What do Analysts' Forecasts Reveal about Analysts' Private Information? [†]

Bjorn N. Jorgensen[*] and **Julian Yeo**[**]

Columbia Business School, 3022 Broadway, Uris Hall, New York, NY 10027

October 7, 2005

Abstract

Analysts often provide forecasts of one-year ahead earnings, earnings two-year ahead, as well as long-term earnings growth rates. In our attempts to understand the properties of these contemporaneous multi-period earnings forecasts, we begin by examining whether analysts' earnings forecasts can be described using the linear information dynamics (LID). We find that LID is an appropriate description of analysts' information processing for 77% of our firm year observations. For firm-year observations that exhibit LID, we develop a theoretical procedure to infer the persistence of abnormal earnings, analysts' other information about future abnormal earnings (not in current abnormal earnings), and the persistence of other information at individual firm year level. Demonstrating that the two symmetrical combinations of the persistence parameters derived from our estimation procedure lead to the same price estimate, we then calculate the predicted firm value (incorporating analysts' private information). Our results show that the predicted firm value is statistically associated with the observed market value. In addition, when forecasted abnormal earnings are expressed as an ARMA (2,1) process, the median persistence in current forecasted abnormal earnings into one period ahead forecasted abnormal earnings is 0.95 and the median persistence in lagged forecasted abnormal earnings into one period ahead forecasted abnormal earnings is 0.16. Since our procedure allows us to infer analysts' other/private information, we find that the main information incorporated in returns originate mostly from innovations in other information rather than innovations in abnormal earnings.

Disclaimer: The Securities and Exchange Commission, as a matter of policy, disclaims responsibility for any private publication or statement by any of its employees. The views expressed herein are those of the author and do not necessarily reflect the views of the Commission or of the author's colleagues upon the staff of the Commission.

[†] VERY PRELIMINARY AND INCOMPLETE.

[*] Currently visiting the Securities and Exchange Commission. E-mail: bnj2101@columbia.edu.

[**] E-mail: jy2176@columbia.edu.

1. **Introduction**

For many firms, analysts provide forecasts of one-year ahead earnings, two-year ahead earnings as well as the long-term growth rate for earnings three to five year ahead. In contrast to the substantial body of research on the time series of 'realized' earnings, the extant literature has provided very little insights on the time-series properties of analysts' contemporaneous multi-period earnings forecasts. It is the aims of this study to provide collective evidence on analysts' information processing and their role in the market place via the examination of analysts' contemporaneous multi-period earnings forecasts.

Ohlson (1995) recognizes that investors and market intermediaries rely on information sources other than accounting information when assessing the market value of the firm, and introduces the role of 'other information' to his valuation model. 'Other information' is information about future abnormal earnings that is not in current abnormal earnings. Following a suggestion in Liu and Ohlson (2000) and Ohlson (2001), a number of papers employ analysts' one-year ahead forecast to deduce information about future abnormal earnings that is not in current abnormal earnings for a cross-sectional set of firms.[1] Collectively, analysts' may possess value-relevant information in addition to the information reflected in firms' current financial statements. Analysts' acquire their informational advantage through costly activities, such as data collection and data analyses. The use of analysts' earnings forecasts to deduce information about future abnormal earnings that is not in current earnings seems to be a logical starting point. We refer to the information about future abnormal earnings (not in current earnings)

---

[1] See Dechow, Hutton, and Sloan (1999), Choi, O'Hanlon and Pope (2004), and Guenther and Sun (2005), among others.

embedded in analysts contemporaneous multi-period forecasts as analysts' private information.

Using analysts' forecasts of one-year ahead earnings, two-year ahead earnings, and long-term earnings growth rates, we develop a procedure which infers analysts' private information for each individual firm-year. We assume that analysts' contemporaneous multi-period forecasts of (abnormal) earnings exhibit properties consistent with the Linear Information Dynamics (LID) in Ohlson (1995). When an analyst makes three contemporaneous analysts' forecasts for different forecast horizons, investors can infer the analysts' other information as well as the persistence of abnormal earnings and the persistence of other information.

Since this inference process can take place independently each year for each individual firm, we can study the cross-sectional and inter-temporal characteristics of analysts' use of other information. This is in contrast with prior papers that only exploit one-year ahead analysts' forecasts to deduce analysts' other information at a pooled regression level. We begin by examining whether analysts' contemporaneous earnings forecasts exhibit properties consistent with LID. For firm-year observations consistent with LID, our inference procedure allows us to examine the followings: (i) the persistence of analysts' current and lagged forecasted abnormal earnings on analysts' forecast of one-period forecasted abnormal earnings (ii) the volatility of abnormal earnings innovations relative to the volatility of innovations in other information. In addition, we are able to provide evidence on (iii) the association between observed market prices and estimated prices that incorporate analysts' private information; and (iv) the association between observed market return and the innovations in abnormal earnings and other information. Collectively, our empirical results contribute to the understanding of analysts' information processing and their role in the market place.

We find that LID is an appropriate description of analysts' information processing for 77% of our firm-year observations. Demonstrating that the two symmetrical combinations of the persistence parameters inferred from our estimation method lead to the same price estimate, we then calculate the predicted firm value (incorporating analysts' private information). Our results show a statistically significant association between predicted firm values and actual observed firm values.

When forecasted abnormal earnings are expressed as an ARMA(2,1) process, the median persistence in current forecasted abnormal earnings into one-period ahead forecasted abnormal earnings is 0.95 and the median persistence in lagged forecasted abnormal earnings into one-period ahead forecasted future abnormal earnings is 0.16. The inferred persistence of current forecasted abnormal earnings is close to unity suggests that, on average, analysts' forecast future abnormal earnings by assuming constant current abnormal earnings.

We find that the volatility of the implied innovations in other information is approximately 5 times larger than the volatility of the implied abnormal earnings innovations, suggesting that revisions in analysts' forecasts are based largely on information currently not impounded in current abnormal earnings. Lastly, we show that the association between return and the innovations in other information is statistically significant; whereas, the association between return and the innovations in abnormal earnings is not significant.

The paper proceeds as follows. The next section outlines the prior literature. Section 3 describes the accounting-based valuation model and outlines our inference procedure. We also characterize some important properties of the inferred persistence parameters and the resulting predicted prices. Section 4 presents the data and Section 5 reports our empirical findings. Finally, we summarize and outline future possible research in section 6. All proofs are in the appendix.

2. Literature Review and Discussion

Our paper builds on the prior accounting-based valuation literature. Before reviewing that literature, we briefly position our analysis relative to the existing literature and summarize its pros and cons. First, we do not empirically investigate whether linear information dynamics (LID) explains realized abnormal earnings. Instead, we test whether observed analysts forecasts appear consistent with analysts relying on LID. A critical difference to the extant literature is that we do not presume the LID environment to remain stable over time for a given firm. Second, we view ‘other information’ as captured by analysts’ private information. That is, while other information is not yet reflected in current abnormal earnings, other information can be inferred from current analysts’ forecast of earnings. Third, we make inferences regarding components of analysts’ information *without* relying on observed market prices. These components of analysts information, including persistence of other information and the volatility of other information have not previously characterized. Fourth, the most closely related literature focuses on the one-year ahead analysts' forecasts and ignore future forecasts.[2] This implies, however, that our methodology is not applicable to all firms with analysts following since we require analysts' forecast for three different future periods.[3] As further discussed below we do not currently consider bias in analysts' forecasts.

Part of the extant literature on accounting-based valuation has proceeded *as if* 'other information' is not yet reflected in accounting numbers and is 'unobservable', while other papers infer other information from analysts' one-year ahead earnings forecasts. For example, Dechow, Hutton and Sloan (1999) find a negative bias of 25.9% in their value estimates with other information deduced from analysts' one-year ahead earnings. Further, Myers (1999) follows Feltham and Ohlson (1995) and allows for conservative accounting resulting in a negative bias in the predicted prices of 35.6%. LID facilitates closed-form valuation expressions based on currently observable information and allows us to simultaneously infer the other information as well as the persistence of abnormal earnings and the persistence of other information. Choi, O'Hanlon and Pope (2004) attribute the 35.6% bias reported in Myers (1999) to his projection of future abnormal earnings with on average negative realizations. Choi, O'Hanlon and Pope (2004) extend Dechow, Hutton and Sloan (1999) by allowing for conservative accounting and utilize scaled residual income in their LID-based projections. They report a lower negative bias of 23.1%. Next, we review the prior literature in detail.

---

[2] Notable exceptions include Frankel and Lee (1998), Liu and Thomas (2000) and papers on infer implied cost of equity capital from forecasts of earnings. These papers, however, do not consider LID.

[3] While our methodology also applies to quarterly forecasts, we focus on annual forecasts. In fact, 148,342 analysts' one-year ahead consensus forecasts were included in our data base between February 1983 to December 2004. Of these firms, 113,853 (76.75%) also provided two-year ahead forecasts, while 70,598 (47.69%) provided the long-term growth rate as well. Our methodology applies only to the last sub-sample.

In an early empirical paper, Frankel and Lee (1998) use return-on-equity (ROE) to estimate future abnormal earnings. They model future ROE as a piecewise function. In the short run, ROE is estimated to be constant and abnormal earnings are assumed constant in the calculation of continuing value. As Myers (1999) points out, this piecewise function is time-inconsistent since it violates the law of iterated expectations. That is when a period that currently lies in the long run eventually cross into the short run, the information dynamics would change predictably. However, the piecewise function does not allow for this anticipated change.

Dechow, Hutton and Sloan (1999), henceforth DHS, study the implications of LID. First, they assume that the persistence of abnormal earnings and the persistence of other information (below denoted by ω and γ, respectively) are common for all firms and estimate them from a two-stage yearly pooled time-series regression. Based on these estimates, DHS calculate the predicted firm values and test empirically whether ω differs reliably from 0 and 1 (although they do relax the constraints on the boundary of ω), whether first-order autoregressive (AR) process describes abnormal earnings by adding additional lags, and whether γ differs from 0 and 1. Finally, DHS estimates ω with conditioning variables.

In contrast to DHS, Myers (1999) uses time-series analyses to estimate LID for each firm. He allows for conservatism based on Feltham and Ohlson (1995) by accounting for understated operating assets with two types of other information. To test how well the

LID-based models conform to the market's expectations (i.e., test the implied price coefficients), Myers investigates whether the market-to-book ratio equals unity, whether actual and predicted firm values are positively correlated, and whether the estimated coefficient fall within the hypothesized range.

A recurring problem is that LID does not suggest what other information is. As a proxy for other information, Myers (1999) incorporates specific non-accounting information, such as order backlog and newly signed contracts. Still it is impossible to explicitly control for all possible types of other information. Prior studies that ignore other information implicitly include other information as parts of the error terms in empirical estimation. We circumvent this problem because our methodology generates firm-year specific estimates.

