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CASH FLOW SIGNALS AND ANALYSTS' EARNINGS FORECAST REVISIONS

O. DOUGLAS MOSES*

INTRODUCTION

This study investigates the incorporation of cash flow information in forecasts of earnings made by security analysts. It extends and links two streams of research in accounting. One stream of research has been concerned with revisions in earnings forecasts made by analysts. What factors lead to forecast revisions? Prior research has concentrated on investigating revisions of earnings forecasts in response to earnings announcements. A critique of that literature notes that there is a lack of knowledge concerning other factors that lead to forecast revisions (Brown, et al., 1985, p. 130). This study extends that research by identifying accounting measures beyond earnings apparently deemed informative to analysts when predicting future earnings. The second stream of research has been concerned with the question of whether a decomposition of earnings into cash flow and accrual components provides incremental information beyond that contained in earnings alone.¹ Is such a decomposition informative? Is a dollar of accrual accounting earnings 'worth' the same as a dollar of cash flow? Prior research has investigated this question through analysis of security returns. Findings have been somewhat contradictory. This study extends that research by addressing the question of the use of earnings component information in the previously unexamined context of the formation of analysts' earnings forecasts. In doing so, the study provides evidence on the signal conveyed by earnings components as perceived by one major group of users of accounting information.

EARNINGS, ACCRUALS AND CASH FLOW

Decomposing earnings into cash flows and accruals implies the following:

$$\text{Earnings} = \text{Accruals} + \text{Cash Flows.}$$

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In general, the cash flow component is seen as reflecting explicit exchange transactions while the accrual component is seen as reflecting the judgments and estimations embodied in generally accepted accounting principles (Rayburn, 1986; and Wilson, 1986 and 1987). However, there is no definitive measure of cash flow. The term is used loosely and applies to a collection of measures each of which can be calculated by adjusting earnings for some accrual component. Bowen, Burgstahler and Daley (1986) offer a set of potential cash flow measures and corresponding accrual components, as summarized in Table 1. Since earnings is the sum of cash flow plus accruals, once earnings is known, knowledge of either the accrual or cash flow component provides the same incremental additional information (Wilson, 1987).

Table 1
Different Concepts of Cashflow and Accruals

<i>'Cashflow': Component</i>	<i>'Accrual' Component¹</i>
NIDPR: Net income plus depreciation and amortization	*depreciation and amortization charges
WCFO: Working Capital from operations	*depreciation and amortization charges *other non-current accruals
CFO: Cashflow from operations	*non-current accruals *current accruals
CFAI: Cashflow after investment	*non-current accruals *current accruals *net investment activity
CC: Net change in cash	*non-current accruals *current accruals *net investment activity *net financing activity

¹Adjustments made to earnings to calculate cash flow.

PRIOR TESTS OF EARNINGS COMPONENTS — SECURITIES MARKET

The fact that earnings signals are associated with market returns is well established (Ball and Brown, 1968; and Beaver, et al., 1979). Of interest here are studies investigating the incremental information content of the accrual and cash flow components of earnings.² While an over-simplification, findings from the prior studies can be summarized by viewing earnings as the sum of three components — CFO, current accruals and non-current accruals — and asking whether knowledge of the separate components is informative (associated with security returns), given earnings. Results from Bowen, Burgstahler and Daley (1987), Patell and Kaplan (1977), Rayburn (1986) and Wilson (1986

and 1987) suggest that the non-current accrual component provides little information, but the CFO, current accrual, or total accrual signals may be informative. Findings, however, are not consistent across all studies. Bernard and Stober (1987) find non-current accruals informative and further argue that the signals conveyed by current accrual and CFO components are highly contextual and cannot be generalized. In short, earnings components may be informative but the findings have been sufficiently contradictory that the meanings of the separate component signals for security prices has not been fully explained.

A COMMENT ON THE PRIOR RESEARCH

One possible explanation for the contradictory results is the complexity of the process linking accounting information to security prices. Consider three models that have been offered to explain how accounting signals are relevant to security pricing.

1. In SFAC No. 1 the FASB (1978) posits a three-step model in which (a) reports of past earnings and earnings components are used to assess future earnings, (b) adjustments to future earnings are made to derive an assessment of future cash flows, and (c) assessments of future cash flows are used to determine security price.³
2. Beaver (1989) also posits a three-step model: (a) past earnings and its components are used to predict future earnings, (b) future earnings are used to predict future dividends, and (c) future dividends are used to determine security price.
3. In the common 'analyst's model' (e.g., Kolb, 1988, p. 280) the process can be described as (a) accounting information is used in the assessment of future earnings, (b) growth prospects and risk are used to determine an appropriate price-earnings ratio, and (c) expected earnings are multiplied by the price-earning ratio to determine security price.

From the perspective of these models, two points are worthy of note. First, the linkage between accounting signals and security prices is sufficiently complex that exogenous factors at each additional stage may obscure the association between accounting signals and prices. This may in part explain the lack of general conclusions from the security price tests of earnings components cited above. Second, although these models do not exhaust the available models, they are representative of a class of models which see the primary role of reported accounting earnings and earnings components as occurring in the (first) step of assessing future earnings.⁴ The premise of this paper is that investigating the use of earnings component information in this step provides an appropriate context for addressing the use of component information,⁵ (and one that

reduces the influence of complicating factors that enter at later stages in the linkage between accounting signals and security prices).

FOCUS OF THE STUDY

The focus of this study is on the relationship between assessments of future earnings and earnings component information. It is well established that assessments of future earnings incorporate information on past earnings. Thus the question of interest is whether, given past earnings, assessments of future earnings additionally incorporate information on earnings components. Since, once earnings is known, knowledge of either the accrual or cash flow component provides the same incremental additional information, this study addresses just the cash flow component.⁶ Do assessments of future earnings incorporate cash flow information? Analysts' forecasts of earnings are used to reflect assessments of future earnings. Expressed in null form, the hypothesis tested is as follows:

$$\begin{aligned} &(\text{Earnings Forecasts} | \text{Reported Earnings}) = \\ &(\text{Earnings Forecasts} | \text{Reported Earnings, Reported Cash Flows}) \end{aligned}$$

Rejection of the null implies that accrual and cash flow components are used by analysts in assessing future earnings. Tests are conducted using three definitions of cash flow: working capital from operations (WCFO), cash from operations (CFO) and cash flow after investing (CFAI).

It is not obvious, *ex ante*, that analysts use cash flow information and that the null hypothesis will be easy to reject. Wilson (1987, p. 297) cites several reasons why there may be minimal interest in cash flow and accrual components as compared to earnings: earnings figures are announced shortly after the fiscal year-end while component information is generally not available until the later release of audited financial statements; managers frequently focus on earnings rather than cash flow in evaluating new projects; management compensation schemes are typically based on earnings, not cashflow measures; the demand for earnings information is considerably greater than the demand for cash flow information. In a survey of analysts (Wilson, 1987), 67 percent of respondents claimed they used earnings to evaluate firms they followed closely, while only 37 percent and 23 percent indicated that they used CFO and WCFO, respectively.

Three conditions must hold for the null hypothesis to be rejected. First, analysts must be sophisticated processors of accounting information. second, cash flows must have potential information content in the sense that cash flow signals are statistically distinct from earnings signals. Third, a reason for attributing different meaning to cash flow and accrual components of earnings must exist. The following three sections comment on these issues.

