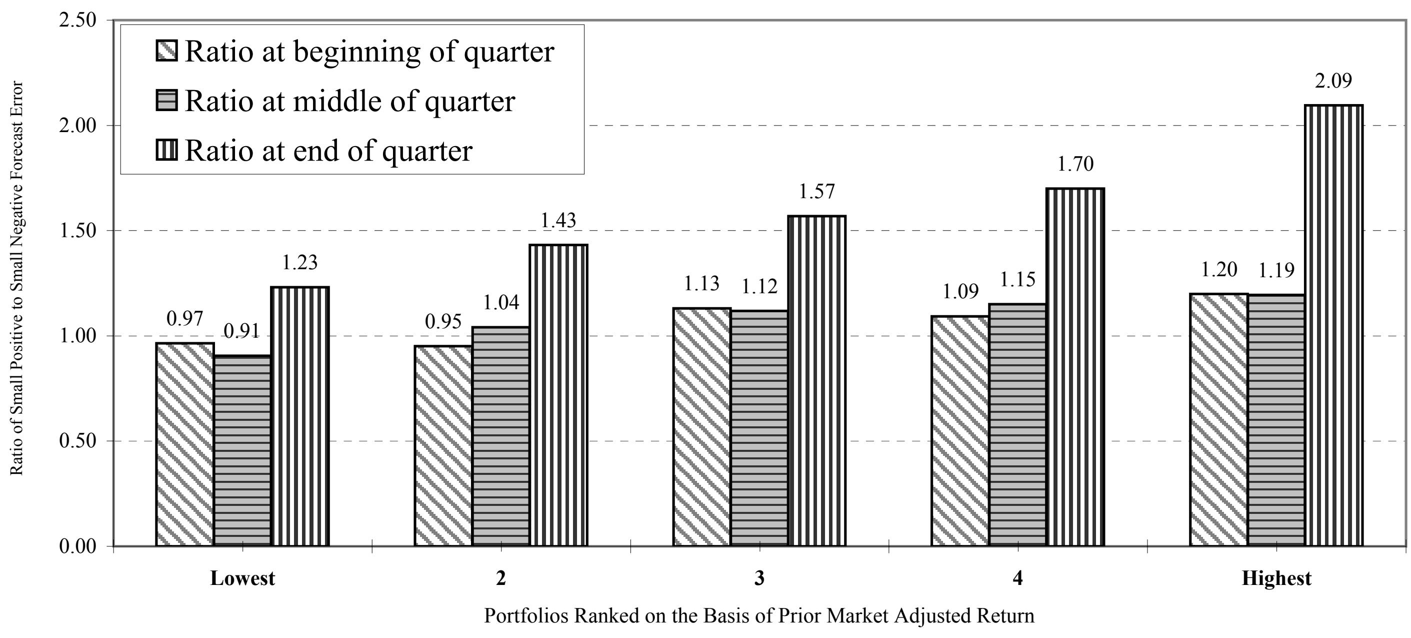
Histograms of Forecast Errors (Panel A) and Ratios of Small Positive to Small Negative Forecast Errors for Portfolios Ranked on the Basis of Prior Market-Adjusted Return (Panel B) at the Beginning, Middle, and End of Quarter

Panel A of this figure presents histograms of forecast errors for observation within forecast error of -.5 to +.5. Panel B presents ratios of small positive (within 0 to 0.1) to small negative forecast error (within 0 to -0.1) for portfolios ranked on the basis of prior market-adjusted return. Forecast errors equal, alternatively, reported earnings minus consensus forecast of quarterly earnings issued at the beginning of the quarter, the middle of the quarter, and prior to earnings announcement scaled by beginning of period price. Prior market adjusted return is the return between 10 days after the last quarterly earnings announcement to 10 days prior to current quarterly earnings announcement minus the return on the value-weighted market portfolio for the same period.

Panel A: Histograms of forecast errors



Panel B: Ratios of small positive to small negative forecast error at different horizons



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