Choi, O'Hanlon and Pope (2004) extend DHS by recognizing that LID parameters may differ with firm characteristics and using analysts' forecasts to adjust for accounting conservatism.[4] Their correction for conservatism results in less negative valuation biases, although overall accuracy does not improve.

We demonstrate in the next section how investors can infer the analysts' other information from observed analysts' forecasts. To infer analysts' private information, which is not (yet) reflected in current earnings, we exploit analyst forecasts for different horizons and the time series structure in current abnormal earnings and analysts' forecasts

---

[4] For example, with high-intangible and low-intangible industrial sectors as in Francis and Schipper (1999) or with profit vs. loss firms as suggested by Hayn (1995). Accounting-based valuation models work better for profit-making firms.

of future earnings. To this end, we assume that the informational variables exhibit a familiar autoregressive structure first applied to accounting-based valuation by Ohlson (1995). We then proceed to implement this inference empirically and characterize the firm's information environment, including analysts' private information, at individual firm year level. Our inferences enable a cross-sectional and inter-temporal variation in analysts' assessment of the firms' information environment.

3. Accounting-based Model and Results

The primitive variable in accounting-based valuation developed by Preinreich, Edwards, Bell and Ohlson, among others, is period t abnormal earnings, $x_t^a = x_t - rb_{t-1}$, where x_t are earnings, b_{t-1} is beginning of period t accounting book value of shareholders' equity, and r is the firm's discount rate. Following Ohlson (1995), we assume that analysts believe that abnormal earnings, x_t^a, are described by Linear Information Dynamics (LID):

$$x_t^a = \omega\, x_{t-1}^a + \nu_{t-1} + \varepsilon_{1,t} \tag{1}$$

where ω is the persistence of abnormal earnings, $\varepsilon_{1,t}$ is the error term and other information, ν_t, is characterized by

$$\nu_t = \gamma \nu_{t-1} + \varepsilon_{2,t} \tag{2}$$

where γ is the persistence of other information and $\varepsilon_{2,t}$ is the error term. The error terms or innovations, $\varepsilon_{1,t}$ and $\varepsilon_{2,t}$, have a mean of zero and are independent from each other and over time. Under the above assumptions and the clean surplus assumption, Ohlson (1995) expresses firm value as:

$$P_t = B_t + \beta(\omega)x_t^a + \alpha(\omega,\gamma)v_t \tag{3}$$

with coefficients:

$$\beta(\omega) = \frac{\omega}{(1+r-\omega)} \tag{3a}$$

$$\alpha(\omega,\gamma) = \frac{(1+r)}{(1+r-\omega)(1+r-\gamma)} = \frac{(1-\beta(\omega))}{(1+r-\gamma)} \tag{3b}$$

Note that these coefficients depend on the discount rate (*r*), the persistence of abnormal earnings (ω), and the persistence of analysts' other information (γ). Ohlson (1995) requires that $0 \le \omega \le 1$ and $0 \le \gamma \le 1$. Although slightly weaker assumptions $-(1+r) \le \omega \le (1+r)$ and $-(1+r) \le \gamma \le (1+r)$ suffice for the purpose of ensuring stationary time-series and finite firm values.[5]

We presume that analysts' use all their information available to make rational forecasts for any forecast horizon, j, that is,

$$f_{t,t+j}^a = E_t[x_{t+j}^a] \tag{4}$$

Equation (4) implies that analysts make unbiased forecasts given their information. Given that we do not correct for analysts' bias, we draw the following caveats.[6] In the

---

[5] Specifically, $\frac{\partial\beta}{\partial r}(\omega) = \frac{-\beta(\omega)}{(1+r-\omega)^2}$, $\frac{\partial\beta}{\partial\omega}(\omega) = \frac{1+r}{(1+r-\omega)^2} > 0$, $\frac{\partial\beta}{\partial\gamma}(\omega) = 0$, $\frac{\partial\alpha}{\partial\omega}(\omega) = \frac{-(1+r)}{(1+r-\omega)^2(1+r-\gamma)} > 0$ and $\frac{\partial\alpha}{\partial\gamma}(\omega) = \frac{(1+r)}{(1+r-\omega)(1+r-\gamma)^2} > 0$.

[6] Empirical evidence on analysts' bias is pervasive and widely-documented. For example, Cowen, Groysberg, and Healy (2003) and Jacob, Rock, and Weber (2003) provide evidence that analysts' biases

presence of analysts' bias, it would *ceteris paribus* become more difficult to document the empirical role of other information in accounting-based valuation. First, if the magnitude of analysts' bias is relatively stable cross-sectionally, bias should not materially affect our estimates. Second, if analysts' bias indeed adds noise to estimates, our cross-sectional regression coefficient estimates become biased towards zero when the analysts' forecasts are incorporated in the independent variables. Finally, if investors fully anticipate and unravel analysts' bias, our predicted intrinsic firm values based on analysts' forecasts will be naïve since we do not consider analysts' bias.

Given LID assumption, we show in the appendix that the analysts' forecasts of earnings one- two-, and three-years ahead can be written as

$$f^{a}_{t,t+1} = \omega x^{a}_{t} + v_{t} \tag{5a}$$

$$f^{a}_{t,t+2} = \omega^{2} x^{a}_{t} + (\omega + \gamma) v_{t} \tag{5b}$$

$$f^{a}_{t,t+3} = \omega^{3} x^{a}_{t} + (\omega^{2} + \gamma\omega + \gamma^{2}) v_{t} \tag{5c}$$

Here, other information is not directly observable to investors. Nonetheless, we argue that investors can infer from the above three analysts' forecasts the information that is not directly observable. To further illustrate, investors can calculate the most recent abnormal earnings from the earnings and book values which are publicly disclosed and hence observable. Arguably, if investors knew, which they do not, the analysts' other

---

appear to vary with the relationship between the firm and the investment bank that employs the analyst following the firm.

information at time t, v_t , investors would infer from the one-year ahead forecast the persistence of abnormal earnings to be:

$$\omega = (f^{a}_{t,t+1} - v_t) / x^{a}_{t} \qquad (6)$$

Armed with the inferred persistence of abnormal earnings, investors could next infer the persistence of analysts' information from the one-year and two-year ahead analysts' forecasts:

$$\gamma = (f^{a}_{t,t+2} - f^{a}_{t,t+1} (f^{a}_{t,t+1} - v_t) / x^{a}_{t}) / v_t \qquad (7)$$

It should now be clear that the three-year ahead analyst forecast allows investors to infer analysts' other information. Combining all three analyst forecasts, investors may therefore infer all three components of analysts' information that are relevant under LID assumption: other information, the persistence of other information, and the persistence of abnormal earnings.

However, as we demonstrate formally in the appendix, it is possible that some analysts' forecasts are inconsistent with the LID assumption. This occurs when a firm-year specific constant, D, defined in the appendix becomes negative. Further, the analysts' forecasts may be consistent with two different inferences made by investors. When $D > 0$, two inferences are feasible, we denote the inferred values by superscripts "+" and "-", respectively. While such non-unique inferences are generally difficult to interpret, we prove results below that facilitate our empirical analyses.

There are two solutions when $D > 0$. Analog to Ohlson (2001), when graphically plotting pairs of inferred persistence parameters, the pairs of inferred persistence parameters exhibit symmetry in the sense that they are mirror images around the 45 degree upward sloping line in a graph. Proposition 1 below formalizes this statement.

Proposition 1: $\gamma^{+} = \omega^{-}$ and $\gamma^{-} = \omega^{+}$.

This symmetry property is helpful because it means that we can attribute arbitrarily, without loss of generality, the higher persistence to either abnormal earnings or other information. Rewriting of the lag polynomial that describes the time-series properties of abnormal earnings, we see that:

$$(1-(\omega+\gamma)L+\omega\gamma L^2)x^a_{t+1} = (1-\gamma L)\varepsilon_{1,t} + \varepsilon_{2,t}$$

where the lag operator, L, is defined such that $Ly_t = y_{t-1}$, as is standard, that is, x^a_{t+1}~ARMA(2,1).[7] Note that the sum and the product of the persistence parameters play important roles in describing the expectations towards the future because they show up in as the AR-coefficients. Fortunately, the sum and the product are the same for each pair of inferred persistence parameters, yet they are not the whole story as seen by γ in the MA-term.

We next show the following critical result regarding neutrality of accounting-based valuation. The inferred market prices are unique even when investors' cannot make unique inferences about the three components of analysts' information. Proposition 2 states this formally:

---

[7] See Hamilton (1994).

Proposition 2: $P_t^{+} = P_t^{-}$

This result is important because it allows us to follow Easton (1984) and Myers (1999) and empirically compare predicted, inferred prices to observed actual prices.

Since the inferred other information differs while the inferred market prices coincide, it would not be surprising if the valuation coefficient on other information were to differ between the two inferred solutions. However, lemma 1 establishes that this is not the case. Instead, the valuation coefficients on abnormal earnings may differ:

Lemma 1: $\alpha(\omega^{-}, \gamma^{-}) = \alpha(\omega^{+}, \gamma^{+})$

$\beta(\omega^{-}) \neq \beta(\omega^{+})$ if and only if $\omega^{-} \neq \omega^{+}$

We can therefore also interpret the effect of other information on firm values without reference to a particular inferred solution.

Finally, we compare the inferred innovations, or noise terms, for abnormal earnings and other information:

Lemma 2: $\varepsilon_{1,t+1}^{+} = \varepsilon_{1,t+1}^{-}$ and $\varepsilon_{2,t+1}^{+} = \varepsilon_{2,t+1}^{-}$.

This result allows us to calculate and compare the standard deviation of the innovations even though the inferences are not unique. Consequently, we can attribute the source of new information to either financial information (abnormal earnings) or other information.

4. Data

We use analysts' consensus forecasts of earnings per share collected from I/B/E/S adjusted files for the period between 1985 and 2003. These forecasts are taken from the first month after the I/B/E/S reported period *t* earnings announcement. Stock return data are from the CRSP daily files. We collect historical accounting data from COMPUSTAT files, including book value of equity and dividends to common shareholders. All empirical analyses are performed using per share data. Following DHS, we use a discount rate of 12%, which approximates the long-run average realized return on US equities. Our results are insensitive to choice of discount rates ranging from 9 to 15%.

Our sample was reduced as follows. When matching COMPUSTAT with IBES with at least one forecast (usually one-year ahead), we end up with 53,898 firm-year observations. After imposing the requirement that firms must have analysts forecasting earnings for each of the next two years as well as long-term growth rates, results in 24,863 observations. Observations with negative book value of equity are excluded. We exclude firms in the utilities (SIC 4900-4999) and financial institutions (SIC 6000-6411). We further delete and the top and bottom 1% of observations by years to variables of interest to mitigate the effect of extreme values (book values, current earnings, one-year ahead earnings forecasts, two-year ahead earnings forecasts, and long term earnings growth forecasts). As is standard, we need to convert analysts' forecast of earnings to analysts' forecasts of *abnormal* earnings, so we construct future book value assuming a constant dividend.[8] The final sample consists of 17,995 observations.