ANALYST SOPHISTICATION

Considerable research has been conducted on the quality of analysts' earnings forecasts. (For reviews see Brown, et al., 1985; and Givoly and Lakonishok, 1984). Evidence shows that analysts' forecasts are superior to time series models based on past reported earnings (Barefield and Comiskey, 1975; Brown and Rozeff, 1979; and Colins and Hopwood, 1980), and indicates that analysts' forecasts reflect information not captured by historical earnings trends (Fried and Givoly, 1982). Analysts have both a contemporaneous and a timing advantage over time series models (Brown, et al, 1987). Forecasts by analysts are rational, in that they are unbiased and appear to reflect relevant available information (Givoly and Lakonishok, 1984). Of particular importance is evidence that analysts do not mechanically extrapolate from past earnings in making forecasts but instead are able to distinguish between temporary and permanent earnings (Critchfield, et al., 1978). This sensitivity to temporary and permanent earnings is important because one argument for disclosing earnings component information is that such information assists users in separating transitory and persistent aspects of earnings.⁷

DISTINCTNESS OF EARNINGS AND CASHFLOWS

A precondition for expecting that cash flows may provide incremental information beyond earnings is that cash flow measures are statistically distinct from earnings. Studies by Bowen, Burgstahler and Daley (1986), Drtina and Largay (1985), Gambola and Ketz (1983a and 1983b) and Thode, Drtina and Largay (1986) have addressed this question, as well as the question of whether different measures of cash flow are distinct from each other. Specific findings differ somewhat from study to study. General conclusions are that many cash flow measures are distinct from earnings and that as more adjustments are made to earnings to calculate cash flow, the distinctness of the cash flow measure increases. A measure such as NIDPR exhibits greater statistical similarity to earnings than do more refined cash flow measures such as CFO and CFAI.

EARNINGS COMPONENTS AND EARNINGS QUALITY

There is an absence of explicit theory tying earnings components to future earnings.⁸ Models linking reported earnings to expected future earnings, however, depend on distinguishing permanent from transitory components of reported earnings (e.g., Beaver, 1989). The concept of 'earnings quality', familiar to security analysts, is tied to this issue. The SEC (in ASR No. 159,

for example) suggests that earnings quality relates directly to the probability of recurrence of income. Higher earnings quality implies greater probability of recurrence. Bernstein and Siegel (1979) cite evidence that earnings quality is referred to by many institutional research houses in the evaluation of firms' earnings and also claim that earnings quality is related to earnings power and the probability of earnings recurrence.

Variance authors (Bernstein and Siegel, 1979; Hawkins, 1986; and Strischek, 1980) see earnings quality as depending on the nature of accounting procedures used (liberal vs. conservative) and the integrity of the reporting period (whether current earnings 'borrows' from future earnings through 'improper' deferral of expenses or losses or 'premature' recognition of revenues). Reported earnings depends on both actual economic events and accounting measurement procedures. Decomposing earnings into cash flow and accruals provides a useful dichotomy. The cash flow component of earnings primarily reflects those economic events supported by explicit cash transactions. The accrual component of earnings primarily reflects the judgments and estimations embodied in accounting measurement procedures. The separate components may contain information bearing on the quality of earnings.

There is a convenient parallelism between the concept of earnings quality and the process of removing the accrual component from earnings to determine cash flow. Given two firms, the firm using conservative (faster) rather than liberal asset amortization procedures, using deferred rather than premature revenue recognition rules, and using current rather than delayed expense or loss accruals would tend to have a higher quality of earnings. Given two firms with the same earnings number, the firm using conservative amortization, deferred revenue recognition and current expense or loss accruals would also have higher cash flows. Thus, cash flow may be perceived as a summary indicator of earnings quality.

In short, given earnings, firms with higher cash flows should have greater quality of earnings, implying higher probability of earnings recurrence and higher assessed future earnings by analysts. This implies that if earnings forecasts do incorporate cash flow information, then empirically a positive relationship between cash flow signals and analysts' forecasts of future earnings should be observed. The remaining sections provide some tests of this association.

SAMPLE

Earnings forecast revisions were investigated for two years: 1983 (during the months following the announcement of 1982 earnings) and 1982 (following the announcement of 1981 earnings). Analysts' earnings forecast data were taken from the Institutional Brokers Estimate System (IBES). Accounting data to create earnings and cash flow measures were taken from Compustat. The 82-83

test period was selected because it was the most recent period covered by the compustat tape available to the author and because recent studies investigating related issues have examined the same period (e.g. Bernard and Stober, 1987; and Wilson, 1986 and 1987).

The sample consisted of all industrial companies where the following three criteria were met:

1. December fiscal year end: A common fiscal year end was desirable to control for economy wide factors influencing earnings forecasts revisions.
2. Complete data on Compustat for the items required to compute the accounting variables for four years prior to and including the test year.
3. Continuous monthly primary EPS forecast data on IBES for the test period.

Compustat contained 747 firms with the necessary accounting data. IBES contained 1174 with the necessary earnings forecast data. The overlap between the two data sources was 479 firms, which comprise the final sample.

MEASURES

The purpose of the study was to test for associations between earnings forecast revisions and accounting cash flow signals. The dependent variable was a measure of the change in earnings forecasts following the release of accounting information. The independent variables were measures of unexpected earnings or cash flows.

IBES collects earnings forecasts from multiple analysts and provides consensus measures of forecasts for up to two years prior to the announcement of actual earnings. Assuming 1983 is the test year, forecasts for 1983 earnings for each of six months following the announcement of 1982 actual earnings were compared with the consensus forecast for 1983 earnings available immediately preceding the announcement of 1982 earnings.⁹ The change in forecasted earnings was the measure of interest. Forecast revisions (REV) were scaled by stock price, and thus can be interpreted as the forecast revision per dollar of value. The six month period is assumed to be sufficient to cover the period of time, following the announcement of earnings, over which cash flow information becomes publicly available and is reflected in revised forecasts. It is not possible to specify the point at which cash flow information becomes impounded in forecasts with precision; two lags are involved. First, there may be a lag between the time earnings is announced and the time cash flow information is available. Evidence from Wilson (1987) indicates that cash flow information is rarely available before audited financial reports are released, and that audited reports generally follow earnings announcements by several weeks. Second, there is potentially a lag between the availability of cash flow information and its incorporation into revised forecasts. Efficient markets and

evidence from Wilson (1987) indicate that cash flow information is impounded in security prices rapidly once available, but evidence on its incorporation in revised earnings forecasts is lacking.

One independent variable, unexpected earnings (UEARN), was included as a control variable since it is well established that earnings forecasts are revised in response to earnings announcements (Brown et al., 1985; and Givoly and Lakonishok, 1984). Evidence indicates that analysts' forecasts are generally superior to time series models based on past earnings in predicting future earnings (Brown et al., 1987). Consequently, unexpected earnings was measured as the difference between actual earnings and the last available forecast preceding the announcement of actual earnings, again scaled by price.

