

Earnings Versus Cash Flow: The Information Provided About Changes in Company Liquidity

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Abstract

Recent research has examined the use of earnings versus cash flow in such areas as explaining abnormal security returns, predicting corporate bankruptcy, and predicting future company cash flow. This study extends prior research on the information provided by earnings and cash flow to the area of explaining changes in company liquidity. Univariate and multivariate regressions are used to examine the relationships between annual changes in the accounting flow variables and changes in liquidity.

Introduction

Accounting research is often concerned with the relationship between accounting information and user decisions. In Statement of Financial Accounting Concepts No. 5, paragraph 52, the Financial Accounting Standards Board states that an important use of information about a company's cash flow includes "helping to assess factors such as the entity's liquidity, financial flexibility, profitability, and risk." The FASB's contention regarding liquidity, however, has not been empirically validated, i.e., the information that cash flow actually provides about a company's liquidity has not been empirically measured. A related question involves the use of accrual earnings to provide information about liquidity. This study addresses these issues by examining the relationship between yearly changes in cash flow from operations and accrual earnings and yearly changes in company liquidity.

In recent years, the rise in corporate bankruptcy has led to an increased interest in the examination of company liquidity. Credit analysts and others involved in the evaluation of a firm's financial position often use various accounting measures to provide information about liquidity. Two measures widely used to provide this information are cash flow from operations and accrual earnings. The relative usefulness of earnings versus cash flow in providing information to decision makers has been examined in many contexts, but research is lacking which empirically tests the relative information provided by these two measures in the context of explaining changes in company liquidity. The purpose of this paper is to empirically measure the relative information provided by accrual earnings and

cash flow from operations. Results from this research will be useful to credit analysts, investors, and others who use accounting data to provide information about changes in company liquidity.

Prior Research Examining Earnings Versus Cash Flow

Accounting research studies have examined the use of earnings versus cash flow in such areas as: (1) explaining abnormal security returns, (2) predicting corporate bankruptcy, and (3) predicting future company cash flow. For example, Bowen, Burgstahler, and Daley (1987) examined the incremental information content of accruals versus cash flows in explaining abnormal security returns, and found cash flow data to have incremental information content relative to that contained in earnings. Wilson (1986 and 1987) reached a similar conclusion, finding that the accrual and funds components of earnings have incremental information content beyond that contained in the overall earnings figure. Bernard and Stober (1989), however, found the results of Wilson (1987) to hold only for the test periods of the fourth quarters of 1981 and 1982. They extended tests to the overall period of 1977-1984, and found no systematic difference between the implications of cash flows and accruals, as reflected in the stock price behavior surrounding the release of detailed financial statements.

In the prediction of corporate bankruptcy, Casey and Bartczak (1985) found that cash-based funds flow components do not provide incremental predictive power over accrual-based ratios in discriminating

between failed and nonfailed companies. In addition, Gentry, Newbold, and Whitford (1985) found that cash flow from operations does not improve the classification of failed and nonfailed companies.

In an examination of the use of earnings versus cash flow in predicting future cash flow, Greenberg, Johnson, and Ramesh (1986) found that, for the majority of companies in their sample, current earnings was a better predictor of future cash flow than was current cash flow. Bowen, Burgstahler, and Daley (1986), however, found that using current cash flow to predict future cash flow provided lower forecast errors than the use of current earnings.

Thus, prior research efforts in these areas have shown mixed results regarding the usefulness of earnings versus cash flow. These research results are summarized in Exhibit 1. The purpose of this study is to extend prior research on the information provided by earnings and cash flow to the area of explaining changes in company liquidity. For both completeness and comparative purposes, working capital from operations also is examined. In earlier accounting research, this variable has often been used as a surrogate for cash flow. In more recent research, however, the variable has been shown to possess distinctly different information than either earnings or cash flow. (See Bowen, Burgstahler, and Daley (1986).)

The main research questions addressed in this paper are:

Q₁: Do the accounting flow variables of accrual earnings, working capital from operations, and cash flow from operations individually provide information useful in explaining changes in company liquidity?

Q₂: Do the accounting flow variables of accrual earnings, working capital from operations, and cash flow from operations incrementally provide information useful in explaining changes in company liquidity?

Question one involves measuring the information contained in each of the individual accounting flow variables. Question two involves measuring the incremental information contained in each variable, given the information already contained in the other variables. Hypotheses are developed and tests are conducted to provide answers to these two research questions.

