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NOTES

A Note on Cash Flow and Classification Patterns of Financial Ratios

Michael J. Gombola and J. Edward Ketz

ABSTRACT: Classification schemes for financial ratios serve to aid understanding of empirical similarity among the ratios and to aid in the selection of critical financial variables for empirical research. Previous researchers, who defined cash flow as net income plus depreciation, found cash flow ratios highly associated with return ratios. In this study, cash flow is computed by adjusting net income for all accruals and deferrals. This more appropriate definition leads to classification schemes in which the cash flow ratios form a factor separate and distinct from the factor of return ratios.

FACED with a bewildering array of potentially useful financial ratios, the user is often forced to rely upon some system for reducing the array to a manageable number of ratios. Typically, the user will classify ratios into groups, and choose one ratio from each group, in the hope that the small subset of financial ratios will adequately describe the characteristics of the firms under study. Understanding empirical relationships among ratios is prerequisite to developing some system for classifying financial ratios. If one lacks this understanding, then the grouping of financial ratios will be *ad hoc*. Then, different users may employ vastly different subsets of financial ratios even when used for the same purpose. When different financial ratios are employed in different studies, comparison of results is made unduly complex.

Considerable insight into relationships among financial ratios is afforded by studies such as the one performed by Pinches, Mingo, and Caruthers (PMC) [1973]. They developed an empirically-based classification system for financial ratios for the years 1951, 1957, 1963, and 1969. Using factor analysis to examine interrelationships among 48 financial ratios for a sample of 221 firms, PMC found seven financial ratio groups: (1) return on investment, (2) capital intensiveness, (3) inventory intensiveness, (4) financial leverage, (5) receivables intensiveness, (6) short-term liquidity, and (7) cash position. Financial ratios from all four years studied could be grouped according to this classification system. Furthermore, the classification patterns

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Michael J. Gombola is Associate Professor of Finance, Southern Illinois University, and J. Edward Ketz is Assistant Professor of Accounting, The Pennsylvania State University.

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were stable across time. Additional corroboration of the study is presented by Pinches *et al.* [1975] over the 1961–1969 time period. Furthermore, according to Chen and Shimerda [1981], other studies of financial ratios produce similar results.

Relationships among those variables closely associated with the return on investment factor found in the PMC study pose some perplexing problems. Profitability ratios such as net income/assets and net income/net worth are closely associated with this factor, but so are ratios such as cash flow/assets and cash flow/net worth. Such results would indicate that profitability measures and cash-flow measures capture the same characteristic or facet of firm performance. This finding would run counter to the idea that accounting profitability measures indicate operating performance whereas cash-flow measures signify solvency and financial flexibility. Indeed, the Financial Accounting Standards Board (FASB), in its Discussion Memorandum on Reporting Funds Flow and Financial Flexibility, takes as given that "Profitability and funds flow are different" [1980, p. i].

The construction of cash flow ratios in the PMC and Pinches *et al.* [1975] studies may be responsible for observed relationships between profitability ratios and cash-flow ratios. In the two studies, and in many others, the sum of net income plus depreciation is used to serve as a proxy for cash flow in each of several ratios. The proper measure of cash flow, which is cash receipts from operations less cash disbursements for operations, may differ markedly from the simple proxy.

The FASB [1981, para. 45] notes that, in current practice, statements of changes in financial position are most frequently prepared on a working-capital basis. However, "The objectives of financial reporting indicate that users need information about cash inflows and outflows to help with assessments of future cash flows and to provide feedback about previous assessments. Accordingly, this proposed Statement focuses on the need for cash-flow statements rather than some other kind of funds statement" [1981, para. 45]. This argument suggests that we also examine whether working capital from operations provides information that is not captured in net income or cash flow from operations.

The primary purpose of this study is to assess the impact of cash-flow measurement upon classification patterns of financial ratios. In order to ascertain the stability of this impact, the time-series stability of classification patterns is studied. Also, the impact of general price-level (GPL) adjustments on the relationship between income and cash-flow ratios is studied by comparing classification patterns of GPL ratios with those of historical cost (HC) ratios.