Table 2
Calculation of Variables

Dependent Variable:

$$\text{Cumulative Earnings Forecast Revision} = \text{REV}_i = \frac{F'_i - F}{\text{Price}}$$

where:

- F = Mean forecasted EPS for year t taken at the month immediately preceding the announcement of year $t-1$ earnings
 F'_i = Mean Forecasted EPS for year t taken at month i ($i = 1, 2, 3, 4, 5$ or 6 . Month 1 is the month of the announcement of year $t-1$ earnings. Months 2-6 are subsequent months.)
 Price = Year $t-1$ year-end market price per share

Independent Variables:

$$\text{Unexpected Earnings} = \text{UEARN} = \frac{Y - Y'}{\text{Price}}$$

- where: Y = Actual reported EPS for year $t-1$
 Y' = Mean forecasted EPS for year $t-1$ at the month immediately preceding the announcement of year $t-1$ actual earnings

$$\text{Unexpected WCFO} = \text{UWCFO} = \frac{\text{WCFO} - \text{WCFO}'}{\text{market value}}$$

$$\text{Unexpected CFO} = \text{UCFO} = \frac{\text{CFO} - \text{CFO}'}{\text{market value}}$$

$$\text{Unexpected CFAI} = \text{UCFAI} = \frac{\text{CFAI} - \text{CFAI}'}{\text{market value}}$$

where:

- WCFO, CFO and CFAI are the actual reported numbers for year $t-1$.
 WCFO', CFO', CFAI' are the actual reported numbers for year $t-2$. (i.e. expected numbers assuming a random walk).
 Market value = Average market value of common equity for year $t-1$.
-

Three signals reflecting cash flow information were calculated: unexpected working capital from operations (UWCFO), unexpected cash flow from operations (UCFO), and unexpected cash flow after investment (UCFAI). Each was computed as the difference between an actual and an expected number, deflated by market value. Expected or predicted cash flow numbers are not published and consequently must be estimated assuming some expectations model. A simple random walk was adopted.¹⁰ This is consistent with the approach used in previous related studies (e.g., Bowen et al., 1986; and Rayburn, 1986).

Unexpected measures aside, the individual measures for WCFO, CFO and CFAI are not always reported by firms and must be calculated from more primitive balance sheet and income statement data (available on compustat). Computation of these individual measures using compustat data followed the formulas provided by Bowen et al., (1987). Details on all variables¹¹ are contained in Table 2.

DESCRIPTIVE STATISTICS

Mean and median values for forecast revisions (REV) for the six month test period in 1982 and 1983, along with the percentage of positive, no change and negative revisions, are contained in Table 3. Note that both means and medians

Table 3

Descriptive Statistics: Cumulative Earnings Forecast Revision (REV)

<i>Year</i> ¹	<i>Month</i> ²	<i>Mean</i>	<i>Std. Dev.</i>	<i>Median</i>	<i>Percent Positive</i> ³	<i>Percent No change</i> ³	<i>Percent Negative</i> ³
1982	1	-0.0051	0.0169	-0.0018	13	18	69
	2	-0.0099	0.0245	-0.0048	16	12	72
	3	-0.0163	0.0355	-0.0084	16	5	79
	4	-0.0263	0.0577	-0.0162	14	3	83
	5	-0.0328	0.0669	-0.0185	14	3	83
	6	-0.0409	0.0817	-0.0239	12	3	85
1983	1	-0.0027	0.0102	-0.0004	18	27	55
	2	-0.0080	0.0251	-0.0021	20	17	63
	3	-0.0096	0.0371	-0.0036	22	10	68
	4	-0.0133	0.0467	-0.0052	27	6	66
	5	-0.0169	0.0536	-0.0057	28	4	68
	6	-0.0184	0.0580	-0.0066	28	4	68

¹ Year in which and for which earnings forecasts were made.

² Month relative to announcement of prior years actual earnings. (Month 1 = month in which earnings announcement occurred.)

³ Percent of sample firms with positive/no change/negative forecast revision.

Table 4
Descriptive Statistics: Earnings and Cashflow Signals

<i>Year</i> ¹	<i>Variable</i> ²	<i>Mean</i>	<i>Std. Dev.</i>	<i>Median</i>	<i>Percent Positive</i> ³	<i>Percent Negative</i> ³
1982	UEARN	-0.0009	0.0701	-0.0000	48	52
	UWCFO	0.0274	0.2645	0.0195	71	29
	UCFO	0.0199	0.2711	0.0228	63	37
	UCFAI	0.0011	0.3966	0.0028	52	48
1983	UEARN	-0.0382	0.2347	-0.0026	35	65
	UWCFO	-0.0585	0.2458	-0.0081	47	53
	UCFO	0.0164	0.2951	0.0212	59	41
	UCFAI	0.0494	0.4226	0.0352	60	40

¹ Year in which and for which earnings forecasts were made.

² Unexpected prior year earnings or cash flow.

³ Percent of sample firms for which unexpected earnings or cash flow signals were positive or negative.

are consistently negative and growing, suggesting that, on average, earnings forecasts were consistently declining. This is not surprising given the generally recessionary period. Also note that there are immediate forecast revisions (either positive or negative) for the large majority of firms in the month of the earnings announcement, suggesting fairly rapid response (by at least some analysts) to new earnings information. The number of no change firms declines as months increase. Note also the high proportion of negative forecast revisions, again consistent with the recessionary period.

Table 4 provides descriptive statistics for the accounting signal variables. There are a fair number of both positive and negative signals, with no obvious pattern, except a tendency for unexpected earnings to be negative more frequently than the unexpected cash flow signals.

Table 5 displays correlations between the accounting signals. In general correlations between unexpected earnings and the three unexpected cash flow measures are small, suggesting that they represent distinct signals. Correlations between the cash flow measures tend to be a bit higher in general, with a distinctively high association between UCFO and UCFAI in both years. This raises the question of the degree to which UCFO and UCFAI represent independent signals.¹²

TEST APPROACHES

Two types of testing approaches were pursued to determine associations between forecast revisions and accounting signals, a regression approach and a portfolio approach.

Table 5
Correlations Between Unexpected Earnings and
Unexpected Cash Flow Signals

<i>1982</i>	<i>UWCFO</i>	<i>UCFO</i>	<i>UCFAI</i>
UEARN	0.07	0.16	0.09
UWCFO		0.42	0.48
UCFO			0.73
<i>1983</i>	<i>UWCFO</i>	<i>UCFO</i>	<i>UCFAI</i>
UEARN	0.34	0.03	-0.12
UWCFO		0.38	0.19
UCFO			0.74

In the regression approach, forecast revision measures (REV) were first regressed against unexpected earnings (UEARN), cross-sectionally.¹³ This was done for two reasons. First, it provides a test of the hypothesis that forecasts are revised in response to earnings signals. Second, the residuals from this regression can be interpreted as the portion of REV that is unexplained by UEARN. Since it is well established that forecasts are updated in response to earnings signals, it is necessary to isolate an unexplained revision that might potentially be a response to cash flow information. To test for associations between cash flows and forecast revisions, residuals from the first regression — unexplained revisions (UREV) — were then regressed on unexpected cash flow measures.¹⁴

In the portfolio approach, tests were conducted by grouping firms on the basis of the sign of the unexpected accounting variable (either unexpected earnings or unexpected cash flow) and comparing the means of forecast revisions between the groups. More specifically, first firms were grouped by the sign of UEARN and tests for group differences in REV were conducted. Second, firms were grouped independently by the signs of UWCFO, UCFO, and UCFAI, and tests for group differences in UREV were conducted.