The study is significant for the following reasons. First, the results add to existing knowledge of the information provided by earnings and cash flow in general. Second, the results provide empirical evidence regarding the FASB's contention that cash flows provide information helpful in assessing an entity's liquidity. Finally, because of the recent emphasis on liquidity

measurement in the evaluation of firm performance, the results provide important information to investors and creditors about the relative usefulness of earnings and cash flow in explaining changes in company liquidity.

The following sections of the paper discuss variable definitions, sample selection, and research design. Empirical results and conclusions are presented in the final sections of the paper.

Data Collection

In order to determine the relationship between accounting flow and liquidity, five company variables are measured: (1) income before discontinued operations and extraordinary items (income from continuing operations), (2) working capital from operations, and (3) cash flow from operations, as measures of accounting flow; and (4) the current ratio and (5) the quick ratio, as measures of liquidity.

Accounting Flow Variables

The measures used for accounting flow variables are calculated using COMPUSTAT data. Definitions are similar to those used by Bowen, Burgstahler, and Daley (1987); Largay and Stickney (1980); and Bowen, Burgstahler, and Daley (1986). Calculations and related COMPUSTAT data items are summarized in the Appendix. The variables are calculated for each firm in the sample on an annual basis, thus, the time period subscripts shown in the calculations refer to years. Variables are calculated for the years 1975-1989.

Liquidity Measures

The concept of company liquidity, in a general sense, refers to the ability of a company to pay its debts as they become due. This underlying "ability" is commonly measured using some combination of available financial data. Thus, the determination of "liquidity" for a given firm depends on the particular financial data that are used. Many measures of liquidity have been used in past research. See, for example, Chen and Shimerda (1981) and Ezzamel, Brodie, and Mar-Molinero (1987). In this study, the current ratio and the quick ratio are used. (Definitions and related COMPUSTAT data items are summarized in the Appendix).

These particular measures were chosen for the following reasons. First, these ratios are widely used to measure company liquidity. (See Peles and Schneller (1979).) Second, the ability of a firm to pay its debts as they become due depends on both the amount of obligations (as measured by some function of current liabilities) and the amount of resources available to meet those obligations (as measured by some function of current assets). Both the current ratio and the quick

Exhibit 1

Summary of Selected Research on the Information Provided By Earnings Versus Cash Flow

Study	Issue	Conclusion
Bowen, Burgstahler, and Daley (1987)	Examined the relationship between unexpected security returns and unexpected cash flows, after controlling for the relationship between unexpected security returns and unexpected earnings.	Cash flow data were found to have incremental information content relative to that contained in either earnings or working capital from operations in explaining unexpected security returns.
Wilson (1986) and Wilson (1987)	Using observations from the 4th quarters of 1981 and 1982, investigated the information content of total accruals and cash flow from operations and their relationship to stock returns.	Both the cash flow and total accrual components of earnings were found to have incremental information content beyond earnings themselves in explaining security returns at the release date of financial statements.
Bernard and Stober (1989)	Extended the work of Wilson by conducting the same tests in measuring the information in cash flows and accruals over 32 quarters for the period 1977-1984.	Found no evidence that cash flows and accruals provide information content over earnings in explaining stock price behavior around the release date of financial statements.
Casey and Bartczak (1985)	Studied whether the addition of operating cash flow data and related measures lead to more accurate predictions of bankrupt and non-bankrupt firms, as compared to predictions based on accrual data.	Using accrual-based multiple discriminate and logit models, found that cash flow data do not provide incremental predictive power over accrual based ratios in classifying bankrupt and non-bankrupt companies.
Gentry, Newbold, and Whitford (1985)	Studied whether cash-based funds flow ratios can adequately classify failed and non-failed companies and serve as an alternative to financial ratios computed using accrual accounting.	Using logit analysis, found that cash flow from operations does not improve the classification of failed and non-failed companies as compared to classification accuracy based on accrual earnings.
Greenberg, Johnson, Ramesh (1986)	Using coefficients of determination from regression, tested whether current earnings or current cash flow is a better predictor of future cash flow.	Found for the majority of companies, for lagged periods of one to five years, that current earnings, rather than current cash flow, was a better predictor of future cash flow.
Bowen, Burgstahler, and Daley (1986)	Examined evidence on the ability of earnings and cash flow measures to forecast one-period and two-period ahead values for cash flows.	For four out of five cash flow variables, found that random walk models using cash flow predict cash flow as well or better than models based on earnings variables.