Based upon the proposition that profitability differs conceptually from cash flow, we hypothesize the presence of a separate cash-flow factor in addition to the seven found by PMC. Earlier, Johnson [1979] observed the presence of a separate factor of firm performance which is closely associated with several decomposition measures, in addition to the seven found by PMC. Lev [1969] had earlier developed the concept of accounting decomposition measures from information theory, which would naturally lead to a hypothesis of a separate aspect of firm performance. Johnson also found classification patterns of ratios for manufacturing firms to be similar to those for retailing firms, and to be stable between 1972 and 1974. In all other respects, Johnson's paper, and an earlier one [Johnson, 1978], corroborate PMC.

Some earlier work on classifying GPL

ratios was performed by Short [1978]. Using a sample of financial ratios for a single year (1972), he obtained seven factors for a set of HC ratios and seven factors for a set of GPL ratios. These seven factors for HC ratios include return on investment, capital intensiveness, asset turnover, financing policy, inventory turnover, working capital, and current position. For the set of GPL ratios, a return factor replaces the return on investment factor and a cash position factor replaces the current position factor. These differences found during one year by Short suggest the need for additional study of classification patterns for GPL ratios, in order to determine whether such observed differences are aberrations or whether relationships among GPL ratios differ substantially from among HC ratios.

In the present study, the comparison of classification patterns for HC ratios with those for GPL ratios over many successive years provides a logical extension of Short's one-year study. More importantly, it also extends Short's study by employing cash-flow ratios adjusted for all accruals and deferrals. Like the previously cited studies employing financial ratios, Short uses net income plus depreciation as a proxy for cash flow.

Data and Methodology

Computation of Cash Flow

The major variables of interest are net income, net income plus depreciation, working capital from operations, and cash flow from operations. By the term income plus depreciation, we mean net income plus depreciation, depletion, and amortization. Working capital from operations is equal to net income plus or minus the following items:

Additions

1. Depreciation expense, depletion expense, amortization of intangibles, and deferred charges.
2. Amortization of discount on bonds payable.
3. Amortization of premium on bond investments.
4. Additions to deferred investment tax credits.
5. Increase in deferred income taxes payable.
6. Pro-rata share of reported losses in excess of cash dividends recognized from unconsolidated stock investments under the equity method.
7. Minority interest in consolidated subsidiaries' net income.
8. Losses from non-operating items.

Subtractions

1. Amortization of deferred credits.
2. Amortization of premium on bonds payable.
3. Amortization of discount on bond investments.
4. Amortization of deferred investment tax credits.
5. Decrease in deferred income taxes payable.
6. Pro-rata share of reported income in excess of cash dividends recognized from unconsolidated stock investments under the equity method.
7. Minority interest in consolidated subsidiaries' net loss.
8. Gains from non-operating items.

Cash flow from operations is equal to working capital from operations plus or minus the following:

Additions

1. Decrease in trade accounts and notes receivable.
2. Decrease in inventory.
3. Decrease in prepaid expenses.
4. Increase in trade accounts and notes payable.
5. Increase in accrued liabilities.

Subtractions

1. Increase in trade accounts and notes receivable.
2. Increase in inventory.
3. Increase in prepaid expenses.
4. Decrease in trade accounts and notes payable.
5. Decrease in accrued liabilities.

Working capital from operations is generally available from the COMPUSTAT tapes for 1971 and years thereafter, since APB Opinion No. 19 [1971] was effective for fiscal periods ending after September 30, 1971. Previous years' working capital from operations is estimated by using the above formula. Cash

