An Empirical Analysis of Cash Flow, Working Capital, and the Stability of Financial Ratio Groups in the Hospital Industry

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Hospitals are facing stringent financial constraints as well as proposed changes in their financial reporting. Three issues were explored: (a) whether hospital financial ratio groups differed from industrial firm financial ratio groups found in previous studies; (b) whether hospital financial ratio groups remained stable over a five-year period 1983–1987; and (c) whether there was a difference between working capital flow, cash flow, and net income plus depreciation as alternative hospital asset flow measures. The results of our study confirmed the existence of five hospital ratio groups that were identical to industrial ratio groups. A separate Cash Flow group emerged for some years but not for the entire study period. And unlike studies on industrial firms, Return On Equity and Working Capital Flow emerged as two distinctly independent financial ratio groups. Furthermore, the Cash Flow ratios did not differ consistently from their surrogate measures—the Net Income Plus Depreciation ratios. Our study provided evidence to suggest that analysts should pay closer attention to two aspects of hosptial financial performance: (a) hospital equity in relationship to total assets, net income, working capital flow, and cash flow; and (b) hospital working capital flow as a separate aspect of hospital asset flow rather than just cash flow and/or net income plus depreciation. In fact, hospital cash flow did not differ consistently from net income adjusted for depreciation.

Statement of the Problem

Ratio analysis is an accepted method of assessing a hospital's financial health. Even though approximately 80% of all hospitals are not-for-profit institutions (American Hospital Association 1990, pp. A19–A463), they constitute a major U.S. industry. Currently, the hospital industry is undergoing changes in its

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Journal of Accounting and Public Policy, 10, 39–58 (1991)

0278-4254/91/$03.50

financial environment. Hospitals are facing stringent financial constraints as well as proposed changes in their financial reporting. In particular, the American Institute of Certified Public Accountants (AICPA) Task Force on Not-For-Profit Organizations recently concluded (AICPA 1988, pp. 112–159; Kleiner et al 1989, pp. 39–40; McLauglin and Farley, 1989 p. 82; Tillett and Titera 1988, pp. 48–52) that not-for profit hospitals should also be required to present a Statement of Cash Flows in accordance with Statement of Financial Accounting Standard 95 (FASB 1987).

Therefore, in conjunction with these changes, our study was conducted to: (a) determine whether hospital financial ratio groups differ from industrial firm financial ratio groups found in previous studies; (b) observe the stability of hospital financial ratio groups over a particular five-year period, 1983–1987; and (c) assessed whether there is a difference between working capital flow, cash flow, and net income plus depreciation as alternative hospital asset flow measures.

Background

Hospital Financial Reimbursement

Financial resources expended on hospital services have increased at an alarming rate. By the end of 1985, expenditures for hospital care totaled approximately $168 billion (National Center for Health Statistics 1989, p. 152) comprising approximately 4% of the nation's Gross National Product (National Center for Health Statistics 1989, p. 150). From 1980 through 1985, the average annual percentage increase in hospital expenses per inpatient day was approximately 13.5% (National Center for Health Statistics 1989, p. 158), whereas the average annual percentage increase in the Consumer Price Index for the same period was only 5 .5% (National center for Health Statistics, 1989, p. 157). In the past, hospitals were reimbursed based on "reasonable" or "allowable" costs depending on whether the third-party payer was public (e.g., Medicare and Medicaid) or private (e.g., Blue cross and other private insurance companies). In any case, retrospective cost reimbursement was the method of hospital payment.

Attempting to control public spending, which included hospital spending, Congress enacted the Tax Equity and Fiscal Responsibility Act of 1982 and the Social Security Amendment of 1983. These two pieces of legislation mandated that, beginning in October 1983, Medicare reimbursement to hospitals must be based on prospectively established flat rates (Smith and Fottler 1985, p. 1). The flat rates were based on 468 diagnosis-related groups (DRGs) into which a patient would be classified upon discharge (Ernst & Whinney 1983, p. 2).

Prospectively set Medicare rates became effective in 1983. Thereafter, hospitals were no longer reimbursed by Medicare entirely according to cost,

but by flat rates that were prospectively established according to the diagnostic classification of the patient. This method of reimbursement was applied to hospitals in 25% increments. In 1983, only 25% of hospital cost incurred in treating Medicare patients was prospectively reimbursed based on DRG rates. The phase-in period was to continue in 25% increments until 1986, in which 100% of hospital cost incurred in treating Medicare patients would be based on DRG rates (Ernst & Whinney 1983, p. 22).

Medicare's shift from a retrospective cost reimbursement system to a DRG-based, prospective flat-rate reimbursement system may have also influenced the reimbursment behavior of private insurance companies. These DRG-based Medicare rates could virtually serve as reference points from which private insurance companies could negotiate their hospital reimbursement rates. Regardless of its influence on private insurers, the shift in Medicare's reimbursement method has ushered in a whole new era in which hospitals are no longer reimbursed retrospectively. In the case of most private insurance, hospital rates are negotiated between the hospital and each insurance company before the next fiscal year. Therefore, the hospital payment system has shifted from a retrospective payment system to a prospective payment system.

Faced with serious financial constraints from all of its third-party payers, hospitals have to consider changing many of their traditional ways of delivering health services. An on-going public policy concern is whether the quality of hospital care will be jeopardized in exchange for financial survival.