ratio relate a measure of current liabilities to a measure of current assets. Third, studies that have used factor analysis or other grouping procedures to categorize ratios have classified the current ratio and quick ratio as measures of short-term company liquidity. (See Pinches, Eubank, Mingo, and Caruthers (1975); Lee (1985); and Chen and Shimerda (1981).) Finally, several studies have examined the prediction of corporate bankruptcy and have used the current ratio and quick ratio as measures of liquidity in the development of bankruptcy prediction models. (See Zavgren (1985); Rose and Giroux (1984); and Deakin (1972).)

It should be noted that no single measure can adequately reflect all aspects of company liquidity. (See Fraser (1988).) The current study provides insights into the relationships between accounting flow variables and company liquidity only to the extent that the latter is measured by the current or quick ratio. Different results may be obtained when other measures are used.

Sample Selection

The firms included in the sample were selected from those available on the COMPUSTAT database. In order for a firm to be selected, data necessary to compute each of the five accounting flow and liquidity measures must have been available for the years 1975-1989. The final sample consisted of 471 firms that met this condition. These firms represent a wide cross-section of industries and firm sizes.

Research Design

The focus of this paper is the usefulness of various accounting flow measures in explaining changes in company liquidity. Therefore, analyses are performed using annual changes in each of the accounting flow and liquidity measures. For each firm in the sample, the yearly change in each of the five variables is computed as follows:

$$\text{Change in Variable}_i \text{ in Period } t = \frac{\text{Variable}_{i,t} - \text{Variable}_{i,t-1}}{\text{Variable}_{i,t-1}}$$

The remaining discussion will use the following notation to refer to the annual changes (computed using the above formula) for each of the accounting flow and liquidity measures:

- BEI_t = change in income before ext. items in period t ,
 CFO_t = change in working capital from operations in period t ,
 $CFFO_t$ = change in cash flow from operations in period t ,
 $CURR_t$ = change in the current ratio in period t , and
 $QUIK_t$ = change in the quick ratio in period t .

Measuring the Information Content of Accounting Flow Variables

Regression analysis is used to measure the relationship between changes in accounting flow and changes in liquidity. The following two general regression models are estimated:

$$\text{Model (A): Liquidity Change} = \beta_0 + \beta_1 (\text{Var}_i) + \epsilon$$

$$\text{Model (B): Liquidity Change} = \beta_0 + \beta_1 (\text{Var}_i) + \beta_2 (\text{Var}_j) + \epsilon$$

The information contained in the individual accounting flow variables (research question 1 addressed previously) is determined by an examination of Model (A) coefficients. The incremental information of the accounting flow variables (research question 2) is measured using two alternative approaches: (1) an examination of individual Model (B) coefficients, and (2) a comparison of the overall explanatory power of Model (B) with that of Model (A). The latter comparison measures the additional explanatory power obtained by adding variable "j" to the model, given that variable "i" is already included.

An F-ratio is computed to measure the significance of the incremental power obtained from adding an additional variable to the model. (See Tables 2 and 3.) Bowen, Burgstahler, and Daley (1987) used this procedure to test the incremental information content of cash flows relative to annual earnings in explaining abnormal security returns. In this study, the procedure is used to test hypotheses concerning the incremental information content of each of the accounting flow variables in explaining changes in company liquidity.

Based on the two general regression models discussed above, the following six specific models are estimated:

$$\text{Model (1): Liq. Change} = \beta_0 + \beta_1 (\text{IBEI}) + \epsilon \quad (1)$$

$$\text{Model (2): Liq. Change} = \beta_0 + \beta_1 (\text{WCFO}) + \epsilon \quad (2)$$

$$\text{Model (3): Liq. Change} = \beta_0 + \beta_1 (\text{CFFO}) + \epsilon \quad (3)$$

$$\text{Model (4): Liq. Change} = \beta_0 + \beta_1 (\text{IBEI}) + \beta_2 (\text{WCFO}) + \epsilon \quad (4)$$

$$\text{Model (5): Liq. Change} = \beta_0 + \beta_1 (\text{IBEI}) + \beta_2 (\text{CFFO}) + \epsilon \quad (5)$$

$$\text{Model (6): Liq. Change} = \beta_0 + \beta_1 (\text{WCFO}) + \beta_2 (\text{CFFO}) + \epsilon \quad (6)$$

Regression Models (1) - (3) are used to measure the information provided by accrual earnings, working capital from operations, and cash flow from operations, respectively, in explaining changes in company liquidity. Models (4) - (6) are used to measure the incremental information provided by each of the variables.