Portfolio tests may have more power to detect information content because (a) outliers can be troublesome for cross-sectional regressions when the explanatory power of the regressions is low, and (b) portfolio tests are less sensitive to non-linearities in the relationship between forecast revisions and accounting signals (Wilson, 1987).

FINDINGS

Unexpected Earnings — Regression

Results from regressing REV on UEARN are provided in Table 6. Findings

Table 6**Regressions of Forecast Revisions on Unexpected Earnings**

Dependent Variable: Cumulative Forecast Revision (REV) Measured at Month i
 Independent Variable: Unexpected Earnings (UEARN)

Year ¹	Month ²	Coef. ³	UEARN		R ² -%
			t	P	
1982	1	0.033	3.00	0.002	1.9
	2	0.071	4.46	0.001	4.1
	3	0.179	8.10	0.001	12.5
	4	0.203	5.46	0.001	6.1
	5	0.194	4.46	0.001	4.1
	6	0.283	5.37	0.001	5.9
1983	1	0.005	2.54	0.011	1.4
	2	0.021	4.31	0.001	3.9
	3	0.019	2.60	0.009	1.5
	4	0.033	3.54	0.001	2.7
	5	0.043	4.03	0.001	3.5
	6	0.045	3.90	0.001	3.3

¹ Year in which and for which earnings forecasts were made.

² Month relative to announcement of prior year earnings.

(Month 1 = month in which earnings announcement occurred)

³ Regression coefficient for unexpected earnings (UEARN).

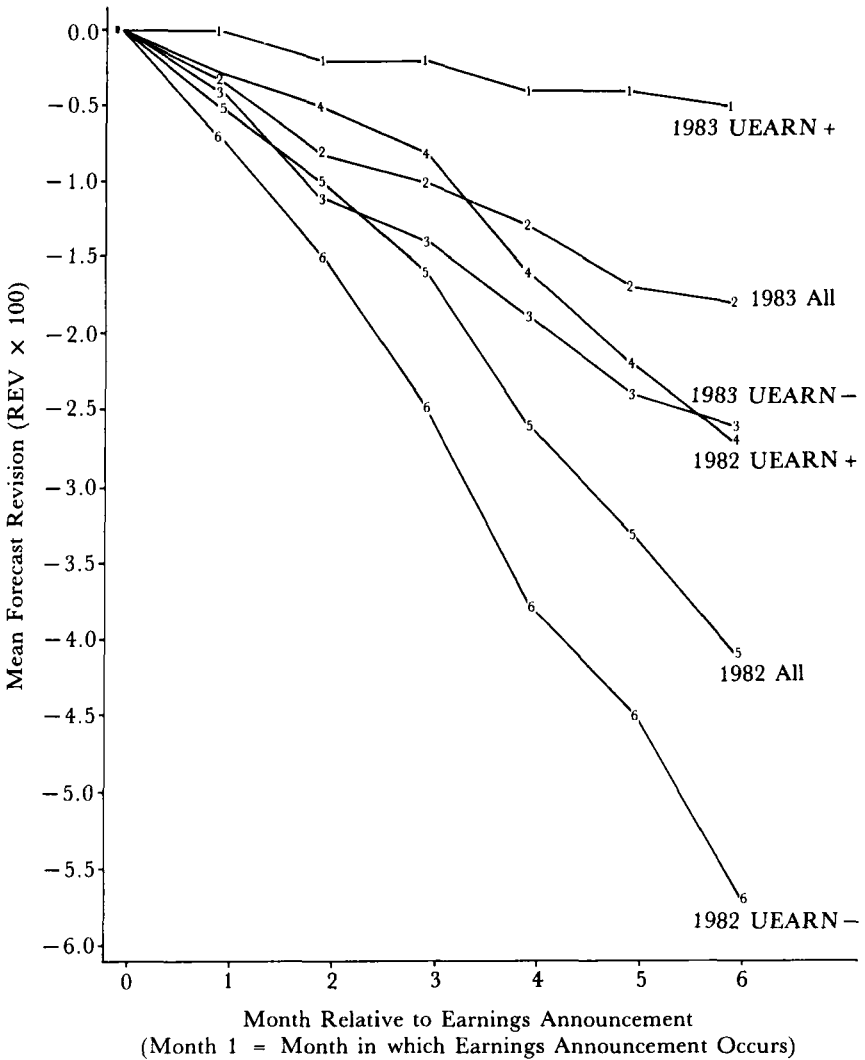
are quite consistent for the two year test period. Three noteworthy patterns emerge from both 1982 and 1983. First, the coefficients are positive for all months and significantly different from zero, generally at $p < 0.001$. Thus, not surprisingly, earnings forecasts are revised in response to earnings signals. Second, while forecast revisions are associated with earnings signals even in the month of the earnings announcement (month 1), coefficients become progressively larger and generally more significant in later months. Apparently all revision activity does not occur immediately following the earnings announcement. Third, in spite of the significance, R^2 values are small. Unexpected earnings explains only a small portion of revisions in earnings forecasts.

Unexpected Earnings — Portfolio Tests

Figure 1 displays forecast revisions for UEARN + and UEARN - portfolios for both 1982 and 1983. As indicated before, forecasts were in general being revised downward during the test years. This is evident for all portfolios, and more pronounced for 1982. Yet, within each year, there is a clear distinction between the UEARN + and UEARN - groups. Negative unexpected earnings

Figure 1

Average Forecast Revisions Plotted by Earnings Signal Portfolios



are associated with greater downward revisions. (Plots using median rather than mean REV exhibit the same pattern.) Table 7 provides *t* tests of the differences between group means for REV. For all month/year tests, revisions are significantly more negative for the UEARN - portfolio. These results are consistent with the patterns and findings suggested by the regression tests.

Note that there is a continuing diversion between the two portfolios as the

Table 7

T-Tests Between Group Means of Cumulative Forecast Revisions (REV):
Portfolios Formed on Sign of Unexpected Earnings (UEARN)

Year ¹	Month ²	REV Means		t	P
		UEARN + Portfolio	UEARN - Portfolio		
1982	1	-0.0033	-0.0071	2.37	0.019
	2	-0.0053	-0.0148	4.12	0.001
	3	-0.0084	-0.0248	5.01	0.001
	4	-0.0159	-0.0377	4.07	0.001
	5	-0.0218	-0.0453	3.73	0.001
	6	-0.0268	-0.0568	3.95	0.001
1983	1	-0.0005	-0.0039	3.49	0.001
	2	-0.0018	-0.0114	4.95	0.001
	3	-0.0024	-0.0137	3.86	0.001
	4	-0.0037	-0.0187	3.82	0.001
	5	-0.0045	-0.0239	4.43	0.001
	6	-0.0050	-0.0260	4.38	0.001

¹ Year in which and for which earnings forecasts were made.

² Month relative to announcement of prior year earnings.

(Month 1 = month in which earnings announcement occurred)

months increase. This suggests a gradual incorporation into forecasts of the information provided by the earnings signal. Several explanations are possible: (a) forecasts for different firms are revised at different times following the earnings announcement, (b) forecast revisions for the same firm occur at different times for different analysts, (c) individual analysts revise their forecasts in stages, not incorporating all the information available in the unexpected earnings signal immediately.