TABLE 1
THE FINANCIAL RATIOS AND THEIR ABBREVIATIONS

Ratio	*Abbreviation*
Cash/Current Debt	CASH/CD
Cash/Sales	CASH/S
Cash/Total Assets	CASH/TA
Cash/Total Debt	CASH/TD
Cash Flow/Equity	CFFO/EQ
Cash Flow/Sales	CFFO/S
Cash Flow/Total Assets	CFFO/TA
Cash Flow/Total Debt	CFFO/TD
Cost of Goods Sold/Inventory	CGS/INV
Cost of Goods Sold/Sales	CGS/S
Current Assets/Current Debt	CA/CD
Current Assets/Sales	CA/S
Current Assets/Total Assets	CA/TA
Current Debt/Total Debt	CD/TD
Earnings Before Interest & Taxes/Equity	EBIT/EQ
Earnings Before Interest & Taxes/Sales	EBIT/S
Earnings Before Interest & Taxes/Total Assets	EBIT/TA
Inventory/Current Assets	INV/CA
Inventory/Sales	INV/S
Inventory/Working Capital	INV/WC
Long-Term Debt/Total Assets	LTD/TA
Net Income/Equity	NI/EQ
Net Income/Sales	NI/S
Net Income/Total Assets	NI/TA
Net Income Plus Depreciation/Equity	NIPD/EQ
Net Income Plus Depreciation/Sales	NIPD/S
Net Income Plus Depreciation/Total Assets	NIPD/TA
Net Income Plus Depreciation/Total Debt	NIPD/TD
Quick Assets/Current Debt	QA/CD
Quick Assets/Sales	QA/S
Quick Assets/Total Assets	QA/TA
Receivables/Inventory	REC/INV
Receivables/Sales	REC/S
Total Debt/Total Assets	TD/TA
Working Capital/Sales	WC/S
Working Capital/Total Assets	WC/TA
Working Capital from Operations/Equity	WCFO/EQ
Working Capital from Operations/Sales	WCFO/S
Working Capital from Operations/Total Assets	WCFO/TA
Working Capital from Operations/Total Debt	WCFO/TD

flow from operations is also estimated by adjusting working capital from operations for changes in the current assets and current debts except for cash.[1] All of the GPL numbers are estimated.

Firms Examined

Financial data are obtained for companies in the sample for the years 1962 through 1980 inclusive. Every industrial company on the COMPUSTAT tape which has all of the necessary data to compute or estimate the HC and GPL ratios listed in the next section is included in the sample. The resulting sample size is 119.

Ratios Examined

Forty financial ratios,[2] as listed in Table 1, were computed on each of three accounting bases: historical cost, general price-level with purchasing power gains and losses not included in income, and general price-level with purchasing power gains and losses included in income. Because the accounting profession is still debating inclusion of purchasing power gains and losses in income, two sets of GPL ratios are represented. Lack of reported GPL accounting data for any but the most recent years necessitates estimation of GPL data. This estimation was performed using the Parker [1977] model, one of the GPL estimation models partially validated by Ketz [1978]. (See also the discussion by Walther [1982].)

[1] For elaboration and rationalization of these algorithms, see Largay and Stickney [1980], Gombola and Ketz [1981a and b], and Ketz and Kochanek [1982]. These articles include examples from actual annual reports that illustrate how to make the computations and show that great disparity among the measures is possible.

[2] Log transformations are not applied to any of our ratios as they were by PMC and Johnson [1979]. There are three reasons for not performing any transformations. First, factor analysis involves no distributional assumptions. Consequently no transformations are needed. Second, as no decision model is employed in this paper, there is no specification of the form the variables must take. Third, even if it were desirable to have normally distributed variables, it is not clear that any transformations are helpful in achieving that goal [Deakin, 1976].

In formulating these ratios, earnings before interest and taxes on a GPL basis are identical to income before purchasing power gains and losses. Purchasing power gains and losses, if treated as income, are viewed as an adjustment to nominal interest revenue and interest expense in obtaining real interest revenue and expense [Kaplan, 1977].

Methodology

Classification patterns of financial ratios were developed via factor analysis, a technique designed to represent economically the variation in the variables of a data set via a smaller number of factors [Harman, 1976; Tatsuoka, 1971]. The first step in this representation is computation of correlation coefficients for all pairs of variables in the data set. This matrix of correlation coefficients is then manipulated to produce a subset of the original data set that retains the maximum amount of information contained in the original data set. Variables within this subset are called factors. Correlation coefficients between original variables and these factors are called factor loadings.