The six regression models could be estimated in any of three ways: (1) intertemporally by firm, (2) cross-sectionally by year, or (3) pooled both cross-sectionally and intertemporally. Because of a limited number of yearly observations in the sample and limited degrees of freedom in computing the F-ratio for the first estimation procedure, only the cross-sectional and pooled proce-

dures were used in this study. Both have been used in previous studies examining the relationship between unexpected accounting flow and abnormal security returns. (See Livnat and Zarowin (1990); Bowen, Burgstahler, and Daley (1987); Rayburn (1986); and Wilson (1987).)

One assumption of the pooled method is that no significant variation exists in the yearly cross-sectional coefficients of the regression model. The results from the yearly cross-sectional regressions did not indicate any variation in these yearly coefficients, and also did not indicate any problems with the underlying structure of the model. The results from both the yearly cross-sectional regressions and the pooled regression were similar, therefore, only results using the pooled method are presented below.

Empirical Results

This section presents empirical evidence regarding the relationship between changes in accounting flow and changes in liquidity. It concludes with the results of tests concerning the incremental information content of each of the accounting flow variables.

Pooled Results

Table 1 presents regression results for Models (1) - (6), measuring the change in liquidity by both CURR and QUIK. The pooled results not only allow an assessment of the relative information provided by each of the accounting flow variables, but also provide a basis for tests to measure the significance of the incremental information provided by each of the variables.

When the change in liquidity is measured using the current ratio (CURR), coefficients for the individual variables of IBEI, Model (1), and WCFO, Model (2), have t-values of 5.258 and 7.333, respectively. Both are significant at the .01 level. The coefficient for CFFO, Model (3), has a t-value of .334, which is insignificant at the .05 level. For Models (4) - (6), all coefficients for IBEI and WCFO are significant, whereas the coefficients for CFFO in Models (5) and (6) remain insignificant. Thus, whether considered either individually or jointly with IBEI or WCFO, cash flow from operations (CFFO) is insignificant in explaining changes in company liquidity as measured by the current ratio.

When the change in liquidity is measured by the quick ratio (QUIK), however, CFFO becomes significant, with a t-value from Model (3) of 3.753. IBEI and WCFO remain individually significant, with t-values of 5.495 and 7.024 in Models (1) and (2), respectively. For Models (4) - (6), the coefficients for IBEI, WCFO, and CFFO remain significant, with larger coefficients and t-values for IBEI and WCFO than for CFFO.

These results indicate that annual changes in earnings and working capital from operations are more significantly related to changes in company liquidity than are changes in cash flow, regardless of the measure used for company liquidity. In addition, CFFO is more strongly related to changes in liquidity when liquidity is measured by the quick ratio than when it is measured by the current ratio. Regardless of which measure of liquidity is used, however, both IBEI and WCFO are significant, and individually provide more information than CFFO about changes in liquidity.

One possible explanation for the above results is as follows. The ability of a firm to meet its obligations as they become due (the concept of liquidity) is appropriately measured by some function of current assets. Cash provided by operations (CFFO) is only one source of current assets. However, the current ratio implicitly assumes that all current assets are available to meet obligations. One therefore would expect that as funds provided by operations becomes more broadly defined (for example, by WCFO or IBEI), more information would be provided about changes in liquidity. Conversely, one would expect that as the function of assets available to pay debts becomes more narrowly defined, as it is with the quick ratio, CFFO would provide more information about changes in liquidity than when the function is more broadly defined. This is indeed what the results indicate, as shown in Table 1.

Measuring Incremental Information Content.

This section presents hypotheses and results of tests which measure the incremental information content of each of the accounting flow variables. Using sum of squared errors from the pooled regression models which were estimated in Table 1, an F-ratio is calculated to measure the significance of the increase in explanatory power from adding a second variable to the model. (See Tables 2 & 3 for the calculation of the F-ratio.) This process measures the incremental explanatory power of a particular accounting flow variable, given the information already contained in another accounting flow variable.