---

[8] Our results appear robust when constant dividend payout ratios are used.

5. Empirical Analyses

This section summarizes our empirical findings. Table 1 provides descriptive statistics for our initial sample in Panel A. Panels B to E comprise four sub-samples where firm-year observations with analysts' forecasts consistent with LID are presented in Panel B and firm year observations with analyst's forecasts that are inconsistent with LID are presented in Panel C. For analysts' forecasts that are consistent with LID, we further sub-categorize observations that lead to closed-form price estimate with ω and γ within the range of $-(1+r)$ and $(1+r)$ in Panel D, and observations with ω and γ within the range of 0 and 1 required in Ohlson (1995) in Panel E.

LID can explain analysts' forecasts for 76.89% of our initial sample.[9] When we compare the means of the firm characteristics between the subset of firms with analysts' forecasts consistent and inconsistent with LID, we find that firms with observations inconsistent with LID have less number of analysts' followings, larger standard deviation in analysts' consensus forecasts, and smaller market capitalization. These differences in means are all statistically significant with p-values of 0.0000.

For firm year observations that are consistent with LID, only 15% (Panel E) exhibit ω and γ within the range of 0 and 1 required in Ohlson (1995). These firms are typically larger in market capitalization and have greater number of analysts' followings. When the restrictions on ω and γ are relaxed to those within the range of $-(1+r)$ and $(1+r)$,

---

[9] 76.89% arises as 13,837 out of 17,995 firm-year observations.

41.07% of the observations generate parameters that lead to finite predicted firm value (Panel D). These firms have larger market capitalization and more analysts' followings than firm year observations consistent with LID but smaller in market capitalization and fewer analysts' followings than firms that require Ohlson's (1995) restriction.

Table 2 reports summary statistics regarding our inferred parameters using our estimation procedure.[10] In Table 3, we report our median estimates by year to illustrate that the distribution of our inferred LID-parameters are reasonably stable over time. Even though the two persistence parameters are non-unique (we have two possible solutions) in our estimation procedure, the symmetry property of the two pairs of persistence parameters ensures that the sum and the product for each pair of the inferred persistence parameters remain the same.[11] In interpreting our implied estimates of $(\omega+\gamma)$ and $\omega\gamma$, we can describe the time-series properties of abnormal earnings as $x_{t+1}^{a} = (\omega+\gamma)x_{t}^{a} - \omega\gamma x_{t-1}^{a} - \gamma\varepsilon_{1,t} + \varepsilon_{2,t} + \varepsilon_{1,t+1}$. Here the implied estimates of $(\omega+\gamma)$ and $\omega\gamma$ are the persistence of current and lagged forecasted abnormal earnings into the one-year ahead forecasted abnormal earnings. This, in turn, is helpful in gaining insights

---

[10] Although not reported, as an illustration of proposition 1, $\omega^{+} = \gamma^{-}$ exhibit a median (mean) of 0.79 (0.98) and $\gamma^{+} = \omega^{-}$ exhibit a median (mean) of 0.36 (-0.47). Our median symmetrical combinations of the two persistence parameters fall between the range of zero and one for our overall sample. This is also true across all sample years and industry classifications. Our median estimates of the persistence parameters are consistent with Ohlson's (1995) LID which predicts a positive serial correlation of the RI with persistence parameters between zero and one. As a consequence of Lemma 1, the median and mean of $\alpha(\omega^{-},\gamma^{-}) = \alpha(\omega^{+},\gamma^{+})$ are 0.60 and -2.27, respectively for our overall sample. When expressing prices as a function of book values, abnormal earnings and other information, $P_t = B_t + \beta(\omega)x_t^{a} + \alpha(\omega,\gamma)v_t$, the median implied α estimate suggests a 0.60 weighting on other information.

[11] That is $\omega^{+} + \gamma^{+} = \omega^{-} + \gamma^{-}$ and $\omega^{+}\gamma^{+} = \omega^{-}\gamma^{-}$.

into how analysts forecast abnormal earnings. The median implied $(\omega+\gamma)$ is 0.95 (in Table 2, Panel A) and range from 0.72 to 1.08 across our sample years (in Table 3, Panel A). The implied persistence result in $(\omega+\gamma)$ close to 1 suggesting that analysts forecast future abnormal earnings *as if* there is no expected change in abnormal earnings (i.e., $x_{t+1}^{a}=x_{t}^{a}$). The median implied value for the product $\omega\gamma$ reported in Table 2 is -0.16 suggesting that the persistence in lagged abnormal earnings into forecasted one-year ahead earnings is 0.16= -(-0.16). The median persistence of lagged abnormal earnings into forecasted one-year ahead earnings range from 0.42 to 0.06 across years as reported in Panel A of Table 3.

We report in Panel B of Table 3, the median estimates of our implied parameters across industries. The persistence in current forecasted abnormal earnings on one-year ahead forecasted abnormal earnings is above 1 for firms in Agriculture, Computers, Retail, Insurance and Real Estate, Services and Others. The highest persistence in lagged forecasted abnormal earnings on one-year ahead forecasted abnormal earnings is found for firms in 'others' at +0.23; while the lowest persistence in lagged forecasted abnormal earnings into one-year ahead forecasted abnormal earnings is found for firms in Insurance and Real Estate at +0.07.

We incorporate our implied estimates and calculate our predicted price (incorporating analysts' private information) $\hat{P}_t=b_t+\beta x_t^{a}+\alpha\nu_t$. In Table 4, the estimated price is used as the dependent variable in a regression on actual price (both on a per share basis).[12] The mean coefficient on the observed price is 1.13 with a Fama-McBeth T-value of 6.83, suggesting that the association between the estimated price and the observed is statistically significant. Previous studies find that predicted accounting-based values are consistently below the observed actual market prices. In contrast, we find positive predicted price. Panel B of Table 4 suggests that the association between predicted and actual price varies across industries. The association between predicted and actual price is statistically significant for firms in Textiles and Printing, Chemicals, Pharmaceuticals, Extractive Industries, Durable Manufacturers, Retail, Services and Others.

In addition, Table 5 reports cum-dividend gross returns. First, $(P_t + d_t)/P_{t-1}$ is the *actual* annual return over time *t-1* to time *t*. For our sample, the mean (median) actual net return was 16% (8%). Second, $(\hat{P}_t + \hat{d}_t)/P_{t-1}$ represents the *hypothetical* annual return to an investor who purchased if the shares can be sold at the intrinsic value inferred from on accounting-based valuation that incorporates analysts' other information. Based on Ohlson (1995), this hypothetical return is calculated as $(1+r)+(1+\beta)\varepsilon_{1,t}/P_{t-1}+\alpha\varepsilon_{2,t}/P_{t-1}$. Since the accounting-based valuation is linear and does not take into account investors' limited liability option, some hypothetical net returns are below -100% (As evidenced by the minimum net return being -322.06%). The median (mean) net return is 12% (29%). We also report summary statistics of the difference between these two returns, $Diff_{\mathrm{Re}turn}$. The median and mean differences

---

[12] The choice of estimated price as the dependent variable is to avoid errors in variable problem that may bias the slope coefficient towards zero.

between the two returns are 0.02 and 0.13 respectively. Table 6 reports the corresponding median estimates for each year and across industry classifications.

In Table 6, we also report the estimates of innovations (or error terms) attributable to abnormal earnings and other information for each firm-year. Here, estimates of innovations are calculated by comparing the actual abnormal earnings and actual other information at time *t* with the product of implied persistence parameters at period *t-1* with abnormal earnings and other information at time *t-1* (i.e., $\varepsilon_{1,t} = x_t^a - \omega_{t-1} f_{t-1,1}^a - v_{t-1}$ and $\varepsilon_{2,t} = v_t - \gamma_{t-1} v_{t-1}$). Comparing the cross-sectional standard deviations of our yearly median estimate of innovations, we observe that other information appears to be more volatility than abnormal earnings. Results reported in Table 8 further corroborate this finding within a smaller sample where at least five years of observations are available for each firm. There, we calculate the standard deviation for each firm. The mean (median) standard deviation of abnormal earnings innovations is 0.36 (0.24) while the mean standard deviation of other information innovations is 1.90 (0.68). This finding is consistent with the hypothesis that accounting systems are slower to recognize news than other information, that is, news predominantly arise from other information sources that precede their effect on abnormal earnings.

Lastly, Table 7 reports the results from a cross-sectional regression of actual annual returns on abnormal earnings innovations and other information innovations. Our results suggest that other information innovations are significantly associated with actual return with a Fama-MacBeth T-value of -3.59. Innovations in abnormal earnings are not significantly associated with actual return with a Fama-MacBeth T-value of 0.33. The mean adjusted R^2 across our yearly regressions is 5.19%.

6. Conclusion

In this paper, we implemented the analysis at the firm level using consensus analysts' forecast, yet the methodology introduced in this paper could also be applied to individual analysts' who provide at least three years of analyst forecasts. This application would allow researchers to address different research questions in future research. For example, do different analysts' hold the same private information in providing forecasts? If so, do they apply the same implied persistence of abnormal earnings and other information? With analyst-specific other information, one could revisit the effect of analysts' characteristics, see work by Mikhail, Walther, and Willis (2003).

Our methodology opens new avenues for future research because it results in firm-year specific inferences about the analysts' perceptions of the persistence in abnormal earnings. First, we can examine the mean reverting process of abnormal earnings and show whether the rate of mean reversion is systematically associated with quality of earnings, dividend payout ratio, or correlated across firms within the same industry. In particular, one might conjecture that firms with extreme levels of earnings and extreme accounting rates of return revert more quickly (Brooks and Buckmaster, 1976; Freeman et al., 1982). Also, non-recurring special items (including restructuring charges and asset write-downs) are less likely to persist (Fairfield et al, 1996) although IBES earnings numbers should have removed special items. Firms with extreme levels of operating accruals, accounting rates of return are less likely to persist (Sloan, 1996). Dividend policy may be an indicator of expected future growth in book value of equity. High growth firms tend to have lower payouts (Fazzari et al, 1988; Anthony and Ramesh, 1992). Firms with low payout will have growth in book value in the future and therefore higher abnormal earnings persistence (see Fazzari et al, 1988; and Anthony and Ramesh, 1992). Finally, industry-specific factors should influence the persistence of abnormal earnings–and be stable over time.

Valuation models that capitalize analysts' earnings forecasts in perpetuity are better at explaining contemporaneous stock prices. This may be due to investors over-weighing information in analysts' earnings forecasts and under-weighing information in current earnings and book value.