As long as no variable is a linear combination of other variables in the original data set, the subset may contain as many factors as original variables. Consistent with the objective of factor analysis, the researcher will want to employ only those factors that contribute substantially to explaining variation in the original data set. Other factors are discarded. Factors which explain more variance than a single variable are included in this study. The variance explained by a factor is estimated by the eigenvalue associated with it. Thus, factors with eigenvalues greater than or equal to one are selected as representatives of the original data set.

Each factor matrix in this study is rotated according to the varimax rotation. This procedure produces a factor matrix where some variables in the original data set have very high correlations (loadings) on a factor. By this means, the interpretability of the factors is enhanced.

Factor analysis was performed for each of the three sets of ratios for each year during the 19-year period beginning 1962 and ending 1980, for a total of 57 analyses. The 57 factor patterns produced are compared cross-sectionally and longitudinally, the comparison aided by computation of pair-wise factorial similarity coefficients.[3] (See Harman [1976, pp. 341–344].) The cross-sectional comparison involves comparison of factor matrices for the three groups of ratios during each of the 19 years. For the analysis of time-series stability, factor matrices for HC ratios are compared to the factor pattern of 1978, a year which seemed to be typical. This procedure was repeated for the GPL ratios, except that the year 1980 was chosen as the benchmark.

Results

Average product moment correlations are given in Table 2 of the HC ratios involving net income plus depreciation, working capital from operations, and cash flow from operations (referred to collectively as asset flow measures). The correlations are averaged across time. The correlations between net income plus depreciation and working capital from operations are quite high, ranging

[3] Pairwise factorial similarity coefficients, also called congruency coefficients, are defined by Harman [1976, p. 344]. These measures are like correlation coefficients in that 1.0 indicates perfect positive factor similarity, −1.0 indicates perfect negative factor similarity, and 0.0 indicates complete dissimilarity.

TABLE 2
AVERAGE PRODUCT MOMENT CORRELATIONS AMONG ASSET FLOW MEASURES

Normalized by Equity		
AFM	*NIPD*	*WCFO*
WCFO	.941	
CFFO	.587	.609
Normalized by Sales		
AFM	*NIPD*	*WCFO*
WCFO	.977	
CFFO	.781	.800
Normalized by Total Assets		
AFM	*NIPD*	*WCFO*
WCFO	.959	
CFFO	.672	.698
Normalized by Total Debt		
AFM	*NIPD*	*WCFO*
WCFO	.986	
CFFO	.830	.840

from .941 to .986. This result suggests that the two will tend to load on the same factor. Correlations between cash flow and net income plus depreciation are similar to correlations between cash flow and working capital flow from operations. When divided by equity or total assets, the correlations are in the moderate zone, ranging from .587 to .698. When divided by sales or total debt, the correlations are somewhat higher (.781–.840). Similar correlations exist for the GPL ratios. Whether these ratios load together or not cannot be conclusively determined only by these correlations, because factor analysis makes such decisions based on examining the correlations among all variables.

A listing of factor patterns found each year for HC and GPL financial ratios is presented in Table 3. As indicated in this table, eight factors with eigenvalues exceeding 1.0 are present during most of the years studied. During a few years, only seven factors with eigenvalues greater than 1.0 may be found. To aid in the analysis, however, all eight factors are reported since they are close to 1.0 and they are interpretable, except for the eighth factor in 1966 and 1969 for GPL. During a few years of the GPL factor patterns, nine factors have eigenvalues greater than 1.0; these are discussed later.

The GPL factor patterns when purchasing power gains and losses are not included in income are the same as the factor patterns of the GPL set that includes purchasing power gains and losses in income. In the rest of the paper we present the results of only the first GPL data set.

