The Corroborative Relation between Earnings and Cash Flows

Jeffrey J. Quirin*
Kansas State University

David O'Bryan
Pittsburg State University

William E. Wilcox
University of South Dakota

Philipich, Costigan, and Lovata (1994) hypothesize that the market reaction to unexpected earnings and unexpected operating cash flows are stronger when these factors corroborate (i.e., have the same sign). Their empirical results support this hypothesis.

This paper replicates Philipich et al. using a larger sample from 1989 to 1997. In contrast to Philipich et al., the replication finds a corroborative effect only for those firms with negative unexpected earnings and negative unexpected cash flows. While Philipich et al. find no difference between the mixed sign cases, these observations differ in the replication and appear to be driven by the sign associated with unexpected earnings.

This paper also extends Philipich et al. by reexamining the corroborative hypothesis using a random walk expectations model for actual (not estimated) cash flow from operations. The extension suggests that the corroborative hypothesis manifests itself only in the intercept term for positive earnings cases. The empirical evidence does not support a corroboration hypothesis in the intercept term for negative earnings cases or in the response coefficients.

Introduction

The cash and accrual comparison literature primarily has investigated the incremental information content of the two accounting signals as if the market reaction to each signal were independent of the other signal (Patell and Kaplan 1977; Rayburn 1986; Bowen, Burgstahler, and Daley 1987; and Ali 1994). Demski and Sappington (1990) and Vickrey (1996) suggest that researchers comparing cash and accrual reporting should also investigate interaction effects between earnings and cash flows.

* The authors acknowledge the helpful comments of Arthur Allen and two anonymous reviewers.

0747-5535/99/1300/0003/$2.00

Philipich, Costigan, and Lovata (1994) examine the joint information content of earnings and operating cash flows. They hypothesize that the market's reaction to earnings and cash flow signals is stronger when the two signals have the same sign, which they refer to as *the corroborative hypothesis*. Their results support this hypothesis.

The results in Philipich et al. (1994) suffer from two factors that may limit their generalizability. First, Philipich et al. estimate operating cash flow because actual operating cash flow reported in the audited statement of cash flows was not readily available for their sample. Material differences may exist between estimated cash flow from operations and reported cash flow from operations (Bahnson, Miller, and Budge 1996). As a result, the Philipich et al. data may suffer from measurement error.

Second, Philipich et al. report no significant difference between the positive unexpected earnings/negative unexpected cash flow firms and the negative unexpected earnings/positive unexpected cash flow firms. As a result, they combine the two mixed-sign categories of firms in their primary test of the corroborative hypothesis. Their sample only has an average of 19 firms per year in the negative unexpected earnings and positive unexpected cash flows category. The resulting lack of power may explain why their testing procedures fail to detect a significant difference between these two categories of firms. If the market reaction significantly differs between these two categories of firms, combining them for hypothesis testing constitutes omission of a relevant variable and a potentially misspecified model.

The purpose of this paper is to reexamine the joint information content of earnings and operating cash flows using actual operating cash flow data and a larger sample size. We assess the joint information content by replicating Philipich et al. with a larger sample. Because Philipich et al. use working capital from operations as their predictor of operating cash flow, this paper extends Philipich et al. by analyzing the corroborative hypothesis using a random walk expectations model for operating cash flow.

Literature Review and Hypothesis Development

Prior studies have investigated the incremental information content of earnings and cash flow measures in the security price revision process (e.g., Patell and Kaplan 1977; Rayburn 1986; Bowen et al. 1987; Ali 1994; Cheng et al. 1996). These prior studies do not, in general, report consistent incremental value-relevance for cash flows from operations. These studies, however, use estimated cash flow data. Bahnson et al. (1996) discuss potential deficiencies of estimates of cash flows from operations. They argue that the estimation of cash flow from operations relies on a false presumption of articulation between balance sheet and income statement accounts. They compare the actual cash flow from operations found on the statement of cash flows with the results of an indirect operating cash flow estimation technique employed by nearly all prior research studies and report that nearly 75 percent of the data points in their sample contain material differences.[1] In discussing the estimation process for cash flows from operations, Bahnson et al. (1996, pp. 7-8) state:

> While it is possible that future research based on reported operating cash flows will not reverse the findings of these earlier studies, the fact remains that the literature is deficient until that research is replicated with reported measures instead of estimates. The authors of those studies (or other researchers) may wish to repeat them using reported operating cash flows instead of the clearly questionable estimates that were originally used. Until these new studies are performed, the usefulness of the original findings are suspect.

A more recent study that directly compares actual and estimated operating cash flows shows that actual cash flows from operations possess incremental information content over estimated cash flows from operations (Cheng, Liu, and Schaefer 1997). Consistent with Bahnson et al., the empirical results also suggest that estimated cash flows from operations may significantly differ from reported cash flow from operations.