In addition, future work might also measure the association between analysts' bias (which we did not address in this paper) and other information. Conservative accounting is likely going to affect the inferred characteristics of linear information dynamics. We plan to perform additional analyses and tests using the Penman and Zhang q-score. Finally, if managers provide management forecasts for three year out, a similar analysis could be performed of management's own information.

Appendix

Proofs of Analyst Forecasts based on LID:

Since

$$x_{t+1}^a = \omega\, x_t^a + v_t + \varepsilon_{1,t+1}$$

and we assume that analysts do observe private information v_t at time t, analysts' one-year ahead forecast is:

$$f_{t,t+1}^a = E_t[x_{t+1}^a]$$

$$= E_t[\omega\, x_t^a + v_t + \varepsilon_{1,t+1}]$$

$$= E_t[\omega\, x_t^a] + E_t[v_t] + E_t[\varepsilon_{1,t+1}]$$

$$= \omega\, x_t^a + v_t$$

The two year ahead analysts' forecast of abnormal earnings is determined by

$$x_{t+2}^a = \omega\, x_{t+1}^a + v_{t+1} + \varepsilon_{1,t+2}$$

$$= \omega(\omega\, x_t^a + v_t + \varepsilon_{1,t+1}) + (\gamma v_t + \varepsilon_{2,t+1}) + \varepsilon_{1,t+2}$$

$$= \omega^2 x_t^a + (\omega + \gamma)v_t + \omega\varepsilon_{1,t+1} + \varepsilon_{2,t+1} + \varepsilon_{1,t+2}$$

We can now take expectations conditional on the analysts' information, which includes the time t abnormal earnings and his private information. Since

$$E_t[\omega\varepsilon_{1,t+1} + \varepsilon_{2,t+1} + \varepsilon_{1,t+1}] = 0$$

we get that

$$f_{t,t+2}^a = E_t[x_{t+2}^a]$$

$$= \omega^2 x_t^a + (\omega + \gamma)v_t$$

Similarly, the three year ahead forecast is determined by

$$x_{t+3}^a = \omega\, x_{t+2}^a + v_{t+2} + \varepsilon_{1,t+3}$$

$$= \omega^3 x_t^a + (\omega^2 + \omega\gamma + \gamma^2)v_t + \omega^2\varepsilon_{1,t+1} + (\omega + \gamma)\varepsilon_{2,t+1} + \omega\varepsilon_{1,t+2} + \varepsilon_{2,t+2} + \varepsilon_{1,t+3}$$

and then taking expectations:

$$f_{t,t+3}^a = E_t[x_{t+3}^a]$$

$$= \omega^3 x_t^a + (\omega^2 + \gamma\omega + \gamma^2)v_t$$

Proof of (7):

$$f_{t,t+2}^a = \omega^2 x_t^a + (\omega + \gamma)v_t$$

$$= \omega(\omega x_t^a + v_t) + \gamma v_t$$

$$= \omega f_{t,t+1}^a + \gamma v_t$$

Substitution of (6) yields the result. Similarly,

$$f_{t,t+3}^{a} = \omega^3 x_t^a + (\omega^2 + \gamma\omega + \gamma^2)\nu_t$$
$$= \omega\left\{\omega^2 x_t^a + (\omega + \gamma)\nu_t\right\} + \gamma^2 \nu_t$$
$$= \omega f_{t,t+2}^{a} + \gamma^2 \nu_t$$

Proof of inference of other information:

By substitution of (6) and (7) into analysts' three year ahead forecast, we get:

$$f_{t,t+3}^{a} = \left\{(f_{t,t+1}^{a} - v_t)/x_t^a\right\} f_{t,t+2}^{a} + \left\{(f_{t,t+2}^{a} x_t^a - (f_{t,t+1}^{a})^2 + f_{t,t+1}^{a} v_t)/x_t^a\right\}/\nu_t$$

Multiplying through with $\left(x_t^a\right)^2 n_t$ we get

$$f_{t,t+3}^{a}(x_t^a)^2 v_t = f_{t,t+1}^{a} f_{t,t+2}^{a} x_t^a v_t - f_{t,t+2}^{a} x_t^a (v_t)^2 + \left\{(f_{t,t+2}^{a} x_t^a - (f_{t,t+1}^{a})^2 + f_{t,t+1}^{a} v_t)\right\}^2$$

Solve for other information value such that

$$\begin{aligned} 0 = {} & \left\{(f_{t,t+1}^{a})^2 - f_{t,t+2}^{a} x_t^a\right\}(v_t)^2 \\ & + \left\{f_{t,t+1}^{a} f_{t,t+2}^{a} x_t^a - f_{t,t+3}^{a}(x_t^a)^2 + 2(f_{t,t+2}^{a} x_t^a - (f_{t,t+1}^{a})^2) f_{t,t+1}^{a}\right\} v_t \\ & + \left\{f_{t,t+2}^{a} x_t^a - (f_{t,t+1}^{a})^2\right\}^2 \end{aligned} \tag{8}$$

To solve this quadratic polynomial, define constants

$$A = \left\{(f_{t,t+1}^{a})^2 - f_{t,t+2}^{a} x_t^a\right\}$$
$$B = \left\{f_{t,t+1}^{a} f_{t,t+2}^{a} x_t^a - f_{t,t+3}^{a}(x_t^a)^2 + 2(f_{t,t+2}^{a} x_t^a - (f_{t,t+1}^{a})^2) f_{t,t+1}^{a}\right\}$$
$$C = \left\{f_{t,t+2}^{a} x_t^a - (f_{t,t+1}^{a})^2\right\}^2 = A^2$$

And the determinant, $D = B^2 - 4AC$. When D<0 there is no solution, that is, analysts' forecasts are inconsistent with LID. When D=0, there is a unique solution: $v_t = \frac{-B}{2A}$.

Finally when D>0 there are two solutions which we can now solve:

$v_t^+ = \frac{-B + \sqrt{D}}{2A}$ and $v_t^- = \frac{-B - \sqrt{D}}{2A}$.

Proof of Lemma 1:

First, recall that

$$\alpha(\omega^+, \gamma^+) = \frac{(1+r)}{(1+r-\omega^+)(1+r-\gamma^+)}.$$

Applying proposition 1:

$$= \frac{(1+r)}{(1+r-\gamma^-)(1+r-\omega^-)}$$
$$= \alpha(\omega^-, \gamma^-)$$

The second part of the lemma follows immediately since

$$\frac{\partial}{\partial \omega}\beta(\omega) < 0 \quad \text{for } \omega \neq (1+r)$$

and

$$\begin{array}{l} \beta(\omega) > 0, \quad for \quad \omega < 1+r \\ \beta(\omega) < 0, \quad for \quad \omega > 1+r \end{array}.$$

Proof of Proposition 1:

To prove that $\omega^+ = \gamma^-$, we substitute in from equations (6) and (7) and find

$$\omega^+ = \frac{(f^a_{t,t+1} - \nu^+_t)}{x^a_t} = \frac{\{f^a_{t,t+2} - f^a_{t,t+1}(f^a_{t,t+1} - \nu^-_t)/x^a_t\}}{\nu^-_t} = \gamma^-$$

Multiplying through

$$(f^a_{t,t+1} - \nu^+_t)\nu^-_t = x^a_t f^a_{t,t+2} - f^a_{t,t+1}(f^a_{t,t+1} - \nu^-_t)$$

And canceling terms we get

$$-\nu^+_t \nu^-_t = x^a_t f^a_{t,t+2} - (f^a_{t,t+1})^2$$

Where we recognize the right hand side, $x^a_t f^a_{t,t+2} - (f^a_{t,t+1})^2 = -A$, from the above proof of inferences of other information. Finally, we rewrite the left hand side. Since $\nu^+_t = \frac{-B+\sqrt{D}}{2A}$ and $\nu^-_t = \frac{-B-\sqrt{D}}{2A}$, it follows that

$$-\nu^+_t \nu^-_t = -\frac{B^2 - D}{(2A)^2} = \frac{-4AC}{4A^2} = \frac{-C}{A} = \frac{-A^2}{A} = -A$$

Which completes the proof.

Proof of Proposition 2:

$$P^+_t = P^-_t$$

Holds if and only if

$$\beta(\omega^+)x^a_t + \alpha(\omega^+, \gamma^+)\nu^+_t = \beta(\omega^-)x^a_t + \alpha(\omega^-, \gamma^-)\nu^-_t$$

Multiply both sides of the equation by

$$(1+r-\omega^+)(1+r-\gamma^+)(1+r-\omega^-)(1+r-\gamma^-),$$

it follows that:

$$\begin{aligned} &(1+r-\gamma^+)(1+r-\omega^-)(1+r-\gamma^-)\omega^+ x^a_t \\ &+ (1+r-\omega^-)(1+r-\gamma^-)(1+r)\nu^+_t \\ &= (1+r-\gamma^-)(1+r-\omega^+)(1+r-\gamma^+)\omega^- x^a_t \\ &+ (1+r-\omega^+)(1+r-\gamma^+)(1+r)\nu^-_t \end{aligned}$$

Since:

$$\begin{aligned} &(1+r-\gamma^+)\omega^-(1+r-\gamma^-)\omega^+ x^a_t \\ &= (1+r-\gamma^-)\omega^+(1+r-\gamma^+)\omega^- x^a_t \end{aligned}$$

it follows that

$$(1+r-\gamma^{+})(1+r)(1+r-\gamma^{-})\omega^{+}x_t^a$$
$$+(1+r-\omega^{-})(1+r-\gamma^{-})(1+r)v_t^{+}$$
$$=(1+r-\gamma^{-})(1+r)(1+r-\gamma^{+})\omega^{-}x_t^a$$
$$+(1+r-\omega^{+})(1+r-\gamma^{+})(1+r)v_t^{-}$$

We next divide through with $(1+r)$ and get

$$(1+r-\gamma^{+})(1+r-\gamma^{-})\omega^{+}x_t^a$$
$$+(1+r-\omega^{-})(1+r-\gamma^{-})v_t^{+}$$
$$=(1+r-\gamma^{-})(1+r-\gamma^{+})\omega^{-}x_t^a$$
$$+(1+r-\omega^{+})(1+r-\gamma^{+})v_t^{-}$$

Next, apply proposition (1) where $\gamma^{+}=\omega^{-}$, $\gamma^{-}=\omega^{+}$

$$(1+r-\omega^{-})(1+r-\omega^{+})\omega^{+}x_t^a$$
$$+(1+r-\omega^{-})(1+r-\omega^{+})v_t^{+}$$
$$=(1+r-\omega^{+})(1+r-\omega^{-})\omega^{-}x_t^a$$
$$+(1+r-\omega^{+})(1+r-\omega^{-})v_t^{-}$$

which reduces to

$$\omega^{+}x_t^a+v_t^{+}=\omega^{-}x_t^a+v_t^{-}$$

The result now follows from substitution of equation (6) since $f_{t,t+1}-v_t^{+}+v_t^{+}=f_{t,t+1}-v_t^{-}+v_t^{-}$ is true.