The eight factors found during the typical year studied include: (1) Return on Investment (ROI), (2) Cash Position (CP), (3) Inventory Intensiveness (INV), (4) Capital Intensiveness (CI), (5) Receivable Intensiveness (REC), (6) Short-Term Liquidity (STL), (7) Debt Structure (DEBT), and (8) Cash Flow From Operations (CFFO). The composition of these factors is shown in Table 4. Seven of these factors are substantially similar to those found by PMC, Johnson [1979] and Short [1978]. At variance with the results of earlier studies is the presence of an eighth factor that is comprised of cash-flow ratios.

Cross-Sectional Stability of Factor Patterns

Financial ratio patterns of the HC and GPL data sets are highly similar.[4] Minor

[4] An alternative experimental design is to factor-analyze HC and GPL ratios as one data set. Generally, there are 11 factors. They are: (1) GPL return on investment, (2) HC return on investment, (3) cash position, (4) cash flow, (5) HC inventory intensiveness, (6) GPL inventory intensiveness, (7) receivable intensiveness (REC/INV and HC-REC/S), (8) GPL REC/S, (9) debt, (10) short-term liquidity and (11) capital intensiveness. The main point relevant to this study is that the cash-flow ratios generally load on a factor separate from ratios involving net income, net income plus depreciation, and working capital from operations.

TABLE 3
THE FACTOR PATTERNS

Year	*Data Set*	*Factor 1*	*Factor 2*	*Factor 3*	*Factor 4*	*Factor 5*	*Factor 6*	*Factor 7*	*Factor 8*
62	HC	ROI	INV	CP	CI	DEBT	STL	REC	(CFFO)
62	GPL	ROI	INV	CP	CI	DEBT	STL	REC	(CFFO)
63	HC	ROI	CP	INV	CI	DEBT	STL	REC	CFFO
63	GPL	ROI	DEBT	CP	CI	WCFO	INV	REC	(STL)
64	HC	ROI	INV	CP	CI	DEBT	STL	REC	(CFFO)
64	GPL	ROI	INV	STL	CI	DEBT	REC/S	CP	(CFFO)
65	HC	ROI	INV	CP	CI	DEBT	STL	REC	CFFO
65	GPL	ROI	INV	CP	CI	DEBT	STL	CFFO	REC/S
66	HC	ROI	CI	CP	INV	DEBT	REC	CFFO	STL
66	GPL	ROI	INV	CP	CI	DEBT	REC/S	CFFO	—
67	HC	CP	INV	ROI	CI	DEBT	REC	CFFO	WCFO/EQ
67	GPL	ROI	INV	DEBT	CP	CI	REC/S	CFFO	WCFO/EQ
68	HC	ROI	CI	INV	CP	DEBT	STL	REC	(CFFO)
68	GPL	ROI	INV	CP	CI	DEBT	REC/S	CFFO	(STL)
69	HC	WCFO	INV	CP	CI	ROI	DEBT	REC	STL
69	GPL	CFFO	ROI	INV	CP	CI	REC/S	REC	—
70	HC	ROI	CP	INV	CI	DEBT	REC	CFFO	STL
70	GPL	ROI	INV	CP	DEBT	CI	REC/S	CFFO	REC
71	HC	ROI	CP	INV	CI	DEBT	STL	REC	(CFFO)
71	GPL	ROI	CP	INV	CI	DEBT	REC/S	REC	(STL)
72	HC	ROI	INV	CP	CFFO	DEBT	STL	REC	CI
72	GPL	ROI	INV	CP	CFFO	DEBT	REC/S	STL	CI
73	HC	ROI	CP	INV	CI	DEBT	REC	STL	(CFFO)
73	GPL	ROI	CP	INV	CFFO	DEBT-1	DEBT-2	REC/S	CI
74	HC	ROI	INV	CP	DEBT	STL	REC	CFFO	CI
74	GPL	ROI	CP	CFFO	DEBT-1	DEBT-2	REC	REC/S	STL
75	HC	ROI	INV	DEBT	REC	STL	CI	CFFO	CP
75	GPL	ROI	INV	CP	DEBT	CI	REC/S	CFFO	STL
76	HC	ROI	INV	DEBT	CP	STL	CI	REC	CFFO
76	GPL	ROI	INV	CP	CFFO	STL	DEBT	CI	REC/S
77	HC	ROI	CP	INV	REC	STL	CI	DEBT	(CFFO)
77	GPL	ROI	INV	CP	CI	DEBT	STL	CFFO	REC/S
78	HC	ROI	CP	INV	CI	REC	STL	DEBT	CFFO
78	GPL	ROI	INV	CP	CFFO	REC/S	DEBT	REC	STL
79	HC	WCFO	INV	CP	DEBT	STL	ROI	REC	CFFO
79	GPL	ROI	INV	CP	CFFO	DEBT	STL	REC/S	CI
80	HC	ROI	INV	CFFO	REC	DEBT-1	DEBT-2	CP	STL
80	GPL	ROI	INV	CP	CFFO	REC/S	DEBT	CI	STL