The incremental information content research has tested for significant main effects, but only one published study (Philipich et al. 1994) has evaluated the potential for an interaction between earnings and cash flows. Demski and Sappington (1990) develop an analytical model that suggests earnings and cash flows from operations jointly convey information to users. Their model provides a link between the income measurement and the information economics approaches to accounting theory. Their analysis consists of a setting where a random cash flow variable and a random information variable are realized each period, and the random cash flow and income measures are reported. Because the information variable consists of new strategies or opportunities for the firm, it is costly for the firm to disclose this variable—therefore, it is unknown by the market. The importance of the interaction effects arises because neither the income measure nor the cash flow variable provides sufficient information to reveal the nature of the additional random information variable. In their model, the specifics of the information variable can be determined when both the income and cash flow measures are used together. Thus, their model suggests researchers should investigate the interactive effects of the two signals. Vickrey (1996) reexamined their model. His analytical results also indicate that the interactive effects of earnings and cash flows should be investigated.

Another reason to expect a corroborative relation between earnings and cash flows is based upon a quality of earnings rationale. This argument suggests that the discretionary component of accrual earnings is difficult to interpret because of its potentially drastic fluctuations. Thus, financial statement users look for other evidence,

1 *Statement of Financial Accounting Standards (SFAS) No. 95, Statement of Cash Flows*, requires actual operating cash flows to be reported for fiscal years ending after December 15, 1987.

such as operating cash flows, to confirm/disconfirm the earnings information. As discretionary accruals can be used to manipulate earnings information, investor reaction to the earnings signal may be dependent on the operating cash flow signal. Philipich et al. report evidence to support a corroborative effect between the two signals; the market reaction is higher (lower) when unexpected earnings and unexpected operating cash flows are both positive (negative).

This paper reexamines the corroborative hypothesis tested by Philipich et al. This hypothesis implies that uncertainty is reduced when unexpected earnings and unexpected cash flows have confirming signals [i.e., positive (negative) unexpected earnings and positive (negative) unexpected operating cash flows]. The formal statement of the hypothesis, in alternative form, is:

H1: Security returns are higher (lower) when both unexpected earnings and unexpected operating cash flows are positive (negative), as compared to situations in which the signals are mixed (one positive and one negative).

Methodology

Measures

This section first defines the measures for the independent variables followed by the measures of the dependent variable. All continuous variables are scaled by the beginning share price of equity (P_{it-1}) (Christie 1987).

Bowen et al. (1986) report that working capital from operations at time t - 1 is the best predictor of estimated operating cash flows at time t. Consequently, Philipich et al. use working capital from operations (WCO) at t - 1 as their predictor of estimated cash flow from operations at time t to measure unexpected operating cash flows. To replicate Philipich et al. with actual cash flow from operations (CFO), we report empirical results using WCO to calculate unexpected, actual cash flow from operations (UCF), as follows:

$UCF_{it} = (CFO_{it} - WCO_{it-1})/P_{it-1}$

The prior year's net income before extraordinary items ($NIBE_{it-1}$) is used as the expectation for the current period's net income before extraordinary items ($NIBE_{it}$), consistent with Bowen et al. (1986):

$UE_{it} = (NIBE_{it} - NIBE_{it-1})/P_{it-1}$

The dependent variable is the annual market-adjusted return computed over a 12-month period starting nine months prior to fiscal year end and ending the third month following the firm's fiscal year-end. Estimates of market betas are based upon a minimum of 24 months of data and, where possible, a 60-month history.[2]

2 All models also are estimated using raw returns, but the results do not differ qualitatively from those reported.

Table 1—Number of Firms in Sample by Year and Joint Information Signal

	Unexpected Earnings, Unexpected Operating Cash Flow				
Year	+, -	+, +	-, -	-, +	Total
1989	170	368	236	189	963
1990	188	401	257	224	1,070
1991	198	374	335	213	1,120
1992	287	438	327	176	1,228
1993	283	500	352	230	1,365
1994	359	688	368	222	1,637
1995	378	719	460	327	1,884
1996	412	947	539	424	2,322
1997	523	914	671	430	2,538
Total	2,798	5,349	3,545	2,435	14,127
(percent)	(20%)	(38%)	(25%)	(17%)	(100%)
Philipich et al.	1,151	1,219	516	193	3,079
(percent)	(37%)	(40%)	(17%)	(6%)	(100%)

Note: The Philipich et al. total sample information represents 10 years of data, while our total sample information represents 9 years of data

Sample

Actual operating cash flow data are available on Compustat PC Plus for the ten-year period 1988-1997. The following additional sample selection requirements also are employed:

1. Each firm must have earnings, operating cash flows, and the necessary data to compute the annual abnormal cumulative return on Compustat PC Plus.
2. Each firm must have a December 31 fiscal year end.
3. Firms classified as financial institutions or regulated utilities are excluded.