Note: Symmetric ω and γ

For valuation purposes, when persistence in ω and γ are inferred from prices, current abnormal earnings and one-period ahead abnormal earnings: $P_t=b_t+(\beta-\omega\alpha)x_t^a+\alpha x_{t,t+1}^a$. P_t is symmetric in ω and γ. See Ohlson (2001, footnote 11, p119). That is if say $\hat{\omega}=0.8$ and $\hat{\gamma}=0.15$ are as good estimates as $\hat{\omega}=0.15$ and $\hat{\gamma}=0.8$

$$x_{t+1}^a=\omega x_t^a+v_t+\varepsilon_{1,t+1}$$
$$v_{t+1}=\gamma v_t+\varepsilon_{2,t+1}$$
$$P_t=B_t+\beta x_t^a+\alpha v_t$$

with coefficients:

$$\beta=\frac{\omega}{(1+r-\omega)}$$
$$\alpha=\frac{(1+r)}{(1+r-\omega)(1+r-\gamma)}=\frac{(1-\beta)}{(1+r-\gamma)}$$

Returns formulation:

$$(P_t + d_t)/P_{t-1} = (1+r) + (1+\beta)\varepsilon_{1,t}/P_{t-1} + \alpha\varepsilon_{2,t}/P_{t-1}$$

Proof of Lemma 2:

$$\varepsilon_{1,t}^{+} = x_t^a - \omega^{+}\, x_{t-1}^a - \nu_{t-1}^{+}$$

$$\varepsilon_{1,t}^{-} = x_t^a - \omega^{-}\, x_{t-1}^a - \nu_{t-1}^{-}$$

Applying (6):

$$\varepsilon_{1,t}^{-} = x_t^a - \omega^{-}\, x_{t-1}^a + \nu_{t-1}^{-}$$

$$= x_t^a - f_{t,t+1}^a + \nu_{t-1}^{-} - \nu_{t-1}^{-}$$

$$= x_t^a - f_{t,t+1}^a$$

That $\varepsilon_{2,t}^{+} = \varepsilon_{2,t}^{-}$ follows because returns are the same.

Proof of Expression for lag-polynomial:

Combining $x_{t+1}^a = \omega\, x_t^a + \nu_t + \varepsilon_{1,t+1}$ with $\nu_{t+1} = \gamma\nu_t + \varepsilon_{2,t+1}$ yields:

$$x_{t+1}^a = \omega\, x_t^a + \nu_t + \varepsilon_{1,t+1}$$

$$= \omega\, x_t^a + (\gamma\nu_{t-1} + \varepsilon_{2,t}) + \varepsilon_{1,t+1}$$

Multiplying γ to lag-expression:

$$\gamma x_t^a = \omega\,\gamma x_{t-1}^a + \gamma\nu_{t-1} + \gamma\varepsilon_{1,t}$$

Substituting $\gamma\nu_{t-1} = \gamma x_t^a - \omega\,\gamma x_{t-1}^a - \gamma\varepsilon_{1,t}$ into

$$x_{t+1}^a = \omega\, x_t^a + \nu_t + \varepsilon_{1,t+1}$$

$$= \omega\, x_t^a + \gamma x_t^a - \omega\,\gamma x_{t-1}^a - \gamma\varepsilon_{1,t} + \varepsilon_{2,t} + \varepsilon_{1,t+1}$$

$$= (\omega + \gamma) x_t^a - \omega\gamma x_{t-1}^a - \gamma\varepsilon_{1,t} + \varepsilon_{2,t} + \varepsilon_{1,t+1}$$

As is standard, define the Lag operator, L, such that $Ly_t = y_{t-1}$, then

$$(1 - (\omega+\gamma)L + \omega\gamma L^2)x_{t+1}^a = (1-\gamma L)\varepsilon_{1,t} + \varepsilon_{2,t}$$

Thus,

x_{t+1}^a~**ARMA(2,1)**

References

Anthony, J.H., and K. Ramesh. 1992. Association between Accounting Performance Measures and Stock Prices. *Journal of Accounting and Economics* 15: 203-228.

Brooks, L.D., and D.A. Buckmaster. 1976. Further Evidence of the Time-Series Properties of Accounting income. *Journal of Finance* 31:1359-1373.

Choi, Y-S, J. O'Hanlon, and P. Pope. 2004. Conservative Accounting and Linear Information Valuation Models.. Working paper, Lancaster University

Cowen, A., Boris G., and P. Healy. 2003. Which Types of Analyst Firms Make More Optimistic Forecasts? Working paper, Harvard Business School.

Dechow, P.M., A.P. Hutton and R.G. Sloan. 1999. An empirical assessment of the residual income valuation model. *Journal of Accounting and Economics* 26 (January): 1-34.

Fairfield, P.M., Sweeney, R.J., and T.L. Yohn. 1996. Accounting Classification and the Predictive Content of Earnings. *Accounting Review* 71, 337-355.

Fama, E., and J. MacBeth. 1973. Risk, Return, and equilibrium: Empirical Tests. *Journal of Political Economy* 71 (May): 607-636.

Fazzari, S., Hubbard R.G., and B. Peterson. 1988. Financing Constraints and Corporate Investment. Brookings Papers on Economic Activity: 141-195.

Feltham, G., and J.A. Ohlson. 1995. Valuation and Clean Surplus Accounting for Operating and Financial Activities. *Contemporary Accounting Research*, 11: 689-731.

Feltham, G., and J.A. Ohlson. 1996. Uncertainty Resolution and the Theory of Depreciation Measurement. *Journal of Accounting Research* 34: 209-234.

Francis, J., and K. Schipper. 1999. Have Financial Statements Lost Their Relevance? *Journal of Accounting Research* 37: 319-352.

Frankel, R. M., and C.M.C. Lee. 1998. Accounting valuation, market expectation, and cross-sectional stock returns. *Journal of Accounting and Economics* 25 (June): 283-319.

Freeman, R., Ohlson, J., and S. Penman. 1982. Book rate of return and the prediction of earnings changes. Journal of Accounting Research 20: 639-653.

Guenther, D., and K. Sun. 2005. The Importance of "Other Information" in Setting Stock Prices: A Cross-Country Comparison. Working paper, University of Colorado at Boulder.

Hayn, C. 1995. The Information content of losses. *Journal of Accounting and Economics* 25: 283-319.

Jacob, J., Rock, S., and D. Weber. 2003. Do Analysts' at Independent Research Firms Make Better Earnings Forecasts? Working paper, Leeds School of Business , University of Colorado at Boulder

Liu, J. and J. Ohlson. 2000. The Feltham-Ohlson (1995) model: Empirical Implications. *Journal of Accounting, Auditing and Finance* 15: 321-331.

Liu, J., and J. Thomas. 2000. Stock Returns and Accounting Earnings. *Journal of Accounting Research* 38 (Spring): 71-101.

Mikhail, M., B. Walther, and R. Willis. 2003. The effect of experience on security analysts underreaction. *Journal of Accounting and Economics* 35 (April): 101-116.

Myers, J.N. 1999. Implementing residual income valuation with linear information dynamics. *The Accounting Review* 74 (January): 1-28.

Ohlson, J.A., 1995. Earnings, book values, and dividends in security valuation. *Contemporary Accounting Research* 11 (Spring): 661-687.

Ohlson, J.A. 2001. Earnings, Book Values and Dividends in Equity Valuation: An Empirical Perspective. *Contemporary Accounting Research* 18: 107-120.

Ohlson, J.A., and B.E. Juettner-Nauroth. 2005. Expected EPS and EPS growth as determinants of value. *Review of Accounting Studies* 10 (June/September): 349-365.

Penman, S. H. 2004. Financial Statement Analysis and Security Valuation. 2nd edition, New York, NY: McGraw-Hill.

Penman, S. H., and X. Zhang 2002. Accounting Conservatism, the Quality of Earnings, and Stock Returns. *The Accounting Review* 77 (April): 237-264.

Sloan, R.G. 1996. Do Stock Prices Fully Reflect Information in Accruals and Cash Flows about Future Earnings? *The Accounting Review* 71: 289-315.

Table 1: Descriptive Statistics

	Obs	Median	Mean	Std. Dev.	Skew.	Kurtosis	Max.	Min.
Panel A: All firm year observations								
P_0	17,995	16.44	19.98	15.68	4.50	96.78	546.19	0.20
b_0	17,995	6.91	8.51	6.36	1.58	6.36	49.87	0.24
x_0^a	17,995	0.03	-0.06	0.81	-1.05	10.19	6.14	-7.91
$f_{0,1}^a$	17,995	0.10	0.11	0.70	-0.17	7.55	6.52	-4.98
$f_{0,2}^a$	17,995	0.21	0.27	0.67	0.63	11.47	11.72	-3.64
$f_{0,3}^a$	17,995	0.28	0.35	0.73	2.27	64.90	23.71	-3.67
Follow	17,995	8.00	10.75	8.03	1.31	4.51	51.00	1.00
F_Stdev	17,662	0.05	0.10	0.13	3.76	25.17	1.90	0.00
MktCap	17,990	784.65	4,399.22	15,791.75	10.57	169.67	450,644.80	2.80
Panel B: Firm year observations consistent with Linear Information Dynamics								
P_0	13,837	16.75	20.35	16.17	5.01	109.79	546.19	0.20
b_0	13,837	6.89	8.51	6.39	1.61	6.56	49.87	0.24
x_0^a	13,837	0.10	-0.01	0.86	-1.06	9.66	6.14	-7.91
$f_{0,1}^a$	13,837	0.17	0.15	0.76	-0.33	6.99	6.52	-4.98
$f_{0,2}^a$	13,837	0.24	0.27	0.71	0.18	6.31	5.12	-3.64
$f_{0,3}^a$	13,837	0.31	0.35	0.75	0.28	6.27	5.63	-3.67
Follow	13,837	8.00	10.93	8.11	1.30	4.47	51.00	1.00
F_Stdev	13,588	0.05	0.09	0.13	3.89	27.74	1.90	0.00
MktCap	13,832	841.77	4,828.19	17,071.01	10.06	152.43	450,644.80	2.80
Panel C: Firm year observations inconsistent with Linear Information Dynamics								
P_0	4,158	15.50	18.76	13.87	1.61	7.38	140.50	0.42
b_0	4,158	6.99	8.52	6.26	1.45	5.61	42.20	0.30
x_0^a	4,158	-0.11	-0.23	0.60	-1.81	13.66	2.81	-6.02
$f_{0,1}^a$	4,158	-0.05	-0.02	0.45	0.84	8.95	3.18	-2.19
$f_{0,2}^a$	4,158	0.14	0.27	0.54	3.86	56.36	11.72	-2.03
$f_{0,3}^a$	4,158	0.22	0.36	0.65	12.43	407.59	23.71	-1.92
Follow	4,158	8.00	10.15	7.70	1.36	4.61	45.00	1.00
F_Stdev	4,074	0.06	0.12	0.15	3.37	19.22	1.67	0.00
MktCap	4,158	612.78	2,972.19	10,340.06	11.61	207.97	274,542.40	4.83
Panel D: Firm year observations with ω and γ within the range of $-(1+r)$ and $(1+r)$								
P_0	5,683	17.19	21.02	17.78	7.17	170.50	546.19	0.20
b_0	5,683	7.95	9.61	6.96	1.44	5.66	49.36	0.33
x_0^a	5,683	-0.08	-0.11	1.03	-0.54	6.92	5.63	-7.91
$f_{0,1}^a$	5,683	0.04	0.07	0.97	-0.03	4.66	6.52	-4.98
$f_{0,2}^a$	5,683	0.06	0.19	0.87	0.30	4.61	5.12	-3.64
$f_{0,3}^a$	5,683	0.08	0.24	0.89	0.38	4.66	5.62	-3.57
Follow	5,683	9.00	11.26	8.29	1.15	3.99	49.00	1.00
F_Stdev	5,547	0.06	0.11	0.14	3.33	20.82	1.82	0.00
MktCap	5,682	947.17	5,695.04	18,873.21	8.84	118.82	450,644.80	2.80