Unexpected Cash Flows — Regression

To test for associations between forecast revisions and unexpected cash flows the unexplained forecast revisions (UREV) were regressed independently on each of the cash flows signals. The results are given in Table 8. Some general tendencies are apparent from the table.

First there is some indication that unexpected cash flows are associated with forecast revisions even as early as month 1, the month of the earnings announcement. Although firms in general do not announce cash flow information simultaneously with the earnings announcement, some indication of such early association between forecast revisions and cash flows is not surprising. Some firms release fully audited financial statements as early as seven days after the earnings announcement (Wilson, 1987), and for large

Table 8
 Univariate Regressions of Unexplained Forecast Revision on Cashflow Signals

Dependent Variable: Forecast Revision Residuals (UREV)
 Independent Variables: Unexpected Cash Flow Signals (UWCFO, UCFO, UCFAI)

Year ¹	Month ²	UWCFO			UCFO			UCFAI			
		Coef. ³	t	R ² -%	Coef. ³	t	R ² -%	Coef. ³	t	R ² -%	
1982	1	0.005	1.31	0.190	0.006	1.87	0.063	0.005	2.34	0.019	1.2
	2	0.012	2.08	0.039	0.013	2.74	0.006	0.008	2.47	0.014	1.3
	3	0.021	2.64	0.009	0.024	3.60	0.001	0.008	1.86	0.064	0.7
	4	0.120	9.69	0.001	0.035	3.16	0.002	0.025	3.38	0.001	2.4
	5	0.110	7.27	0.001	0.035	2.69	0.007	0.026	2.96	0.003	1.9
	6	0.130	7.12	0.001	0.049	3.11	0.002	0.034	3.16	0.002	2.1
1983	1	0.008	3.69	0.001	0.004	2.65	0.008	0.001	0.97	0.332	0.2
	2	0.036	6.88	0.001	0.015	3.75	0.001	0.008	2.15	0.032	1.0
	3	0.036	4.55	0.001	0.029	4.84	0.001	0.009	2.02	0.044	0.9
	4	0.058	5.87	0.001	0.038	5.04	0.001	0.014	2.45	0.014	1.3
	5	0.114	10.73	0.001	0.065	7.84	0.001	0.028	4.58	0.001	4.4
	6	0.126	11.80	0.001	0.073	8.21	0.001	0.030	4.47	0.001	4.2

¹ Year in which and for which earnings forecasts were made.

² Month relative to announcement of prior year earnings.
 (month 1 = month in which earnings announcement occurred.)

³ Regression coefficient for unexpected cash flow signals.

actively traded firms in particular, analysts may be able to obtain financial statement information prior to its formal release.

Second, the association between cash flow signals and forecast revisions become more evident as the months increase. For all three cash flow variables, coefficients increase, t values are generally larger and more significant, and R^2 values are larger in the later months (4,5,6) when compared to the earlier months (1,2,3). This is probably due to some general lag between the earnings announcement and the availability and incorporation of cash flow information. (Typically first disclosed when the annual report is made public.)

Third, while there is evidence that all three cash flow signals are associated with analysts' revisions, the apparent strength of that association is not the same. Recall that non-current accruals are added to earnings to get WCFO; current accruals are added to WCFO to get CFO; and investing transactions are added to CFO to get CFAI. In sequence, the three measures are progressively more 'distant' from earnings. Similarly, associations between forecast revisions and UWCFO, UCFO and UCFAI, respectively, tend to be progressively weaker. By the later months, when most cash flow information can be assumed to be reflected in forecast revisions, coefficients, t values and R^2 values are highest for UWCFO and lowest for UCFAI.

Unexpected Cash Flows — Portfolio Tests

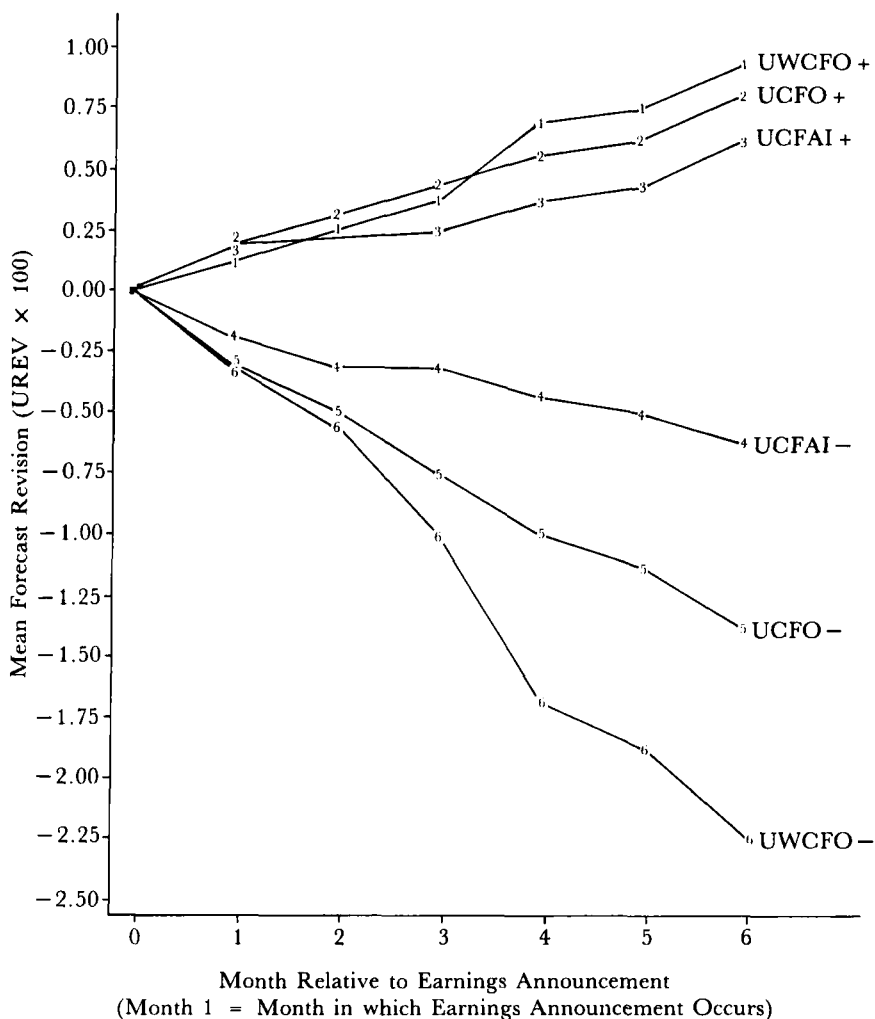
Note that unexplained forecast revisions (UREV), being residuals from a previous regression, by construction have a distribution with a mean of zero. Figures 2 and 3 display UREV for portfolios of sample firms grouped by signs of the unexpected cash flow measures for 1982 and 1983, respectively. The plots are similar for both years and for the three cash flow signals. After controlling for UEARN, forecast revisions for firms with a positive unexpected cash flow are on average positive; revisions for firms with a negative unexpected cash flow are negative. And the divergence between the positive and negative groups increases as the months after earnings announcement progress. Table 9 provides t tests of the difference between group means of UREV. Group differences are significant at $p < 0.05$ for all cash flow variables, in all months, for both years (except for UCFAI in 1982, months 3–6). The plots and t test results are generally consistent with the regression findings. It appears that all of the three cash flow signals provide incremental information, beyond earnings, relevant to the revision of forecasts of future earnings.