Table 1 reports the number of sample firms per year and for each of the four categories of unexpected earnings and unexpected operating cash flows. The number of sample observations ranges from 963 to 2,538 per year.[3,4] With 17 percent of the overall total, the smallest category in the sample is firms with negative unexpected earnings and positive unexpected operating cash flow (-, +). The remaining categories, (+, -), (+, +), and (-, -) include 20 percent, 38 percent, and 25 percent of the overall sample total, respectively.

Comparative information about the Philipich et al. (1994) sample is reported in the last row of Table 1. Their sample is drawn from the ten-year period 1972-1981 and

[3] Although the statement of cash flows is required by the FASB for fiscal years ending after December 15, 1987, relatively few statement of cash flows data are available on Compustat PC Plus for December 31, 1987 fiscal year end firms.

[4] The 1998 version of Compustat PC Plus contains a total of 19,477 firms in the current and research tapes combined. Of this amount, 7,206 firms possess December fiscal year-ends. The exclusion of financial services and regulated utilities yields a sample of 4,715 firms from which the annual accounting and market return data are screened. Market beta requirements result in a loss of 155, 166, 173, 198, 216, 230, 255, 185, and 211 firms for the years 1989-1997, respectively. The remaining sample mortality for each year is due to a lack of required accounting data.

includes a total of 3,079 observations. The sample for this study is larger (14,127 observations) and more evenly distributed among the four cases. Specifically, our sample includes a larger proportion of negative unexpected earnings cases (42 percent) as contrasted with the Philipich et al. sample (23 percent). For the negative unexpected earnings and positive unexpected operating cash flow case (i.e., -, +) the Philipich et al. sample has a total of 193 observations, which represents 6 percent of their total sample or an average of approximately 19 such observations per year. In contrast, our sample includes 2,435 such cases, which represent 17 percent of our sample.

Models

To replicate Philipich et al., the following two models are estimated using ordinary least squares regression:

$$(1)\ RET_{it} = a_0 + b_1 UE_{it} + b_2 UCF_{it} + b_3 INT(+,+) + b_4 INT(-,-) + b_5 SLUE_{it} + b_6 SLUCF_{it} + e_{it}$$

$$(2)\ RET_{it} = a_0 + b_1 UE_{it} + b_2 UCF_{it} + b_3 INT(+,+) + b_4 INT(-,-) + b_5 INT(-,+) + b_6 SLUE_{it} + b_7 SLUCF_{it} + e_{it}$$

where:

RET_{it} = The 12-month abnormal stock return for firm i, year t;
UE_{it} = The unexpected net income before extraordinary items per share for firm i, year t;
UCF_{it} = The unexpected operating cash flow per share for firm i, year t, using working capital from operations as the expectations model;
$INT(+,+)$ = Dummy variable equal to 1 when both UE_{it} and UCF_{it} are positive;
$INT(-,-)$ = Dummy variable equal to 1 when both UE_{it} and UCF_{it} are negative;
$INT(-,+)$ = Dummy variable equal to 1 when UE_{it} is negative and UCF_{it} is positive;
$SLUE_{it}$ = $[INT(+,+) + INT(-,-)] * [UE_{it}]$;
$SLUCF_{it}$ = $[INT(+,+) + INT(-,-)] * [UCF_{it}]$;
e_{it} = Error term for firm i year t, assumed to be i.i.d.

The UE and UCF measures are scaled by P_{it-1}, which represents the per share price of the firm's common stock at the beginning of the return period.

Equation (1) is consistent with the main model used by Philipich et al. to test the corroborative hypothesis. It includes dummy variables [INT(+, +); INT(-, -)] to determine the effect that the corroborating cases may have on the intercept. Both of the mixed sign cases [(+, -) and (-, +)] are captured in the intercept of equation (1). This intercept implies that there is no significant difference between the mixed sign cases. Equation (2) adds a dummy variable [INT(-, +)] to determine whether a significant difference in the intercept exists between the mixed sign cases. Both models also include variables (SLUE; SLUCF) to allow the corroborative effect to manifest itself as changes in the response coefficients, or slopes, associated with UE and UCF.

Models estimated using pooled, cross-sectional data may be biased by cross-sectional correlation, which causes the t-statistics to be overstated (Bernard 1987). To

Table 2—Regression Results for Equation (1) Using a Working Capital Expectations Model for Cash Flow (1989-1997)

(1) $RET_{it} = a_0 + b_1UE_{it} + b_2UCF_{it} + b_3\,INT(+,+) + b_4INT(-,-) + b_5SLUE_{it} + b_6SLUCF_{it} + e_{it}$