Panel E: Firm year observations with ω and γ within the range of 0 and *(1+r)*

P_0	2,072	18.00	22.63	22.05	9.39	192.75	546.19	0.20
b_0	2,072	7.55	9.14	6.49	1.32	5.01	38.25	0.33
x_0^a	2,072	0.02	-0.07	1.01	-0.72	6.41	4.87	-5.72
$f_{0,1}^a$	2,072	0.26	0.26	0.88	0.08	4.14	4.15	-3.23
$f_{0,2}^a$	2,072	0.35	0.37	0.89	0.18	4.12	4.19	-2.86
$f_{0,3}^a$	2,072	0.39	0.43	0.91	0.27	4.09	4.01	-2.76
Follow	2,072	10.00	11.84	8.46	1.06	3.65	45.00	1.00
F_Stdev	2,027	0.05	0.09	0.12	4.16	37.16	1.82	0.00
MktCap	2,071	1,103.83	6,999.13	22,160.26	8.44	113.12	450,644.80	2.80

P_t is the price per share at time *t*. b_t is the book value per share at time *t*. x_0^a is abnormal earnings at time *t=0*. $f_{0,t}^a$ is analysts' forecast of *t*-period ahead abnormal earnings available at time *t=0*. *Follow* is the number of analysts' followings. *F_Stdev* is the standard deviation in analysts' consensus forecasts. *MktCap* is the market capitalization measured as the product of price per share and the number of shares outstanding.

Table 2: Estimates of the Implied Parameters

	Obs	Median	Mean	Std. Dev.	Skew.	Kurtosis	Max.	Min.
Panel A: Firm year observations consistent with Linear Information Dynamics								
v_t^+	13,837	-0.01	0.10	12.65	-57.75	5,093.95	335.89	-1,134.07
v_t^-	13,837	0.11	-1.78	222.23	-117.41	13,802.07	271.77	-2,6125.76
$\omega+\gamma$	13,837	0.95	-0.24	104.14	-108.24	12,298.09	619.90	-11,891.30
$\omega\gamma$	13,837	-0.16	-1.16	66.25	-86.86	9,047.58	1,008.54	-6,996.66
$Diff_{\Pr ice}$	13,837	-0.55	-0.54	18.56	-64.22	7,059.14	783.26	-1,827.37
Panel B: Firm year observations with ω and γ within the range of *-(1+r)* and *(1+r)*								
v_t^+	5,683	-0.05	0.19	0.91	1.50	13.54	10.76	-4.57
v_t^-	5,683	0.09	-0.09	1.03	-1.51	10.66	5.45	-9.16
$\omega+\gamma$	5,683	0.80	0.72	0.52	-0.31	2.48	2.07	-1.21
$\omega\gamma$	5,683	-0.11	-0.13	0.37	-0.12	2.99	1.07	-1.23
$Diff_{\Pr ice}$	5,683	-0.30	0.50	14.01	27.92	1,995.38	783.26	-461.90
Panel C: Firm year observations with ω and γ within the range of 0 and *(1+r)*								
v_t^+	2,072	0.24	0.30	0.76	0.65	5.78	5.39	-2.88
v_t^-	2,072	0.20	0.24	0.60	0.35	9.04	4.15	-3.11
$\omega+\gamma$	2,072	1.20	1.21	0.27	-0.32	4.25	2.07	0.05
$\omega\gamma$	2,072	0.19	0.24	0.20	0.97	3.46	1.07	0.00
$Diff_{\Pr ice}$	2,072	-0.25	0.78	21.15	19.86	1,017.95	783.26	-461.90

Superscripts + and - are implied parameters calculated based on $v_t^+ = (-B+\sqrt{D})/2A$ and $v_t^- = (-B-\sqrt{D})/2A$ in our inferences of 'other information' respectively in equation (8). v_t is the analysts' private/other information (not in current abnormal earnings). ω is the persistence in abnormal earnings (x_t^a). γ is the persistence in other information. α and β are the implied multiplier on other information and abnormal earnings when firm value is express as $P_t = b_t + \beta x_t^a + \alpha v_t$ respectively where P_t is the price per share at time *t* and b_t is the book value per share at time *t.* $\omega+\gamma$ and $\omega\gamma$ are persistence of current and lagged abnormal earnings when abnormal earnings are expressed as $x_{t+1}^a = (\omega+\gamma)x_t^a - \omega\gamma x_{t-1}^a - \gamma\varepsilon_{1,t} + \varepsilon_{2,t} + \varepsilon_{1,t+1}$. $Diff_{\Pr ice}$ is $(\hat{P}_t - P_t)/P_t$ where $\hat{P}_t$ is estimated as $\hat{P}_t = b_t + \beta x_t^a + \alpha v_t$.

Table 3: Median Estimates of Implied Parameters by Years and Industry Classifications

Panel A: Median Estimates by Years

Year	obs	v_t^+	v_t^-	$\omega+\gamma$	$\omega\gamma$	$Diff_{\Pr ice}$
1985	223	0.13	0.12	0.89	-0.30	-0.42
1986	253	-0.01	0.12	0.75	-0.31	-0.52
1987	280	-0.01	0.12	0.72	-0.42	-0.51
1988	307	0.09	0.10	0.88	-0.20	-0.42
1989	442	0.00	0.12	0.74	-0.33	-0.38
1990	507	-0.01	0.11	0.85	-0.22	-0.41
1991	585	-0.02	0.12	0.88	-0.25	-0.54
1992	594	-0.01	0.10	0.97	-0.14	-0.50
1993	661	0.00	0.09	1.07	-0.06	-0.53
1994	790	-0.01	0.10	0.91	-0.22	-0.54
1995	815	0.00	0.12	0.99	-0.18	-0.59
1996	974	0.00	0.13	0.98	-0.14	-0.57
1997	972	0.00	0.12	1.05	-0.09	-0.63
1998	1,170	0.00	0.15	1.08	-0.07	-0.57
1999	1,224	-0.02	0.11	0.97	-0.16	-0.52
2000	1,050	-0.02	0.12	0.98	-0.12	-0.55
2001	955	-0.01	0.13	0.93	-0.18	-0.55
2002	966	-0.08	0.07	0.87	-0.15	-0.49
2003	1069	-0.10	0.03	0.84	-0.17	-0.61
Mean*		0.00	0.11	0.91	-0.20	-0.52
Median*		-0.01	0.12	0.91	-0.18	-0.53
Stdev*		0.05	0.03	0.11	0.09	0.07

Panel B: Median Estimates by Industry Classifications

Industry	obs	v_t^+	v_t^-	$\omega+\gamma$	$\omega\gamma$	$Diff_{\Pr ice}$
Agriculture	52	0.12	0.31	1.09	-0.08	-0.63
Mining & Construction	390	-0.05	0.09	0.88	-0.15	-0.44
Food	544	0.17	0.11	0.98	-0.09	-0.38
Textiles and Printing	1,136	-0.01	0.14	0.88	-0.21	-0.42
Chemicals	616	0.00	0.14	0.91	-0.17	-0.43
Pharmaceuticals	532	0.00	0.11	0.95	-0.22	-0.77
Extractive Industries	744	-0.11	0.08	0.67	-0.21	-0.53
Durable Manufacturers	3,452	-0.01	0.12	0.91	-0.18	-0.50
Computers	2,064	-0.01	0.10	1.05	-0.14	-0.72
Transportation	1,015	-0.04	0.12	0.86	-0.20	-0.52
Retail	1,885	-0.01	0.09	1.03	-0.12	-0.52
Insurance and Real Estate	101	-0.02	0.18	1.02	-0.07	-0.66
Services	1,259	-0.01	0.09	1.07	-0.10	-0.60
Others	47	0.06	0.12	1.00	-0.23	-0.39
Mean*		0.00	0.13	0.95	-0.16	-0.54
Median*		-0.01	0.12	0.97	-0.16	-0.52
Stdev*		0.07	0.06	0.11	0.06	0.12

Superscripts + and - are implied parameters calculated based on $v_t^+ = (-B + \sqrt{D})/2A$ and $v_t^- = (-B - \sqrt{D})/2A$ in our inferences of 'other information' respectively in equation (8). v_t is the analysts' private/other information (not in current abnormal earnings). $\omega + \gamma$ and $\omega\gamma$ are persistence of current and lagged abnormal earnings when abnormal earnings are expressed as $x_{t+1}^a = (\omega + \gamma)x_t^a - \omega\gamma x_{t-1}^a - \gamma\varepsilon_{1,t} + \varepsilon_{2,t} + \varepsilon_{1,t+1}$. $Diff_{\Pr ice}$ is $(\hat{P}_t - P_t)/P_t$ where $\hat{P}_t$ is estimated as $\hat{P}_t = b_t + \beta x_t^a + \alpha \nu_t$.

Agriculture are firms with primary SIC codes 1-999; Mining and Construction are firms with primary SIC codes 1000-1999 (excluding 1300-1399); Food are firms with primary SIC codes 2000-2111; Textile and Printing are firms with primary SIC codes 2200-2790; Chemicals are firms with primary SIC codes 2800-2824 and 2840-2899; Pharmaceuticals are firms with primary SIC codes 2830-2836; Extractive Industries are firms with primary SIC codes 2900-2999 and 1300-1399; Durable Manufacturers are firms with primary SIC codes 3000-3999 (excluding 3560-3569 and 3670-3679); Computers are firms with primary SIC codes 7370-7379, 3570-3579, and 3670-3679; Transportation are firms with primary SIC codes 4000-4899; Retail are firms with primary SIC codes 5000-5999; Insurance and Real Estate are firms with primary SIC codes 6500-6999; Services are firms with primary SIC codes 7000-8999 (Excluding 7370-7379); Others are firms with primary SIC codes 9000 and above.