Unexpected Cash Flows — Multivariate Regression

Another question is whether the individual cash flow measures are just substitutes for each other, or whether each provides incremental information not contained in the others. To address this question a multivariate regression

Figure 2

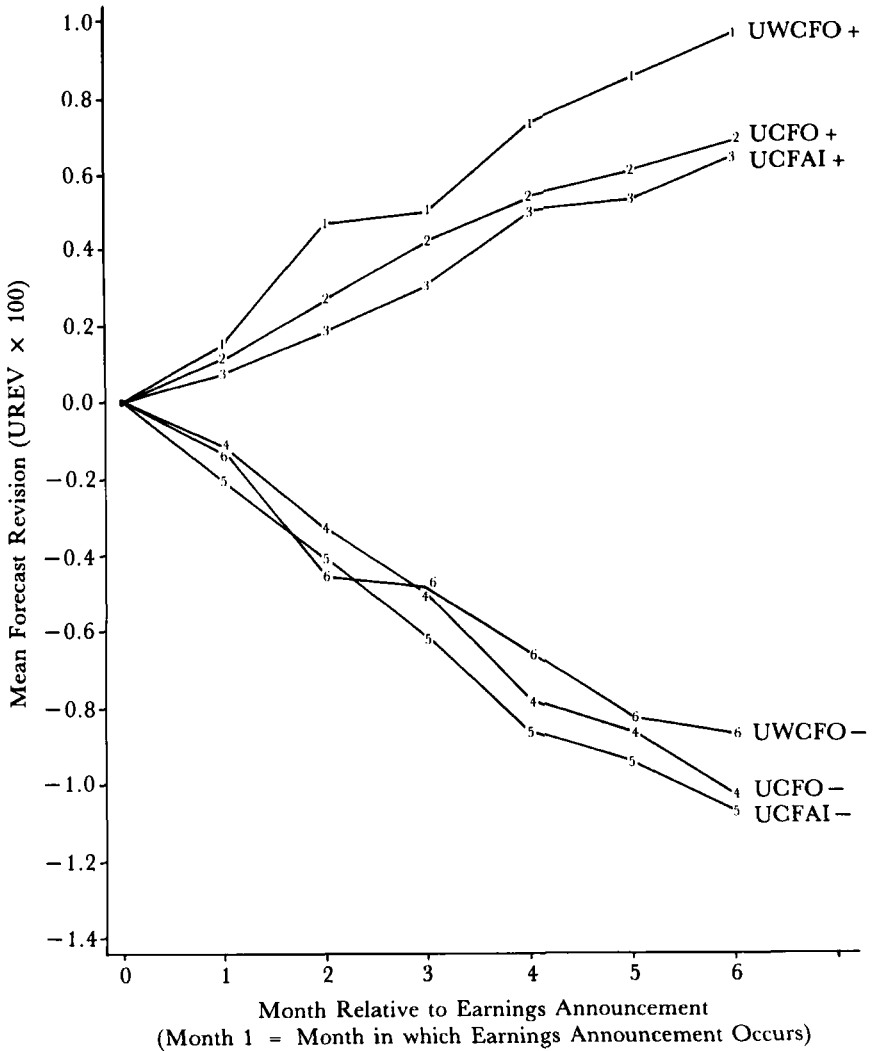
Average Forecast Revisions Plotted by Cash Flow Signal Portfolios 1982



was computed, regressing UREV on UWCFO, UCFO, and UCFAI simultaneously. The results are given in Table 10. There is no consistency in the findings for UCFO and UCFAI. Both positive and negative coefficients are observed and, except for UCFO in the later months of 1983, *t* values are generally insignificant. On the other hand, UWCFO has consistent positive coefficients, which are significant in the later months of both years. Due to

Figure 3

Average Forecast Revisions Plotted by Cash Flow Signal Portfolios 1983



high correlations between the cash flow variables, particularly UCFO with UCFAI, these findings are tentative. They suggest, however, that the important cash flow signal is unexpected WCFO.¹⁵ This conclusion is reinforced by the relatively stronger and more significant results found for WCFO in both the earlier univariate regression and portfolio tests. The significant associations between CFO and CFAI signals in earlier tests may be due to UCFO and UCFAI serving as surrogates for UWCFO.

Table 9
 T-Test Between Group Means of Unexplained Forecast Revision (UREV):
 Portfolios Formed on Sign of Unexpected Cash Flows (UWCFO, UCFO, UCFAI)

Year ¹	Month ²	Mean UREV for UWCFO Portfolios			Mean UREV for UCFO Portfolios			Mean UREV for UCFAI Portfolios		
		UWCFO +	UWCFO -	t P	UCFO +	UCFO -	t P	UCFAI +	UCFAI -	t P
1982	1	0.0012	-0.0028	2.32 0.021	0.0018	-0.0031	3.11 0.002	0.0019	-0.0020	2.56 0.011
	2	0.0024	-0.0058	2.82 0.005	0.0030	-0.0052	3.33 0.001	0.0028	-0.0030	2.61 0.009
	3	0.0040	-0.0099	3.33 0.001	0.0042	-0.0072	3.42 0.001	0.0027	-0.0029	1.81 0.070
	4	0.0068	-0.0168	4.19 0.001	0.0059	-0.0101	3.17 0.002	0.0040	-0.0043	1.61 0.107
	5	0.0076	-0.0185	3.95 0.001	0.0065	-0.0111	2.98 0.003	0.0044	-0.0048	1.54 0.125
	6	0.0092	-0.0227	3.56 0.001	0.0082	-0.0139	2.91 0.004	0.0061	-0.0065	1.71 0.088
1983	1	0.0015	-0.0013	2.98 0.003	0.0012	-0.0018	3.11 0.002	0.0008	-0.0012	2.05 0.041
	2	0.0048	-0.0042	4.22 0.001	0.0027	-0.0040	2.52 0.013	0.0021	-0.0032	1.98 0.049
	3	0.0053	-0.0047	3.09 0.002	0.0042	-0.0062	2.75 0.006	0.0032	-0.0048	2.11 0.035
	4	0.0074	-0.0064	3.40 0.001	0.0057	-0.0084	2.92 0.004	0.0050	-0.0076	2.62 0.009
	5	0.0090	-0.0079	3.63 0.001	0.0063	-0.0093	2.71 0.007	0.0057	-0.0086	2.49 0.013
	6	0.0098	-0.0086	3.64 0.001	0.0072	-0.0106	2.87 0.005	0.0067	-0.0101	2.72 0.007

¹ Year in which and for which earnings forecasts were made.

² Month relative to announcement of prior year earnings.