Year	Intercept	UE	UCF	I(+, +)	I(-, -)	SLUE	SLUCF	Adjusted R^2	N
	Coefficients (t-statistics)								
1989	-0.104	3.665	0.392	0.083	-0.145	-3.509	-0.413	0.038	901
1990	-0.072	0.503	-0.663	0.088	-0.111	-0.320	0.876	0.068	980
1991	0.255	0.323	-0.872	0.187	-0.149	-0.126	1.168	0.058	1,049
1992	0.028	1.921	0.537	0.039	-0.214	-1.934	0.522	0.105	1,140
1993	0.074	0.525	-0.817	0.123	-0.166	-0.324	0.870	0.129	1,276
1994	-0.143	0.763	-0.421	0.059	-0.207	-0.332	0.297	0.058	1,542
1995	0.017	0.451	-0.740	0.048	-0.158	0.029	1.205	0.064	1,783
1996	-0.201	0.468	-0.360	0.125	-0.274	-0.839	0.475	0.079	2,251
1997	-0.176	0.115	-1.738	0.234	-0.205	-0.128	1.782	0.037	2,503
Mean	-0.356	0.971	-0.520	0.109	-0.181	-0.831	0.754	0.071	
	(-0.75)	(2.57)*	(-2.28)	(5.00)**	(-11.31)**	(-2.14)	(3.60)**		

** $p < .01$ * $p < .05$ All tests are one-sided except SLUE and SLUCF

UE = Unexpected net income before extraordinary items

UCF = Unexpected operating cash flow, using working capital from operations as the expectations model

I(+, +) = Dummy variable equal to one if unexpected net income and unexpected operating cash flow are both positive.

I(-, -) = Dummy variable equal to one if unexpected net income and unexpected operating cash flow are both negative.

SLUE = [I(+, +) + I(-, -)] * UE

SLUCF = [I(+, +) + I(-, -)] * UCF

Mean represents the mean of the nine yearly coefficients, and the t-statistic of the mean is obtained by dividing the mean parameter estimate by its standard error

avoid this bias, each model was estimated by year and cross-temporal t-tests are constructed from the yearly estimations.

Empirical Results of the Replication

Equation (1) estimation results are reported in Table 2. The intercept variables [i.e., I(+, +) and I(-, -)] are significant in the hypothesized direction at the .01 level.[5] These results support the corroborative hypothesis and are consistent with Philipich et al. The slope variable for unexpected operating cash flows (SLUCF) is positive and significant at the .01 level. This slope variable implies that the market reacts more favorably to each increment of UCF when UE and UCF have the same sign, which is also consistent with the findings of Philipich et al. The slope variable for unexpected net income before extraordinary items (SLUE) is negative but insignificant. Philipich et al. also report a negative but insignificant coefficient on this variable.

By omitting the I(-, +) term, equation (1) restricts the two conflicting cases [(+, -) and (-, +)] to have the same intercept. If this condition does not hold, equation (1) is

[5] The appropriate degrees of freedom for the cross-temporal t-statistics are the number of years estimated minus one (Bernard 1987).

Table 3—Regression Results for Equation (2) Using a Working Capital Expectations Model for Cash Flow (1989-1997)

(2) $RET_{it} = a_0 + b_1UE_{it} + b_2UCF_{it} + b_3 INT(+,+) + b_4INT(-,-) + b_5INT(-,+) + b_6SLUE_{it} + b_7SLUCF_{it} + e_{it}$

	Coefficients (t-statistics)									
Year	Intercept	UE	UCF	I(+, +)	I(-, -)	I(-, +)	SLUE	SLUCF	Adjusted R^2	N
1989	-0.038	2.860	0.940	0.017	-0.213	-0.133	-2.681	-0.993	0.030	812
1990	0.033	0.388	-0.145	-0.008	-0.229	-0.243	-0.313	0.341	0.075	984
1991	0.264	0.647	-0.417	0.178	-0.159	-0.043	-0.450	0.714	0.059	1,043
1992	0.066	2.243	0.995	0.004	-0.258	-0.107	-2.247	-0.012	0.107	1,134
1993	0.145	0.472	-0.012	0.048	-0.241	-0.187	-0.251	0.016	0.137	1,273
1994	-0.053	0.293	0.342	-0.026	-0.303	-0.271	0.062	-0.465	0.061	1,550
1995	0.100	0.218	-0.142	-0.037	-0.242	-0.240	0.288	0.542	0.066	1,788
1996	-0.142	0.273	0.052	0.065	-0.333	-0.158	-0.643	0.070	0.080	2,254
1997	-0.123	0.089	-1.479	0.178	-0.258	-0.137	-0.077	1.505	0.037	2,506
Mean	0.028	0.831	0.015	0.046	-0.249	-0.169	-0.701	0.191	0.072	
	(0.64)	(2.50)*	(0.06)	(1.70)	(-14.91)**	(-6.90)**	(-2.02)	(0.80)		

**p < .01 *p < .05 All tests are one-sided except SLUE, SLUCF, and I(-, +).

UE = Unexpected net income before extraordinary items
UCF = Unexpected operating cash flow, using working capital from operations as the expectations model
I(+, +) = Dummy variable equal to one if unexpected net income and unexpected operating cash flow are both positive
I(-, -) = Dummy variable equal to one if unexpected net income and unexpected operating cash flow are both negative
I(-, +) = Dummy variable equal to one if unexpected net income is negative and unexpected operating cash flow is positive
SLUE = [I(+, +) + I(-, -)] * UE
SLUCF = [I(+, +) + I(-, -)] * UCF

Mean represents the mean of the nine yearly coefficients, and the t-statistic of the mean was obtained by dividing the mean parameter estimate by its standard error.