Hypotheses are presented concerning the incremental explanatory power of each of the three accounting flow variables. The first two hypotheses concern the incremental explanatory power of IBEI, and are stated in the null form as:

- H₁:** IBEI provides no incremental information over that provided by WCFO in explaining changes in company liquidity.
- H₂:** IBEI provides no incremental information over that provided by CFFO in explaining changes in company liquidity.

Table 1

Summary of Pooled Regression Results for Association Between
Changes in Accounting Flow and Changes in Liquidity

Model	Independent Variable	Estimated Coefficients (t-Values)			
		Intercept	β_1 IBEI	β_2 WCFO	β_3 CFFO
(1) ¹	CURR	.053 (8.424)*	.016 (5.258)*		
(2) ²	CURR	.048 (7.715)*		.030 (7.333)*	
(3) ³	CURR	.054 (8.562)*			.001 (.334)
(4) ⁴	CURR	.049 (7.725)*	.008 (2.172)*	.026 (5.544)*	
(5) ⁵	CURR	.053 (8.369)*	.017 (5.254)*		-.001 (-.264)
(6) ⁶	CURR	.049 (7.737)*		.031 (7.358)*	-.002 (-.693)
(1) ¹	QUIK	.091 (10.256)*	.025 (5.495)*		
(2) ²	QUIK	.086 (9.586)*		.041 (7.024)*	
(3) ³	QUIK	.089 (9.868)*			.013 (3.753)*
(4) ⁴	QUIK	.086 (9.601)*	.013 (2.593)*	.034 (5.078)*	
(5) ⁵	QUIK	.087 (9.681)*	.023 (5.105)*		.011 (3.156)*
(6) ⁶	QUIK	.082 (9.118)*		.039 (6.567)*	.010 (2.814)*

* Indicates significance at the 5% level.

¹Model (1): Dependent Variable = $\beta_0 + \beta_1$ (IBEI) + ϵ

²Model (2): Dependent Variable = $\beta_0 + \beta_1$ (WCFO) + ϵ

³Model (3): Dependent Variable = $\beta_0 + \beta_1$ (CFFO) + ϵ

⁴Model (4): Dependent Variable = $\beta_0 + \beta_1$ (IBEI) + β_2 (WCFO) + ϵ

⁵Model (5): Dependent Variable = $\beta_0 + \beta_1$ (IBEI) + β_2 (CFFO) + ϵ

⁶Model (6): Dependent Variable = $\beta_0 + \beta_1$ (WCFO) + β_2 (CFFO) + ϵ

The next two hypotheses concern the incremental explanatory power of WCFO over the information contained in the other accounting flow variables, and are stated as:

H₃: WCFO provides no incremental information over that provided by IBEI in explaining changes in company liquidity.

H₄: WCFO provides no incremental information over that provided by CFFO in explaining changes in company liquidity.

Finally, hypotheses concerning the incremental explanatory power of CFFO are stated as:

H₅: CFFO provides no incremental information over that provided by IBEI in explaining changes in

company liquidity.

H₆: CFFO provides no incremental information over that provided by WCFO in explaining changes in company liquidity.

To test for incremental information content, two regression models are compared for each of the six hypotheses. For example, to measure the incremental explanatory power of IBEI over that of WCFO, (Hypothesis 1), the sum of squared errors from Model (4) is compared to the sum of squared errors from Model (2), using the pooled regression results from Table 1.

Table 2 presents the results for each of the six hypotheses, using changes in liquidity as measured by the current ratio. For H₁ and H₂, IBEI provides significant information in explaining changes in liquidity, in addition to the information provided by either WCFO or CFFO. The F-ratio calculated from measuring the incremental explanatory power of IBEI over that of CFFO is 27.604, which is significant even at the .001 level.

Regarding H₃ and H₄, WCFO also provides significant information, in addition to the information provided by either IBEI or CFFO. For H₅ and H₆, however, CFFO provides no significant explanatory power over that provided by either IBEI or WCFO. The F-ratios for H₅ and H₆ are .069 and .478, respectively, both of which are insignificant at the .05 level. These results are consistent with the overall results from the pooled regression models in Table 1, which indicate that CFFO is insignificant in explaining changes in liquidity as measured by the current ratio.