Table 10
 Multivariate Regressions of Unexplained Forecast Revisions on Cashflow Signals

Dependent Variable: Forecast Revision Residuals (UREV)
 Independent Variables: Unexpected Cashflow Signals (UWCFO, UCFO, UCFAI)

Year ¹	Month ²	UWCFO		UCFO		UCFAI		Regression Model Statistics		
		Coef. ³	t	Coef. ³	t	Coef. ³	t	R ² -%	F	P
1982	1	0.002	0.39	0.001	0.09	0.005	1.38	0.005	1.88	0.130
	2	0.006	0.84	0.009	1.05	0.003	0.60	0.003	2.88	0.035
	3	0.011	1.22	0.029	2.81	-0.008	-1.26	0.009	3.3	5.26
	4	0.127	9.04	-0.024	-1.52	0.009	0.91	0.012	17.3	32.07
	5	0.114	6.63	-0.021	-1.12	0.012	0.95	0.012	10.6	18.04
	6	0.130	6.24	-0.014	-0.59	0.012	0.79	0.012	10.0	17.05
1983	1	0.006	2.58	0.006	1.90	-0.003	-1.39	0.003	3.7	5.78
	2	0.033	5.66	0.007	1.04	-0.002	-0.35	0.002	9.8	16.34
	3	0.021	2.43	0.042	4.02	-0.018	-2.49	0.013	8.0	12.93
	4	0.042	3.85	0.043	3.29	-0.016	-1.81	0.011	9.6	15.92
	5	0.091	7.96	0.049	3.61	-0.011	-1.13	0.001	23.8	46.94
	6	0.100	8.11	0.063	4.29	-0.018	-1.76	0.001	25.6	51.59

¹ Year in which and for which earnings forecasts were made.

² Month relative to announcement of prior year earnings.

³ Regression coefficient for unexpected cash flow signal.

SUMMARY AND CONCLUSIONS

Several broad conclusions follow from the tests.

1. Forecasts of current year earnings are revised to reflect the forecast error (unexpected earnings) in reported earnings for the previous year.
2. Information on both earnings and cash flow signals appears to be incorporated into earnings forecasts gradually over time: mean revisions for portfolios based on the sign of both unexpected earnings and unexpected cash flows diverged as the number of months following the earnings announcement increased. This may be due to differences in the time lag between earnings announcement and release of cash flow data across firms, difference in the speed with which individual analysts revise forecasts for a given firm, or analysts revising their forecasts in a series of small steps rather than one large revision.¹⁶ Foster (1986, p. 289) indicates that individual analysts in some industries develop reputations as 'lead analysts'. When lead analysts make revisions, others follow the lead. Additionally, analysts see high penalties associated with making forecasts that diverge greatly from the consensus. Both these effects may explain why forecast revisions by some analysts may lead to follow-on revisions by others, creating the apparent 'gradual' pattern of revisions over time.
3. After controlling for the information contained in unexpected earnings, forecast revisions are additionally associated with unexpected cash flows. Positive unexpected cash flows are associated with positive forecast revisions. The existence of an association provides support for the contention that the components of earnings provide information useful in assessing future earnings. The fact that the association is positive is consistent with the concept of earnings quality.¹⁷ After controlling for earnings, higher cash flow implies higher earnings quality and leads to higher assessed future earnings.
4. All cash flow measures examined (WCFO, CFO, CFAI) were associated with forecast revisions. However, the strongest relationship was for WCFO. In univariate tests, WCFO was statistically more strongly related to forecast revisions than CFO or CFAI. In multivariate tests, WCFO was consistently associated with forecast revisions, while the explanatory power of CFO and CFAI was less obvious.

One explanation for the individual associations of CFO and CFAI with revisions is that CFO and CFAI are surrogates for WCFO in the univariate tests. This suggests that the decomposition of earnings seen by analysts as most relevant for forecasting future earnings is to separate earnings into working capital from operations and non-current accrual components. This is consistent with the associations between earnings component signals and security market

prices observed by Bernard and Stober (1987); non-current accruals and cash flow components had different implications for valuation, while no systematic differences in the valuation implications of current accruals and cash flows was observed. One interpretation of the stronger results for WCFO found in this study is that analysts attempt to forecast permanent earnings and that WCFO is seen as a more relevant signal of permanent earnings than either CFO or CFAI. Current accruals may be of little importance because of their potential for reflecting relatively short-run fluctuations in current assets and current liabilities.¹⁸ Wilson (1987, p. 295) also speculates on the different meaning of alternative cash flow signals, suggesting that WCFO is more closely associated with long-run profitability while CFO is more closely related to liquidity.

Finally, a comparison with studies linking cash flow signals to stock prices is of interest. Two studies by Wilson (1986 and 1987) and a replication by Bernard and Stober (1987), covering the same 1982–1983 time period, found CFO to be significantly associated with stock price changes, and concluded that current accruals was an information signal impounded in stock price. But the findings of this study suggest that it is non-current rather than current accruals that is the important signal for earnings forecast revisions. It is well established that stock price revisions are linked to earnings forecast revisions.¹⁹ The fact that current accruals were associated with stock price changes but apparently not with forecast revisions could imply that, if current accruals are incorporated in price changes, the process does not appear to be contingent on an intervening revision in forecasted earnings. More research into the means by which various cash flow and accrual information becomes impounded in stock prices — through earnings forecast revisions or by some other mechanism — is necessary.

Limitations of the study also suggest directions for future research. First, this study analyzed a two-year period. Studies of longer periods would provide evidence of whether the relationships between cash flows and earnings forecasts are consistent across periods of both economic expansion and contraction. Second, naive expectations models were used to create the unexpected cash flow measures. While there is currently little knowledge either of the time series properties of cash flows or of what model produces expectations that most adequately reflect analysts' expectations, evidence from tests using alternative models would be useful. Lastly, this study has documented a general tendency for earnings forecasts to be revised in association with cash flow signals. Studies investigating the nature and degree of the revision process conditional on firm-specific factors or economic conditions would provide further insight into the meaning attributed to earnings component signals.

NOTES

1 Much of the interest in this issue has been motivated by changing requirements for funds flow and cash flow disclosure in financial statements of US companies. APB Opinion No. 3 encouraged

voluntary disclosure of funds flow information; APB Opinion No. 19 mandated funds statements disclosure. Those statements have been criticized, in particular because of a failure to provide a precise or uniform definition of funds (e.g., Heath 1978a and 1978b). Most recently, the FASB has issued SFAS No. 95 requiring cash flow statements. Implicit in these disclosure requirements is the idea that some measure of funds or cash from operations provides useful information to financial statement users beyond that contained in earnings. The issuance of SFAC No. 1 (1978) also has led to increased interest in funds flow and cash flow measures.

- 2 There are of course alternative ways of decomposing earnings into components. Lipe (1986) tests for differential market response to different expense components of earnings and finds market response to be dependent on the 'persistence' of components.
- 3 The first two steps are explicitly stated in Paragraph 37 of SFAC No. 1. The third step is implicit in the surrounding discussion.

This FASB model is relevant to the implications that have been drawn from some previous studies. In SFAC No. 1, the FASB (1978, paragraph 43) asserts that 'interest in an enterprise's future cash flow . . . leads primarily to an interest in information about its earnings rather than information directly about its cash flows.' This assertion has been interpreted by some to mean that current earnings is seen by the FASB as being more highly associated with future cash flow than is current cash flow. Two studies (Bowen, et al., 1986; and Greenburg, et al., 1986) have tested whether earnings or cash flows are a better predictor of future cash flows (with conflicting results). But statistical tests of the relative ability of earnings and cash flow numbers to predict future cash flows cannot provide a refutation of the FASB's assertion. This is because the FASB argues not for a direct link between past earnings and future cash flows, but rather a two-step process involving the intermediate step of assessing future earnings. It may well be that past cash flow is a better *direct* predictor of future cash flow than is past earnings. But such evidence may be consistent with the FASB's logic if that cash flow information is incorporated by users in their assessment of future earnings. This study provides tests related to that question.