Additional test: I(-, -) = I(-, +) t-statistic = -3.64, reject equality at the p < .01 level

misspecified. Equation (2) adds the I(-, +) term to equation (1). The estimation results are reported in Table 3.

Results reveal that the coefficient for the I(+, +) case is positive but is not significantly different from the default case of (+, -), providing no support for the corroborative hypothesis when UE is positive. The corroborative hypothesis is supported for the negative earnings cases. Both the I(-, -) and I(-, +) cases are significantly different from the default case of (+, -) at the .01 level. An additional t-statistic is computed to test whether the coefficient associated with the I(-, -) cases is significantly less than that of the I(-, +) cases. The resulting t-value is significant at the .01 level, indicating that the market reacts more negatively to negative unexpected earnings, when unexpected cash flows are negative as well. Both slope variables are insignificant in this model.

In contrast to Philipich et al., the conflicting signal cases [(+, -) and (-, +)] are significantly different, as reflected by the significant parameter estimate for I(-, +). In the current sample, the mean response for the (-, +) is significantly more negative than for the (+, -) default case. Thus, in this sample it is inappropriate to combine the conflicting cases when testing the corroborative hypothesis.

Empirical Results of the Extension

Several recent studies have used a random walk model to measure the unexpected component of cash flow from operations (e.g., Ali 1994; Cheng et al. 1996; Cheng et al. 1997). This section reports the empirical results from testing the corroborative hypothesis using a random walk expectations model for actual cash flow from operations, as follows:

$UCF_{it} = (CFO_{it} - CFO_{it-1})/P_{it-1}$

Models

Equation (2) is estimated again using the random walk expectations model for operating cash flow. In addition, the following model is estimated:

$$(3)\ RET_{i}t = a_0 + b_1 UE_{it} + b_2 UCF_{it} + b_3 INT(+,+) + b_4 INT(-,-) + b_5 INT(-,+) + b_6 SLE(+,+)_{it} + b_7 SLE(-,-)_{it} + b_8 SLE(-,+)_{it} + b_9 SLCF(+,+)_{it} + b_{10} SLCF(-,-)_{it} + b_{11} SLCF(-,+)_{it} + e_{it}$$

where:

RET_{it}	=	The 12-month abnormal stock return for firm i, year t;
UE_{it}	=	The unexpected net income before extraordinary items per share for firm i, year t;
UCF_{it}	=	The unexpected cash flows from operations per share for firm i, year t, using a random walk expectations model;
INT(+, +)	=	Dummy variable equal to 1 when both UE_{it} and UCF_{it} are positive;
INT(-, -)	=	Dummy variable equal to 1 when both UE_{it} and UCF_{it} are negative;
INT(-, +)	=	Dummy variable equal to 1 when UE_{it} is negative and UCF_{it} is positive;
$SLE(+,+)_{it}$	=	$[INT(+,+)] * [UE_{it}]$;
$SLE(-,-)_{it}$	=	$[INT(-,-)] * [UE_{it}]$;
$SLE(-,+)_{it}$	=	$[INT(-,+)] * [UE_{it}]$;
$SLCF(+,+)_{it}$	=	$[INT(+,+)] * [UCF_{it}]$;
$SLCF(-,-)_{it}$	=	$[INT(-,-)] * [UCF_{it}]$;
$SLCF(-,+)_{it}$	=	$[INT(-,+)] * [UCF_{it}]$;
e_{it}	=	Error term for firm i year t, assumed to be i.i.d.

Equation (3) further extends the Philipich et al. analysis by adding interaction terms [SLE(-, +); SLE(+, +); SLE(-, -); SLCF(-, +); SLCF(+, +); SLCF(-, -)] to allow not only the intercept terms but also the response coefficients to vary depending upon the signs of unexpected earnings and unexpected cash flows.

Results

The estimation results for equation (2) using a random walk expectations model for operating cash flow are reported in Table 4. The two negative unexpected earnings

Table 4—Regression Results for Equation 2 Using a Random Walk Model of Operating Cash Flow (1989-1997)

(2) $RET_{it} = a_0 + b_1UE_{it} + b_2UCF_{it} + b_3 INT(+,+) + b_4INT(-,-) + b_5INT(-,+) + b_6SLUE_{it} + b_7SLUCF_{it} + e_{it}$