* calculated based on median yearly estimates.

Table 4: The Regression of Estimated Prices (incorporated analysts' private information) on Market Prices - Results from Year-by-Year and Industry Classification Regressions of $\hat{P}_t = \phi_0 + \phi_1 P_t + \varepsilon_t$

Panel A: Year-by-Year Regressions

Year	obs	ϕ_0	ϕ_1	adj R^2
1985	80	-4.4001	1.9099	0.0006
		(0.4137)	(0.0003)	
1986	97	18.2878	0.3108	0.0022
		(0.2570)	(0.5711)	
1987	106	5.5176	0.5433	0.0448
		(0.0997)	(0.0069)	
1988	120	7.0646	1.0317	0.0649
		(0.1648)	(0.0060)	
1989	194	36.6878	0.5581	0.0000
		(0.2031)	(0.1071)	
1990	202	14.1098	1.0116	0.0000
		(0.1482)	(0.0001)	
1991	198	7.6316	0.6666	0.0000
		(0.1134)	(0.0007)	
1992	248	-3.5918	1.3708	0.0000
		(0.6704)	(0.0323)	
1993	266	4.5315	1.2945	0.0022
		(0.5920)	(0.0196)	
1994	304	-21.6086	3.4582	0.0089
		(0.3958)	(0.1133)	
1995	290	1.5732	0.8975	0.0084
		(0.6029)	(0.0000)	
1996	375	16.7455	0.8097	0.0000
		(0.2282)	(0.2039)	
1997	359	-14.8975	1.5984	0.0050
		(0.2991)	(0.0178)	
1998	423	57.9062	0.4659	0.0000
		(0.2052)	(0.1316)	
1999	510	21.5462	0.4974	0.0031
		(0.0014)	(0.2804)	
2000	463	7.6670	0.8126	0.0000
		(0.1515)	(0.0033)	
2001	407	-4.7996	1.5092	0.0072
		(0.6293)	(0.0569)	
2002	493	-2.0958	1.1502	0.0121
		(0.3890)	(0.0000)	
2003	548	-19.8417	1.6550	0.0331
		(0.0545)	(0.0027)	
Mean		6.7386	1.1342	0.0660
FM t-value.		1.5484	6.8303	

Panel B: Industry-Classification Regressions

Industry	obs	ϕ_0	ϕ_1	adj R^2
Agriculture	22	17.4779	0.1659	0.0000
		(0.0167)	(0.3657)	
Mining & Construction	189	-41.4531	4.4396	0.0392
		(0.3294)	(0.2234)	
Food	324	3.9496	1.2940	0.0237
		(0.8364)	(0.1271)	
Textiles and Printing	508	12.9141	0.8023	0.0266
		(0.0005)	(0.0000)	
Chemicals	315	-4.2341	1.5639	0.0459
		(0.5982)	(0.0047)	
Pharmaceuticals	211	-5.4753	1.3622	0.0719
		(0.4121)	(0.0046)	
Extractive Industries	408	41.1553	0.5496	0.0000
		(0.3164)	(0.0004)	
Durable Manufacturers	1503	5.6365	1.0592	0.0145
		(0.5774)	(0.0860)	
Computers	654	16.4128	0.4213	0.0021
		(0.0035)	(0.2261)	
Transportation	482	24.0123	0.3773	0.0000
		(0.2707)	(0.3721)	
Retail	620	7.8519	0.9647	0.0200
		(0.2311)	(0.0003)	
Insurance and Real Estate	27	17.0177	-0.0212	0.0000
		(0.0063)	(0.8943)	
Services	403	-14.3458	1.9662	0.2223
		(0.2144)	(0.0075)	
Others	17	-0.8741	1.0956	0.3238
		(0.8073)	(0.0068)	

We restrict our samples to observations with ω and γ within the range of -(1+r) and (1+r). The dependent variable is estimated price (incorporating analysts' private information), where estimated price, $\hat{P}_t = b_t + \beta x_t^a + \alpha \nu_t$, are calculated using our implied parameters (see Table 3). P_t is the market price per share at time *t*. P-values are in parentheses. *FM t-value* is the Fama-MacBeth's (1973) t-value. See Table 3 for industry classifications.

Table 5: Estimates of Innovations in Abnormal Earnings and Analysts' Private Information

	Obs	Median	Mean	Std. dev.	Skew.	Kurtosis	Max.	Min.
Panel A: Firm year observations consistent with Linear Information Dynamics								
$\varepsilon_{1,t}$	7,660	-0.03	-0.15	0.52	-2.05	18.48	4.44	-5.72
$\varepsilon_{2,t}$	7,660	-0.05	-0.06	14.17	14.09	1,939.85	819.13	-588.17
$(\hat{P}_t + \hat{d}_t)/P_{t-1}$	7,660	1.12	1.29	24.25	66.11	5,101.98	1,911.25	-322.06
$(P_t + d_t)/P_{t-1}$	7,660	1.08	1.16	0.59	4.48	49.64	10.70	0.05
$Diff_{\mathrm{Re}\,turn}$	7,660	0.02	0.13	24.26	66.04	5,095.05	1,909.92	-323.31
Panel B: Firm year observations with ω and γ within the range of *-(1+r)* and *(1+r)*								
$\varepsilon_{1,t}$	3,014	-0.05	-0.18	0.58	-2.02	15.78	3.44	-5.07
$\varepsilon_{2,t}$	3,014	-0.09	-0.17	8.01	2.94	864.85	282.82	-233.41
$(\hat{P}_t + \hat{d}_t)/P_{t-1}$	3,014	1.08	1.49	35.78	50.53	2,694.55	1,911.25	-176.73
$(P_t + d_t)/P_{t-1}$	3,014	1.10	1.18	0.61	5.29	63.84	10.58	0.05
$Diff_{\mathrm{Re}\,turn}$	3,014	-0.06	0.31	35.79	50.50	2,692.27	1,909.92	-177.96
Panel C: Firm year observations with ω and γ within the range of 0 and *(1+r)*								
$\varepsilon_{1,t}$	1,142	-0.04	-0.19	0.59	-2.64	18.81	3.00	-5.07
$\varepsilon_{2,t}$	1,142	-0.02	0.19	8.63	30.69	1,007.70	282.82	-33.95
$(\hat{P}_t + \hat{d}_t)/P_{t-1}$	1,142	1.10	2.75	57.46	32.21	1,068.05	1,911.25	-111.30
$(P_t + d_t)/P_{t-1}$	1,142	1.09	1.15	0.56	6.22	84.36	9.86	0.07
$Diff_{\mathrm{Re}\,turn}$	1,142	0.00	1.60	57.46	32.20	1,067.68	1,909.92	-112.58

$\varepsilon_{1,t}$ is the innovations in abnormal earnings at time *t* where $\varepsilon_{1,t} = x_t^a - \omega_{t-1} f_{t-1,1}^a - v_{t-1}$. x_t^a is the actual abnormal earnings. ω_{t-1} is the persistence in abnormal earnings inferred at time *t-1* and $f_{t-1,1}^a$ is the forecast of one-year ahead abnormal earnings made at time *t-1*. v_{t-1} is analysts' other information inferred at time *t-1*. $\varepsilon_{2,t}$ is the innovations in other information at time *t* where $\varepsilon_{2,t} = v_t - \gamma_{t-1} v_{t-1}$. γ_{t-1} is the persistence in other information inferred at time *t-1*.

$(\hat{P}_t + \hat{d}_t)/P_{t-1}$ is calculated as $(\hat{P}_t + \hat{d}_t)/P_{t-1} = (1+r) + (1+\beta)\varepsilon_{1,t}/P_{t-1} + \alpha\varepsilon_{2,t}/P_{t-1}$. $(P_t + d_t)/P_{t-1}$ is the actual return over time *t-1* to time *t*. $Diff_{\mathrm{Re}\,turn}$ is the difference in return calculated as $Diff_{\mathrm{Re}\,turn}$ $= (\hat{P}_t + \hat{d}_t)/P_{t-1}$ - $(P_t + d_t)/P_{t-1}$.

Table 6: Median Estimates of Innovations in Abnormal Earnings and Analysts' Private Information by Years and Industry Classifications

Panel A: Median Estimates by Years

Year	obs	$\varepsilon_{1,t}$	$\varepsilon_{2,t}$	$(\hat{P}_t + \hat{d}_t) / P_{t-1}$	$(P_t + d_t) / P_{t-1}$	$Diff_{\mathrm{Re}turn}$
1985	120	-0.08	-0.04	1.12	1.29	-0.09
1986	136	-0.06	-0.05	1.12	0.93	0.16
1987	161	-0.01	0.04	1.11	1.08	0.05
1988	222	0.01	0.02	1.12	1.07	0.03
1989	293	-0.06	-0.04	1.10	1.04	0.04
1990	329	-0.05	-0.05	1.10	1.15	-0.08
1991	341	-0.10	-0.01	1.11	1.06	0.02
1992	360	-0.03	-0.03	1.11	1.10	-0.04
1993	418	-0.05	-0.05	1.11	1.01	0.08
1994	464	0.00	-0.05	1.11	1.18	-0.08
1995	544	-0.01	-0.03	1.11	1.14	-0.02
1996	540	-0.01	-0.04	1.12	1.21	-0.08
1997	595	0.00	-0.02	1.12	0.91	0.20
1998	700	-0.05	-0.08	1.11	0.99	0.06
1999	637	-0.01	-0.05	1.12	1.08	0.04
2000	586	0.00	-0.06	1.12	1.02	0.12
2001	576	-0.16	-0.22	1.12	0.86	0.26
2002	638	0.00	-0.19	1.11	1.36	-0.29
Mean*		-0.04	-0.05	1.11	1.08	0.02
Median*		-0.02	-0.04	1.11	1.07	0.04
Stdev*		0.04	0.06	0.01	0.13	0.13

Panel B: Median Estimates by Industry Classifications

Industry	obs	$\varepsilon_{1,t}$	$\varepsilon_{2,t}$	$(\hat{P}_t + \hat{d}_t) / P_{t-1}$	$(P_t + d_t) / P_{t-1}$	$Diff_{\mathrm{Re}turn}$
Agriculture	28	-0.03	-0.02	1.01	0.99	-0.07
Mining & Construction	215	-0.07	-0.09	1.09	1.08	-0.05
Food	360	-0.01	-0.02	1.10	1.11	-0.03
Textiles and Printing	680	-0.04	-0.05	1.11	1.06	0.05
Chemicals	371	-0.03	-0.03	1.11	1.09	-0.01
Pharmaceuticals	326	-0.01	-0.03	1.11	1.10	-0.01
Extractive Industries	389	-0.06	-0.14	1.11	1.11	0.01
Durable Manufacturers	1,860	-0.04	-0.07	1.11	1.08	-0.01
Computers	1,029	-0.02	-0.06	1.12	1.08	0.06
Transportation	573	-0.05	-0.07	1.11	1.08	0.04
Retail	1,102	-0.02	-0.04	1.12	1.07	0.05
Insurance and Real Estate	44	-0.01	-0.09	1.11	1.10	0.04
Services	655	-0.02	-0.04	1.12	1.07	0.05
Others	28	0.00	0.07	1.09	1.05	0.04
Mean*		-0.03	-0.05	1.10	1.08	0.01
Median*		-0.03	-0.05	1.11	1.08	0.02
Stdev*		0.02	0.05	0.03	0.03	0.04