NOTE: Those factors in parentheses had the associated eigenvalue less than 1.0.

differences occur in those years where one data set has two debt factors, where the GPL data set has two receivable factors, or where a working capital from operations (WCFO) factor occurs instead of a cash-flow factor. Overall, these differences appear minor.[5]

[5] Further evidence of this similarity is seen in the congruency coefficients. These coefficients were computed between each factor of the HC and GPL factor

TABLE 4
VARIABLES ASSOCIATED WITH FACTORS

ROI	*CP*	*INV*	*CI*	*REC*	*STL*	*DEBT*	*CFFO*
EBIT/EQ	CASH/CD	CA/S	CA/TA	REC/INV	CA/CD	CD/TD	CFFO/EQ
EBIT/S	CASH/S	CGS/INV	CFFO/S	REC/S	QA/CD	CFFO/TD	CFFO/S
EBIT/TA	CASH/TA	CGS/S	NIPD/S			LTD/TA	CFFO/TA
NI/EQ	CASH/TD	INV/S	WCFO/S			NIPD/TD	CFFO/TD
NI/S		QA/S				TD/TA	
NI/TA		WC/S				WCFO/TD	
NIPD/EQ							
NIPD/TA							
WCFO/EQ							
WCFO/TA							

Regardless of the accounting basis used for constructing ratios, a unique cash-flow factor is typical among factor patterns. It appears in 18 out of 19 HC factor patterns and 17 out of 19 GPL factor patterns.

Time-Series Stability of Factor Patterns

Ratios calculated on an HC basis display considerable time-series stability. Fifteen years show the same eight factors. Of the remaining four years there are only minor perturbations. In 1967, there appears a working capital from operations/equity factor, comprised of that ratio only. A working capital from operations (WCFO) factor appears in 1969 and 1979. That factor is comprised of the four working-capital flow ratios. Finally, in 1980 two debt factors appear: DEBT-1 is comprised of CD/TD and LTD/TA, while DEBT-2 is comprised of TD/TA.[6]

Factors obtained from either GPL set of financial ratios also display considerable similarity, although there are several minor differences. In 1963, there appears a working capital from operations factor and in 1967 there appears a working capital from operations/equity factor. There are two debt factors in 1973 and 1974. There are two receivables factors in 1969, 1970, 1971, 1974, and 1978. REC/S is comprised of receivables/sales, while REC is comprised of receivables/inventory. Also, in 1966 and 1969 only seven factors emerge (the eighth is uninterpretable). On the other hand, there are nine factors in 1970 and 1979, with the factors being short-term liquidity and working capital from operations, respectively.[7]

Cash Flow, NIPD, and Working Capital Flow

There are four cash flow ratios, four net income plus depreciation ratios, and four working-capital flow ratios. NIPD/EQ, NIPD/TA, WCFO/EQ, and WCFO/TA almost always load on the return on investment factor while CFFO/EQ and CFFO/TA almost always load on a separate cash flow factor. These ratios

patterns and averaged across the 19 years. The mean congruency coefficients are: ROI(.935), CP(.981), INV(.831), CI(.933), REC(.723), STL(.855), DEBT(.942), and CFFO(.936).