	Coefficients (t-statistics)									
Year	Intercept	UE	UCF	I(+, +)	I(-, -)	I(-, +)	SLUE	SLUCF	Adjusted R^2	N
1989	-0.145	1.676	-0.630	0.147	-0.108	0.009	-1.502	0.518	0.036	873
1990	-0.041	0.638	0.417	0.126	-0.161	-0.195	-0.549	-0.408	0.071	985
1991	0.339	0.288	0.347	0.021	-0.183	-0.253	0.269	-0.121	0.052	1,057
1992	0.066	0.192	-0.216	0.004	-0.242	-0.201	0.169	0.898	0.096	1,167
1993	0.126	0.205	-0.472	0.062	-0.180	-0.199	0.057	0.712	0.158	1,280
1994	-0.079	0.118	-0.232	0.032	-0.303	-0.170	-0.189	0.261	0.065	1,543
1995	0.080	0.608	-0.209	0.029	-0.242	-0.234	-0.516	0.376	0.059	1,785
1996	-0.134	0.048	0.131	0.018	-0.295	-0.259	-0.029	-0.033	0.067	2,270
1997	-0.048	0.011	-0.661	0.082	-0.339	-0.288	0.046	0.642	0.032	2,496
Mean	0.018	0.421	-0.169	0.058	-0.228	-0.199	-0.249	0.316	0.071	
	(0.35)	(2.42)*	(-1.28)	(3.41)**	(-9.12)**	(-6.86)**	(-1.36)	(2.19)		

* *p < .01 *p < .05 All tests are one-sided except I(-, +), SLUE, and SLUCF

UE = Unexpected net income before extraordinary items
UCF = Unexpected operating cash flow, using a random walk expectations model
I(+, +) = Dummy variable equal to one if unexpected net income and unexpected operating cash flow are both positive
I(-, -) = Dummy variable equal to one if unexpected net income and unexpected operating cash flow are both negative
I(-, +) = Dummy variable equal to one if unexpected net income is negative and unexpected operating cash flow is positive
SLUE = [I(+, +) + I(-, -)] * UE
SLUCF = [I(+, +) + I(-, -)] * UCF

Mean represents the mean of the nine yearly coefficients, and the t-statistic of the mean was obtained by dividing the mean parameter estimate by its standard error

Additional test: I(-, -) = I(-, +) t-statistic = -1.32, do not reject equality

intercept variables [I(-, -) and I(-, +)] are once again significantly different than the default [(+, -)] case at the .01 level. There is no significant difference between I(-, -) and I(-, +), though. This fact indicates the market does not react more negatively to negative unexpected earnings, when unexpected cash flows are also negative. The coefficient for the I(+, +) case is positive and significantly different than the default case of (+, -), providing support for the corroborative hypothesis when unexpected earnings are positive and accompanied by positive unexpected operating cash flow.

Comparing the results in Table 3 with those in Table 4 reveals the results of using a random walk unexpected cash flow measure are different than those results supplied by a working capital from operations unexpected cash flow measure. Using a random walk expectations model, the negative unexpected earnings cases are not significantly different from each other using a working capital expectations model. The positive unexpected earnings cases are significantly different using a random walk model. Again, this contrasts with the results reported in Table 3 which find no difference between the (+, +) case and the default case of (+, -). The slope coefficients are not significant in either Table 3 or 4.

Equation (3) allows the intercept and response coefficients to vary depending upon the sign of unexpected earnings and unexpected cash flows. The default case, represented by the estimated results for the intercept and the response coefficients associated with UE and UCF, is positive unexpected earnings and negative unexpected cash flows (+, -). These estimation results are reported in Table 5.

The discussion of the intercept terms compares the two positive earnings cases [(+, +) and (+, -)], the two mixed sign cases [(+, -) and (-, +)], and the two negative earnings sign cases [(-, +) and (-, -)]. The intercept term reported in Table 5 reflects the default case of positive unexpected earnings and negative unexpected cash flow, or the (+, -) case. It is positive, but not significantly different from zero. The intercept term associated with positive unexpected earnings and positive unexpected cash flows, I(+, +), is positive and significant at the .01 level. The intercept for the (+, +) case equals the intercept term plus the coefficient associated with I(+, +), or (0.020 + 0.061) 0.081. The significance of I(+, +) implies that it is significantly different from zero and from the default case (+, -). For positive earnings cases, the corroboration hypothesis is supported.

In contrast to the results reported by Philipich et al., the mixed sign cases are significantly different. The intercept term for the (-, +) case is negative, significant at the .01 level, and equals (0.020 - 0.172) -0.152. The significance of I(-, +) implies that the intercept for this case is significantly different from zero and from the base case (+, -). This supports separate analyses of the mixed sign cases.

The two negative earnings sign cases are rank ordered consistent with the corroboration hypothesis (i.e., the (-, -) case is more negative than the (-, +) case), but are not significantly different from each other. The intercept term for the I(-, +) case equals -0.152 and is significantly different from the base case. The intercept term for the negative signed case I(-, -) is negative, significant at the .01 level, and equals (0.020 - 0.208) -0.188. An additional t-test to determine whether the I(-, +) case differs from the I(-, -) case results in an insignificant t-test of -1.42.

Summarizing the results for the intercept terms results in a rank ordering with the (+, +) case having the largest intercept (0.081), followed by the (+, -) case at 0.020, the (-, +) case at -0.152, and the (-, -) case at -0.188. The mean returns for the two positive earnings cases are significantly different from each other, as are the two mixed sign cases. The two negative earnings sign cases do not have a significantly different intercept.