Table 3 presents the results for each of the six hypotheses, using changes in liquidity as measured by the quick ratio. For H₁ and H₂, IBEI again is shown to provide significant incremental information over either WCFO or CFFO, with F-ratios for H₁ and H₂ of 6.724 and 26.058, respectively. For H₃ and H₄, WCFO also provides significant incremental information over that of either IBEI or CFFO. For H₅ and H₆, CFFO also is shown to provide significant incremental information in explaining changes in liquidity, given the information already provided by either IBEI or WCFO. These results also are consistent with the pooled results from Table 1, which showed CFFO to be significant in explaining changes in the quick ratio.

Conclusion

This study examines the relationship between changes in accounting flow and changes in company liquidity. Accounting flow is measured by income before extraordinary items (IBEI), working capital from operations (WCFO), and cash flow from operations (CFFO),

whereas liquidity is measured by the current ratio (CURR) and the quick ratio (QUIK). The results support the following main conclusions.

First, IBEI and WCFO are individually significant, whereas CFFO is insignificant, in explaining changes in the current ratio. When liquidity is measured by the quick ratio, however, all three accounting flow variables are shown to be individually significant.

Second, in measuring the incremental information content of each of the accounting flow variables, IBEI and WCFO are shown to have significant incremental explanatory power in explaining changes in the current ratio, while CFFO provides no significant incremental information. In explaining changes in the quick ratio, however, all three accounting flow variables are shown to be incrementally significant, i.e., each provides information useful in explaining changes in liquidity in addition to the information provided by either of the other variables.

The overall implication of the results is that both IBEI and WCFO have more explanatory power than CFFO in explaining changes in liquidity. In Table 1, the pooled regression coefficients and t-values for the individual variables, computed in Models (1) - (3), are larger for IBEI and WCFO than for CFFO. For multivariate Models (4) - (6), IBEI and WCFO again have larger coefficients and t-values than CFFO, regardless of the liquidity measure that is used. Thus, IBEI and WCFO appear to provide more explanatory power than CFFO in explaining changes in liquidity.

Suggestions for Future Research

These conclusions should not be extended to measures of liquidity other than the ones examined in this study. Company liquidity is a broad concept. Future research could examine the relationship between accounting flow variables and other measures of liquidity (or solvency). This examination could include more specific measures of long-term versus short-term liquidity, and the information provided by accounting flow variables about these measures of liquidity.

Future research could also examine the information provided by other accounting flow variables, such as sales and other intermediate measures of income. The current study examines information provided by earnings, cash flow, and working capital from operations. It is possible that other intermediate accounting flow variables also provide useful information about changes in company liquidity. The current study, however, does add to existing knowledge on the usefulness of earnings versus cash flow, and specifically, presents information about the usefulness of accounting flow variables in explaining changes in company liquidity. ■

Table 2

Results of Hypothesis Tests Using CURR

Hypothesis	Description of Null Hypothesis	Independent Variable in Model (A) ¹	Independent Variables in Model (B) ²	F-Ratio ³
H1	IBEI contains no incremental explanatory power over that contained in WCFO	WCFO	WCFO, IBEI	4.716*
H2	IBEI contains no incremental explanatory power over that contained in CFFO	CFFO	CFFO, IBEI	27.604*
H3	WCFO contains no incremental explanatory power over that contained in IBEI	IBEI	IBEI, WCFO	30.742*
H4	WCFO contains no incremental explanatory power over that contained in CFFO	CFFO	CFFO, WCFO	54.142*
H5	CFFO contains no incremental explanatory power over that contained in IBEI	IBEI	IBEI, CFFO	.069
H6	CFFO contains no incremental explanatory power over that contained in WCFO	WCFO	WCFO, CFFO	.478

* Indicates significance at the 5% level.