- 4 Lev (1974, chapter 8) discusses four other security valuation models that use forecasted earnings as a fundamental input, Ohlson (1983) and Easton (1985) provide additional analysis and evidence of links between earnings and earnings changes and future equity benefits.
- 5 Observation and survey evidence support the great importance attached to earnings forecasts by investors and analysts: The existence of many commercial earnings forecast services (e.g., IBES, Zacks, The Earnings Forecaster) indicate that earnings forecast information has passed the 'market test'. A survey of investor and analysts (Chang and Most, 1980) concludes that earnings forecasts are considered the most important expectational data.
- 6 Tests are conducted by relating revision in earnings forecasts to measures of unexpected earnings and cash flow. If earnings forecasts are assumed to incorporate expected earnings, cash flow and accrual information, then forecast revisions depend on unexpected measures. Given expected earnings, cash flow and accruals, unexpected earnings must equal unexpected cash flows plus unexpected accruals. So even when formulated in terms of unexpected measures, once unexpected earnings is known, unexpected cash flow or unexpected accruals provide the same incremental information.
- 7 Prior studies also support the conclusion that analysts' earnings forecasts are relevant to decision settings. Research has documented the relationship between earnings' forecasts and forecast revisions with stock prices, and provided evidence that favorable trading strategies based on analysts' forecasts can be developed. See Brown, et al., (1985) and Givoly and Lakonishok (1984) for reviews. Additionally, there is evidence that analysts' earnings forecasts are useful in predicting bankruptcy (Moses, 1990).
- 8 Researchers have suggested that earnings components, accruals specifically, should be relevant to predicting future earnings. Beaver and Demski (1979) suggest that accruals may be viewed as a cost effective way of management communicating future plans. Ronen and Sadan (1981) argue that management has incentives to use accruals to signal future operations in such a way that users (analysts) can accurately predict future earnings. But neither study provides specific guidelines for specifying ex ante the nature of the relationship between earnings components and future earnings that one might expect to observe.

In the context of security market studies, Wilson (1987) suggested that higher cash flow may signal greater ability of firms to respond to uncertain future events and hence be valued positively in the market. Bernard and Stober (1987) analyze accruals in terms of related changes in asset

and liability accounts and suggest that accruals can signal future sales and hence have information content for valuation purposes. But their findings were not consistent across periods.

- 9 The IBES tape is structured in terms of monthly data, thus forecast revisions represent a month to month change. Measures of reported and forecasted EPS observed at different points in time were adjusted for confounding factors such as stock dividends or splits using an adjustment factor provided on the IBES tape. For purposes of the study, the announcement date is the month actual earnings is reported on the IBES tape. Prior studies indicate that IBES updates its tape rapidly when earnings reports become public.
- 10 Tests were conducted using an alternative random walk plus drift expectations model (last year's cash flow plus the change in cash flow from the preceding year). Findings using measures derived from this alternative expectations model were consistent with those reported in this paper.
- 11 Several alternative measures were also investigated:

(a) Measures of the revision in forecasts were calculated using an alternative 'starting point'. More specifically, rather than computing forecast revisions relative to the last earnings forecast (for, say, 1983) available prior to the announcement of actual (1982) earnings, forecast revisions were computed relative to the first earnings forecast (for 1983) available after the announcement of actual (1982) earnings. The issue here concerns the timing of the availability of earnings and cash flow information. If cash flow information is not generally available to analysts until some weeks after the earnings announcement (which is supported by Wilson, 1987) then it could be argued that a forecast taken just following the earnings announcement will not reflect cash flows and will provide a reasonable starting point from which to measure revisions. Furthermore, if forecasts are revised rapidly in response to the earnings announcement, it could be argued that a forecast observed just following the announcement will incorporate earnings information and that subsequent revision would be due to other (e.g. cash flow) information that becomes available at a later point in time.

(b) Measures were scaled by total assets (instead of market value) and assets per share (instead of market price per share).

(c) Individual positive (negative) values for the independent variable were truncated to the 95th (5th) percentile to reduce the impact of extreme values on the analysis. (In this process, observations with extreme values are not deleted, but the values are 'pulled in' toward the center of the distribution. Bowen et al. (1987) adopted similar procedures, termed 'windsorizing').

Findings from tests involving each of these alternatives provided results consistent with those reported in this paper.

- 12 Bowen et al. (1986) provide evidence on the associations between first differences in earnings and cash flows. They find poor associations between earnings (net income before extraordinary items) and both CFO and CFAI, and strong association between CFO and CFAI, consistent with the associations reported here. They also find strong association between earnings and WCFO, contrary to the low correlation found here. However, Thode et al. (1986) find poor association between first differences in earnings (income from continuing operations), and WCFO, which is consistent with the low correlations here.
- 13 This cross-sectional approach assumes that coefficients are constant across firms, which can be challenged. An alternative approach would be to use separate time series regressions for each firm. Time series regressions would assume constant coefficients across time, which can also be challenged. Cross sectional regressions were used because of the lack of sufficient longitudinal forecast data to estimate time series models.
- 14 A single regression with REV as the dependent variable and including UEARN and the unexpected cash flow variables as predictors leads to the same findings as the two stage regression approach. The two stage regression approach was used for consistency: Regression tests of unexpected cash flows use unexplained forecast revision (UREV) as a dependent variable; similarly, portfolio tests of unexpected cash flows test for group differences in UREV.
- 15 Other tests were conducted to attempt to deal with the collinearity problem. Regressions including UWCFO and either UCFO or UCFAI, but not both, were estimated. Also first stage regressions of REV on UEARN and UWCFO were computed, and the residuals were then regressed on UCFO or UCFAI or both. And first stage regressions of REV on UEARN and UCFO were computed, and the residuals were regressed on UWCFO or UCFAI or both. These alternatives all provided consistent findings; WCFO was the signal most strongly associated with forecast revisions.

- 16 Givoly and Lakonishok (1979) provide evidence of a positive dependence in successive forecast revisions for individual firms over time, but conclude that this dependence is generally small.
- 17 In a recent review of accounting research, Lev (1989) calls for a redirection of research efforts and argues that quality of earnings should be the central topic of concern by accounting researchers.
- 18 Since tests were conducted on 1982–83 data, prior to SFAS No. 95, during a period when most firms produced statements of changes in financial position on a working capital basis, another interpretation of the stronger findings for WCFO is that analysts tended to ignore other cash flow measures and focus narrowly on WCFO. However, this is not a very appealing interpretation. Because data to adjust from WCFO to either CFO or CFAI was readily available and the calculation involved is trivial, the cost of creating CFO or CFAI measures was essentially zero.
- 19 While associations between earnings forecasts and stock price exist, the cause and effect nature of the associations is ambiguous. Results from Givoly and Lakonishok (1979) indicated a slow response of security prices to forecast revisions. This is consistent with earnings forecasts impounding information prior to security prices. However, Brown et al. (1985) and Finn (1984) provide evidence that changes in security returns may precede changes in analysts forecasts, suggesting that the security market may be a more efficient processor of information or that analysts use security prices as a signal relevant to forecast revisions.

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