The two positive earnings cases, UE and SLE(+, +), both have insignificant response coefficients. Second, the two mixed sign cases differ as reflected by the significance of SLE(-, +) at the .01 level. Third, the other negative earnings case is also significant at the .01 level. The response coefficient associated with SLE(-, +) equals (0.115 + 0.985) 1.100 and for SLE(-, -) it equals (0.115 + 0.675) 0.790. An additional t-test reveals that the two negative unexpected earnings cases are not significantly different from each other, though.

Table 5—Regression Results for Equation 3 (1989-1997)

(3) $RET_{it} = a_0 + b_1UE_{it} + b_2UCF_{it} + b_3 INT(+,+) + b_4INT(-,-) + b_5INT(-,+) + b_6SLE(+,+)_{it} + b_7SLE(-,-)_{it} + b_8SLE(-,+)_{it} + b_9SLCF(+,+)_{it} + b_{10}SLCF(-,-)_{it} + b_{11}SLCF(-,+)_{it}\ e_{it}$

	Coefficients(t-statistics)													
Year	Intercept	UE	UCF	I(+, +)	I(-, -)	I(-, +)	SLE(+, +)	SLE(-, -)	SLE(-, +)	SLCF(+, +)	SLCF(-, -)	SLCF(-, +)	Adj. R^2	N
1989	-0.142	0.298	-1.561	0.182	-0.024	0.019	-0.538	1.019	2.326	1.369	1.443	1.350	0.037	859
1990	0.012	-0.347	0.498	0.099	-0.132	-0.220	0.071	0.612	1.368	-0.547	0.088	-0.073	0.078	974
1991	0.324	0.310	0.520	0.005	-0.234	-0.296	0.307	0.662	-0.085	-0.053	-1.148	0.158	0.066	1,026
1992	0.074	0.102	-0.196	-0.010	-0.230	-0.165	0.137	0.618	1.006	1.097	0.923	-0.086	0.092	1,135
1993	0.121	0.152	-0.637	0.045	-0.202	-0.190	-0.090	0.189	-0.055	1.281	0.424	-0.001	0.157	1,261
1994	-0.079	-0.205	-0.627	0.046	-0.273	-0.165	-0.213	1.199	1.252	0.761	0.093	1.362	0.068	1,520
1995	0.078	0.799	-0.304	0.028	-0.151	-0.123	-1.087	0.932	1.556	0.905	-0.207	0.670	0.124	1,765
1996	-0.151	-0.019	-0.188	0.075	-0.305	-0.238	-0.328	0.516	0.280	0.272	-0.686	0.545	0.076	2,254
1997	-0.053	-0.053	-0.998	0.078	-0.323	-0.171	0.004	0.331	1.215	1.156	0.808	0.094	0.038	2,482
Mean	0.020	0.115	-0.388	0.061	-0.208	-0.172	-0.193	0.675	0.985	0.693	0.193	0.447	0.082	
	(0.41)	(1.03)	(-1.75)	(3.18)**	(-6.64)**	(-5.90)**	(-1.38)	(6.23)**	(3.69)**	(3.14)**	(0.71)	(2.32)*		

** $p < .01$ * $p < .05$ All tests are one-sided except I(-,+), SLE(-,+), and SLCF(-,+).

UE = Uunexpected net income before extraordinary items
UCF = Unexpected operating cash flow, using a random walk expectations model
I(+, +) = Dummy variable equal to one if unexpected net income and unexpected operating cash flow are both positive
I(-, -) = Dummy variable equal to one if unexpected net income and unexpected operating cash flow are both negative
I(-, +) = Dummy variable equal to one if unexpected net income is negative and unexpected operating cash flow is positive
SLE(+, +) = I(+, +) * UE
SLE(-, -) = I(-, -) * UE
SLE(-, +) = I(-, +) * UE
SLCF(+, +) = I(+, +) * UCF
SLCF(-, -) = I(-, -) * UCF
SLCF(-, +) = I(-, +) * UCF

Mean represents the mean of the nine yearly coefficients, and the t-statistic of the mean was obtained by dividing the mean parameter estimate by its standard error

Additional tests: I(-, -) = I(-, +) t-statistic = -1.43, do not reject equality
SLE(-, -) =SLE(-, +) t-statistic = -1.42, do not reject equality
SLCF(+, +) = SLCF(-, +) t-statistic = 0.98, do not reject equality

To summarize, the positive earnings cases both have insignificant response coefficients and therefore do not differ from each other. The negative earnings cases both have significant response coefficients but do not differ significantly from each other. The response coefficient for UE differs in this sample between positive and negative earnings, but is not affected by the accompanying sign of UCF. The response coefficient for UE does differ for the mixed sign cases with the (-, +) case being negative and significantly different from the base case of (+, -). Again, this supports separate analyses of the two mixed sign cases.