¹ Model (A): $CURR = \beta_0 + \beta_1 (\text{Variable } i) + \varepsilon$

² Model (B): $CURR = \beta_0 + \beta_1 (\text{Variable } i) + \beta_2 (\text{Variable } j) + \varepsilon$

³ The F-Ratio is used to measure the incremental explanatory power of Model (B) over the explanatory power of Model (A), i.e., the additional explanatory power obtained by adding variable j to the model, given that variable i is already included. The F-Ratio is calculated as:

$$F(v_1, v_2) = \frac{[SSE \text{ Model (A)} - SSE \text{ Model (B)}] / \# \text{ of added variables}}{SSE \text{ Model (B)} / [N - (K+1)]}$$

where;

SSE Model (A) = Sum of squared errors from regression Model (A)

SSE Model (B) = Sum of squared errors from regression Model (B)

N = number of observations

K = number of independent variables in Model (B)

v1 = number of additional variables tested in Model (B)

v2 = [N - (K+1)]

Table 3

Results of Hypothesis Tests Using QUIK

Hypothesis	Description of Null Hypothesis	Independent Variable in Model (A) ¹	Independent Variables in Model (B) ²	F-Ratio ³
H1	IBEI contains no incremental explanatory power over that contained in WCFO	WCFO	WCFO, IBEI	6.724*
H2	IBEI contains no incremental explanatory power over that contained in CFFO	CFFO	CFFO, IBEI	26.058*
H3	WCFO contains no incremental explanatory power over that contained in CFFO	CFFO	CFFO, WCFO	43.123*
H4	WCFO contains no incremental explanatory power over that contained in IBEI	IBEI	IBEI, WCFO	25.783*
H5	CFFO contains no incremental explanatory power over that contained in IBEI	IBEI	IBEI, CFFO	9.959*
H6	CFFO contains no incremental explanatory power over that contained in WCFO	WCFO	WCFO, CFFO	7.916*

* Indicates significance at the 5% level.

¹ Model (A): $QUIK = \beta_0 + \beta_1 (\text{Variable } i) + \epsilon$

² Model (B): $QUIK = \beta_0 + \beta_1 (\text{Variable } i) + \beta_2 (\text{Variable } j) + \epsilon$

³ The F-Ratio is used to measure the incremental explanatory power of Model (B) over the explanatory power of Model (A), i.e., the additional explanatory power obtained by adding variable j to the model, given that variable i is already included. The F-Ratio is calculated as:

$$F(v_1, v_2) = \frac{[SSE \text{ Model (A)} - SSE \text{ Model (B)}] / \# \text{ of added variables}}{SSE \text{ Model (B)} / [N - (K+1)]}$$

where;

SSE Model (A) = Sum of squared errors from regression Model (A)

SSE Model (B) = Sum of squared errors from regression Model (B)

N = number of observations

K = number of independent variables in Model (B)

v1 = number of additional variables tested in Model (B)

v2 = [N - (K+1)]

References

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Appendix

Summary of Formulas and COMPUSTAT Data Items Used in the Calculation
of Accounting Flow Variables and Liquidity Measures

Definition and Formula

1. Income Before Extraordinary Items in period t
= IB_t
2. Working Capital From Operations in period t
= $FOPT_t$ (For firms reporting working capital from operations)
= $IBC_t + DPC_t + XIDOC_t + TXDC_t + ESUBC_t + SPPIV_t + FOPO_t$
(For firms reporting a Statement of Cash Flows)
3. Cash Flow From Operations in period t
= $OANCF_t$ (For firms reporting a Statement of Cash Flows)
= $WCFO_t + [(LCT_t - DLC_t) - (LCT_{t-1} - DLC_{t-1})]$
- $[(ACT_t - CHE_t) - (ACT_{t-1} - CHE_{t-1})]$
(For firms reporting working capital)
4. Current Ratio in period t
= $[ACT_t / LCT_t]$
5. Quick Ratio in period t
= $[(CHE_t + RECT_t) / LCT_t]$

where;	COMPUSTAT Item No.
IB = Income Before Extraordinary Items	18
FOPT = Working Capital From Operations	110
IBC = Income Before Extraordinary Items (St. of Changes)	123
DPC = Depreciation and Amortization (St. of Changes)	125
XIDOC = Extraordinary Items and Discontinued Operations	124
TXDC = Deferred Taxes	126
ESUBC = Equity in Earnings of Unconsolidated Subsidiary	106
SPPIV = Gain or Loss from the Sale of Long Term Assets	213
FOPO = Funds from Operations - Other	217
OANCF = Operating Activities Net Cash Flow	308
LCT = Current Liabilities - Total	5
DLC = Long Term Debt Listed in Current Liabilities	34
ACT = Current Assets - Total	4
CHE = Cash and Cash Equivalentents	1
RECT = Total Current Receivables	2

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