[6] The congruency coefficients also indicate a high degree of similarity. These coefficients were computed between the 1978 HC factor pattern, a typical one, and all other HC factor patterns. The average congruency coefficients are: ROI(.960), CP(.956), INV(.966), CI(.928), REC(.933), STL(.914), DEBT(.936), and CFFO(.903).

[7] Congruency coefficients were computed between the 1980 GPL factor pattern and all other GPL factor patterns. The average congruency coefficients are: ROI(.876), CP(.917), INV(.864), CI(.632), REC(.882), STL(.792), DEBT(.806), and CFFO(.859).

almost never overlap in the factor patterns.

On the other hand, there is some overlap among cash flow, net income plus depreciation, and working-capital flow when divided by sales or by total debt. The capital-intensiveness factor is generally characterized by CA/TA, CFFO/S, NIPD/S, and WCFO/S for the years 1962–1969 and 1971. For 1970 and 1972–1980, the factor is generally comprised of CA/TA, NIPD/S, and WCFO/S. For these years CFFO/S generally loads on the cash-flow factor.[8]

The debt factor usually consists of CD/TD, CFFO/TD, LTD/TA, NIPD/TD, TD/TA, and WCFO/TD for the years 1962–1973. The ratio CFFO/TD drops out for the years 1974–1980.[9]

Thus, during the 1960s and early 1970s, cash flow is different from net income plus depreciation, and working capital from operations when normalized by equity or by total assets, but similar when divided by sales or total debt. In the 1970s the split is completed. All four cash flow ratios load on a single cash flow factor. The overlap in the earlier years and the lack of overlap during the latter years may be due to the different economic conditions of the periods (e.g., inflation, growth, productivity, and interest rate differences) or to different accounting conventions (e.g., deferred taxes in APB Opinion 11 [1967], imputed interest in APB Opinion 21 [1971], and firms switching to LIFO) or to both. Future research is needed to answer this question.

Summary and Conclusion

The major difference between the present study and earlier studies of classification patterns for financial ratios lies in the identification of cash-flow measures as representing a separate dimension of firm performance. In previous studies, where net income plus depreciation and amortization is used as a proxy for cash flow, the resulting cash-flow ratios are closely associated with profitability ratios. When cash flow is measured as cash revenues from operations less cash expenses for operations, the cash-flow ratios load on a separate and distinct factor. This separate factor is not captured by any other ratio group, including profitability ratios. This result confirms distinct differences between profitability measures and cash-flow measures, and validates the separate purpose of the Statement of Changes in Financial Position (cash basis) from the Income Statement. Moreover, the result also suggests that cash-flow ratios may contain some information not found in profitability ratios. Therefore, cash-flow ratios should not be overlooked in predictive or descriptive studies involving financial ratios.

The impact of the definition of cash-flow ratios upon classification patterns is also studied for general price-level adjusted financial ratios. General price-level ratios exhibit factor patterns very similar to patterns of historical cost ratios, including presence of a separate cash-flow factor. Whether or not purchasing power gains and losses are included in income does not affect factor patterns for general price-level adjusted ratios.

Although the results of this study provide important implications relevant to development of future studies involving financial ratios, the results of this study by themselves do not provide any infor-

[8] CFFO/S has an average loading during 1962–1969, 1971 of .72 on capital intensiveness and .50 on the cash-flow factor. During 1970, 1972–1980, the average loading is .39 on capital intensiveness but .76 on cash flow.

[9] CFFO/TD has an average loading during 1962–1973 of .71 on the debt factor and .48 on the cash flow factor. The average loading during 1974–1980, however, is .42 on the debt factor and .71 on the cash-flow factor.

mation about the predictive or descriptive power of financial ratios or groups of financial ratios. No decision model is specified in this study nor is any behavioral analysis made of decision makers. Nevertheless, the analysis of classification patterns for financial ratios will provide assistance in selecting potentially useful variables in decision models or behaviorial analyses.

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