The positive UCF response coefficients are both significantly positive, with SLCF(+, +) significant at the .01 level and SLCF(-, +) at the .05 level. An additional t-test indicates that the two positive UCF cases are not significantly different from each other. Neither of the negative UCF cases is significantly different from zero or from each other. Again, the response coefficient for UCF differs between positive and negative UCF, but is not affected by the sign of UE. The mixed sign cases once again differ as reflected by the significance of SLCF(-, +) in comparison to the base case.[6]

Summary and Conclusions

The results from replicating Philipich et al. using a larger, more recent sample, actual cash flow from operations, and a working capital expectations model to measure unexpected cash flow indicated some similarities to, and some differences from, the original study. Table 2 reports results that are qualitatively the same as those of Philipich et al.[7] and strongly support the corroborative hypothesis. When the mixed sign cases are allowed to differ, however, Table 3 reports that the corroborative relationship between earnings and operating cash flows is asymmetric. While Philipich et al. report significant effects for the same sign or corroborating cases and no effects for the mixed sign cases, this study reports a corroborative effect only for those firms with negative unexpected earnings. Furthermore, the coefficients for the mixed cases [(+, -) and (-, +)] differ and appear to be driven by the sign associated with unexpected earnings.

Recent literature has used a random walk model to estimate unexpected operating cash flow rather than the working capital model used by Philipich et al. This paper reexamines the corroborative hypothesis using a random walk model. This extension to Philipich et al. suggests that the corroborative hypothesis manifests itself only in the intercept term for positive earnings cases. The empirical evidence does not support a

---

6 Equation (3) also is estimated with a sample that omits the decile of UE cases immediately above and immediately below zero, and the decile of UCF cases immediately above and immediately below zero, to determine whether the results would be impacted by the magnitude of near zero unexpected earnings or cash flows. These results are similar to those reported in Table 5.

7 The appropriate comparison in Philipich et al. would be their equation (4) reported in their Table 2.

corroboration hypothesis in the intercept term for negative earnings cases or in the response coefficients for UE or UCF.

Consequently, using a larger, more recent sample, actual operating cash flow, and a random walk model to measure unexpected operating cash flow results in evidence that generally does not support a corroborative relationship between earnings and cash flows. Future research could focus on identifying contextual or economic factors that might strengthen this relationship and lead to stronger support for an interactive effect between earnings and cash flows.

References

1. Ali, A., "The Incremental Information Content of Earnings, Working Capital from Operations, and Cash Flows," *Journal of Accounting Research* (Spring 1994), pp. 61-74.

2. Bahnson, P., P. Miller, and B. Budge, "Nonarticulation in Cash Flow Statements and Implications for Education, Research and Practice," *Accounting Horizons* (December 1996), pp. 1-15.

3. Belsey, D., E. Kuh, and R. Welsh, *Regression Diagnostics: Identifying Influential Data and Sources of Collinearity* (New York: John Wiley, 1980).

4. Bernard, V., "Cross-Sectional Dependence and Problems in Inference in Market-Based Accounting Research," *Journal of Accounting Research* (Spring 1987), pp. 1-48.

5. Bowen, R., D. Burgstahler, and L. Daley, "Evidence on the Relationships Between Earnings and Various Measures of Cash Flow," *The Accounting Review* (October 1986), pp. 713-725.

6. Bowen, R., D. Burgstahler, and L. Daley, "The Incremental Information Content of Accrual Versus Cash Flows," *The Accounting Review* (October 1987), pp. 723-747.

7. Cheng, A., C. Liu, and T. Schaefer, "Earnings Permanence and the Incremental Information Content of Cash Flow from Operations," *Journal of Accounting Research* (Spring 1996), pp. 173-181.

8. Cheng, A., C. Liu, and T. Schaefer, "The Value-Relevance of SFAS No. 95 Cash Flows from Operations as Assessed by Security Market Effects," *Accounting Horizons* (September 1997), pp. 1-15.

9. Christie, A., "On Cross-Sectional Analysis in Accounting Research," *Journal of Accounting and Economics* (1987), pp. 231-258.

10. Demski, J., and D. Sappington, "Fully Revealing Income Measurement," *The Accounting Review* (April 1990), pp. 363-383.

11. Patell, J., and R. Kaplan, "The Information Content of Cash Flow Data Relative to Annual Earnings: Preliminary Tests," working paper (Stanford University 1977).

12. Philipich, K., M. Costigan, and L. Lovata, "The Corroborative Relation Between Earnings and Cash Flow Information," *Advances in Accounting* (1994), pp. 12: 31-50.

13. Rayburn, J., "The Association of Operating Cash Flow and Accruals with Security Returns," *Journal of Accounting Research* (Supplement 1986), pp. 112-133.

14. Vickrey, D., "Additional Thoughts on Conditions for Fully Revealing Disclosure," *Journal of Business Finance and Accounting* (April 1996), pp. 481-490.