$\varepsilon_{1,t}$ is the innovations in abnormal earnings at time *t* where $\varepsilon_{1,t} = x_t^a - \omega_{t-1} f_{t-1,1}^a - v_{t-1}$. x_t^a is the actual abnormal earnings. ω_{t-1} is the persistence in abnormal earnings inferred at time *t-1* and $f_{t-1,1}^a$ is the forecast of one-year ahead abnormal earnings made at time *t-1*. v_{t-1} is analysts' other information inferred at time *t-1*. $\varepsilon_{2,t}$ is the innovations in other information at time *t* where $\varepsilon_{2,t} = v_t - \gamma_{t-1} v_{t-1}$. γ_{t-1} is the persistence in other information inferred at time *t-1*. $(\hat{P}_t + \hat{d}_t)/P_{t-1}$ is calculated as $(\hat{P}_t + \hat{d}_t)/P_{t-1} = (1+r) + (1+\beta)\varepsilon_{1,t}/P_{t-1} + \alpha\varepsilon_{2,t}/P_{t-1}$. $(P_t + d_t)/P_{t-1}$ is the actual return over time *t-1* to time *t*. $Diff_{\mathrm{Re}turn}$ is the difference in return calculated as $Diff_{\mathrm{Re}turn} = (\hat{P}_t + \hat{d}_t)/P_{t-1}$ - $(P_t + d_t)/P_{t-1}$. See Table 3 for industry classifications.

* calculated based on median yearly estimates

Table 7: The Regression of Returns on Innovations in Abnormal Earnings and Analysts' Private Information – Results from Year-by-Year Regressions and Industry-Classifications

$$(P_t + d_t)/P_{t-1} = \delta_0 + \delta_1 \varepsilon_{1,t}/P_{t-1} + \delta_2 \varepsilon_{2,t}/P_{t-1} + e_t$$

Panel A: Year-by-Year Results

Year	obs	Int.	$\varepsilon_{1,t}/P_{t-1}$	$\varepsilon_{2,t}/P_{t-1}$	adj R^2
1985	49	1.3151	-0.3530	-0.7935	0.0320
		(0.0000)	(0.6099)	(0.0147)	
1986	39	0.9066	-0.9244	0.1253	0.0000
		(0.0000)	(0.4543)	(0.3691)	
1987	57	1.1224	-0.0103	-0.4122	0.0004
		(0.0000)	(0.9645)	(0.0502)	
1988	86	1.0938	0.5275	-0.7036	0.0209
		(0.0000)	(0.3634)	(0.0352)	
1989	125	1.0545	0.8455	-0.3231	0.0419
		(0.0000)	(0.0047)	(0.4764)	
1990	115	1.1387	-1.7719	-0.9201	0.1101
		(0.0000)	(0.0096)	(0.1298)	
1991	115	1.0831	0.1337	-0.7162	0.0000
		(0.0000)	(0.8644)	(0.1217)	
1992	144	1.2315	0.5067	-0.1252	0.0000
		(0.0000)	(0.6039)	(0.5578)	
1993	169	1.0712	0.2133	-0.2389	0.0000
		(0.0000)	(0.7642)	(0.1825)	
1994	160	1.2091	-0.3412	-0.3757	0.0000
		(0.0000)	(0.8336)	(0.1804)	
1995	179	1.1790	0.0642	0.1890	0.0000
		(0.0000)	(0.9261)	(0.1108)	
1996	197	1.2264	-0.7243	0.1646	0.0046
		(0.0000)	(0.3757)	(0.7131)	
1997	220	0.9921	1.5500	-0.3924	0.6078
		(0.0000)	(0.0000)	(0.2936)	
1998	258	1.3328	4.3876	-0.0916	0.0469
		(0.0000)	(0.2793)	(0.2047)	
1999	261	1.2571	1.0023	-0.0406	0.0066
		(0.0000)	(0.1410)	(0.0000)	
2000	260	1.0785	-0.2311	-0.0581	0.0099
		(0.0000)	(0.7170)	(0.0000)	
2001	245	0.9182	-0.6091	-0.2379	0.0005
		(0.0000)	(0.6990)	(0.7575)	
2002	335	1.5398	-2.2935	-0.1006	0.0519
		(0.0000)	(0.0192)	(0.4406)	
Mean		1.1528	0.1096	-0.2806	0.0519
FM T-stat		31.5834	0.3277	-3.5915	

Panel B: Industry-Classification Results

Industry	obs	Int.	$\varepsilon_{1,t} / P_{t-1}$	$\varepsilon_{2,t} / P_{t-1}$	adj R^2
Agriculture	13	1.2024	-2.0620	-7.8021	0.0217
		(0.0000)	(0.8206)	(0.3033)	
Mining & Construction	94	1.2015	0.0100	-0.2357	0.0000
		(0.0000)	(0.9869)	(0.8342)	
Food	206	1.1611	2.4767	0.0266	0.0030
		(0.0000)	(0.2923)	(0.7194)	
Textiles and Printing	291	1.0853	-1.7785	-0.2082	0.0352
		(0.0000)	(0.1850)	(0.2378)	
Chemicals	197	1.1487	1.7967	0.2572	0.4366
		(0.0000)	(0.0000)	(0.7896)	
Pharmaceuticals	129	1.2745	-1.9669	-0.9319	0.0086
		(0.0000)	(0.1293)	(0.1358)	
Extractive Industries	215	1.1496	-1.1532	-0.0673	0.0134
		(0.0000)	(0.0438)	(0.0518)	
Durable Manufacturers	773	1.1538	0.0688	-0.0524	0.0023
		(0.0000)	(0.8448)	(0.0000)	
Computers	280	1.2632	-0.4149	-3.3485	0.0781
		(0.0000)	(0.5967)	(0.0001)	
Transportation	273	1.1561	0.8032	0.1450	0.0003
		(0.0000)	(0.2602)	(0.5392)	
Retail	337	1.1901	0.6055	0.2388	0.0000
		(0.0000)	(0.3521)	(0.4905)	
Insurance and Real Estate	12	1.2008	-3.5009	-1.9257	0.0000
		(0.0000)	(0.3876)	(0.1599)	
Services	185	1.2404	1.5381	-0.0407	0.0114
		(0.0000)	(0.2541)	(0.0000)	
Others	9	1.1795	0.1516	3.5232	0.0000
		(0.0000)	(0.9952)	(0.2397)	

We restrict our samples to observations with ω and γ within the range of -(1+r) and (1+r). The dependent variable is 1+actual return $(P_t + d_t) / P_{t-1}$. $\varepsilon_{1,t}$ is the innovations in abnormal earnings at time *t* where $\varepsilon_{1,t} = x_t^a - \omega_{t-1} f_{t-1,1}^a - v_{t-1}$. x_t^a is the actual abnormal earnings. ω_{t-1} is the persistence in abnormal earnings inferred at time *t-1* and $f_{t-1,1}^a$ is the forecast of one-year ahead abnormal earnings made at time *t-1*. v_{t-1} is analysts' other information inferred at time *t-1*. $\varepsilon_{2,t}$ is the innovations in other information at time *t* where $\varepsilon_{2,t} = v_t - \gamma_{t-1} v_{t-1}$. γ_{t-1} is the persistence in other information inferred at time *t-1*. P-values are in parentheses. *FM T-stat* is Fama-MacBeth's (1973) T-value. See Table 3 for industry classifications.

Table 8: Mean Estimates of Implied Parameters for 698 firms with at least 5 Implied Parameters Available across Years

	Median	Mean	Maximum	Minimum
v_t^+	0.13	0.04	10.59	-46.24
Stdev (v_t^+)	[0.56]	[1.50]	[104.59]	[0.01]
v_t^-	0.13	-0.01	25.55	-53.19
Stdev (v_t^-)	[0.50]	[1.94]	[217.50]	[0.01]
$\omega+\gamma$	0.89	0.27	89.87	-341.18
Stdev ($\omega+\gamma$)	[1.59]	[6.46]	[760.11]	[0.08]
$\omega\gamma$	-0.28	-1.70	91.32	-727.35
Stdev($\omega\gamma$)	[-0.18]	[-1.11]	[71.01]	[-519.49]
$\varepsilon_{1,t}$	-0.08	-0.15	1.66	-2.14
Stdev($\varepsilon_{1,t}$)	[0.24]	[0.36]	[2.86]	[0.00]
$\varepsilon_{2,t}$	-0.05	-0.03	52.67	-22.45
Stdev($\varepsilon_{2,t}$)	[0.68]	[1.90]	[155.99]	[0.00]

For 698 firms with at least 5 implied parameters available across years, we first calculated the mean of the implied parameters for each firm. This table presents the median, mean, maximum and minimum of the each firm's median implied estimates. For the ease of reading, standard deviations are in parentheses [ ]. Superscripts + and - are implied parameters calculated based on $v_t^+ = (-B+\sqrt{D})/2A$ and $v_t^- = (-B-\sqrt{D})/2A$ in our inferences of 'other information' respectively in equation (8). v_t is the analysts' private/other information (not in current abnormal earnings). ω is the persistence in abnormal earnings (x_t^a). γ is the persistence in other information. $\omega+\gamma$ and $\omega\gamma$ are persistence of current and lagged abnormal earnings when abnormal earnings are expressed as $x_{t+1}^a = (\omega+\gamma)x_t^a - \omega\gamma x_{t-1}^a - \gamma\varepsilon_{1,t} + \varepsilon_{2,t} + \varepsilon_{1,t+1}$. $\varepsilon_{1,t}$ is the innovations in abnormal earnings at time *t* where $\varepsilon_{1,t} = x_t^a - \omega_{t-1} f_{t-1,1}^a - v_{t-1}$. x_t^a is the actual abnormal earnings. ω_{t-1} is the persistence in abnormal earnings inferred at time *t-1* and $f_{t-1,1}^a$ is the forecast of one-year ahead abnormal earnings made at time *t-1*. v_{t-1} is analysts' other information inferred at time *t-1*. $\varepsilon_{2,t}$ is the innovations in other information at time *t* where $\varepsilon_{2,t} = v_t - \gamma_{t-1} v_{t-1}$. γ_{t-1} is the persistence in other information inferred at time *t-1*.