Considering the importance of hospital services, the enormous size of this industry, its current financial environment, and the impact of financial constraint on the quality of hospital care, attention must first be focused on the financial health of hospitals. As such, a separate analysis of hospital financial ratios is necessary.

Studies on Financial Ratio Groups

The purpose of analyzing financial ratios is to examine the relationships among financial statement data so that the user may identify a firm's financial strengths and potential problems. However, the large number of ratios derived from financial statements can be a source of confusion rather than illumination. The user must have a classification scheme whereby ratios can be reduced to smaller groups that are manageable yet adequately representative of the firm's financial characteristics. A useful classification scheme should also have as many ratio groups as are necessary to highlight the many different financial characteristics of a firm. Therefore, the ways in which different financial characteristics of a firm are measured become crucial concerns in the derivation of different ratios. For example, results might vary considerably when a firm's asset flow is measured as cash flow rather than working capital flow. Furthermore, even if asset flow is defined as cash flow, results can be vastly

different depending on how cash flow is calculated. In addition to having meaningful ratio groups, a classification scheme must consist of stable ratio groups that can be consistently analyzed and compared for the same firm from year to year and among firms in the same industry.

Several studies have been performed on the financial ratios of industrial firms. Pinches et al. (1973) developed an empirically based classification of 48 financial ratios taken from a sample of 221 industrial firms for the period 1951–1969. Using factor analysis, they (1973, pp. 394–395) concluded that the 48 ratios from industrial firms could be effectively classified into seven groups: (a) "Return On Investment" (b) "Capital Intensiveness; (c) "Inventory Intensiveness;" (d) "Financial Leverage;" (e) "Receivables Intensiveness;" (f)"Short-Term Liquidity;" and (g) "Cash Position." Moreover, these seven groups remained reasonably stable over the time period 1951–1969. In another study, Pinches et al. (1975) found the same seven groups over the time period 1966–1969. Furthermore, Chen and Shimerda (1981) analyzed 39 ratios based on a sample of 1,053 industrial firms from the 1977 COMPUSTAT tapes and found the same seven groups.

Gombola and Ketz (1983) examined the stability of financial ratios over time from another perspective. Using 40 financial ratios from 119 industrial firms, they assessed the impact of cash flow measurement on ratios groups over the period 1962–1980. According to Gombola and Ketz (1983, p. 106) previous researchers often used net income plus depreciation as a surrogate measure for cash flow. Gombola and Ketz posited that different results would be found in the ratio groups if cash flow was measured by net income plus depreciation *and* adjusted for short-term accruals and deferrals. Using factor analysis, they (1983, pp. 110–112) found that the cash flow ratios, as measured by net income plus depreciation and adjusted for all short-term accruals and deferrals, grouped into a separate factor which was different from the findings of previous studies. Therefore, in addition to finding the seven groups that were similar to previous results, a separate cash flow group emerged in 18 of the 19 years. Gombola and Ketz concluded (1983, pp. 113–114) that net income plus depreciation was not an adequate surrogate measure of cash flow. Instead, cash flow should be separately computed and cash flow ratios should be analyzed as a separate characteristic of the firm. Accordingly, cash flow ratios should be added as a separate group to the original seven ratio groups resulting in eight factor groups (Gombola and Ketz 1983, p. 113).

These four studies found the existence of at least seven financial dimensions of an industrial firm that should be evaluated. However, different dimensions may need to be assessed when the subject of analysis is a hospital instead of an industrial firm. Counte et al. (1988) applied factor analysis on 25 ratios taken from the financial statements of 114 hospitals in Illinois. They (1988, pp. 176–177) found five factor groups that they classified as (a)"Liquidity;" (b)"Debt Structure;" (c)"Profitability;" (d) "Cash Flow Management;" and (e)"Utilization of Assets." Their findings (1988, pp. 176–178) suggested that

there may be important differences between hospital ratio groupings and industrial ratio groupings. However, the time period of their study only covered one year (1984); and their hospital database did not include the Statement of Changes in Financial Position, which would have been necessary for computing cash flow from operations.

Our study seeks to expand the studies of Gombola and Ketz (1983) and Counte et al. (1988) by obtaining data from audited hospital financial statements, including the Statement of Changes in Financial Position, over a five-year period. Our goal was to see whether different factors of hospital financial ratios emerge as compared with the factors found in previous studies of industrial firms. If hospitals and manufacturing concerns have the same financial components conveying similar information to financial statement users, the same factor groupings will emerge for hospitals as was found for industrial companies in the previous studies.

Methodology

Sample of Hospitals

The Indiana State Board of Health, by virtue of the state of Indiana's "Hospital Financial Disclosure Act" of 1983, required all Indiana hospitals to submit their audited financial statements (Balance Sheet, Statement of Revenues and Expenses, Statement of Changes in Fund Balances, Statement of Changes in Financial Position, and the related footnotes) on a yearly basis beginning in 1983 to the Indiana State Board of Health. Indiana hospitals were selected for this study because of data availability.

Our study covered the period 1983–1987. The year 1983 was included in our study because it represented a period in which hospitals were still retrospectively reimbursed for most of their services. From 1984 to 1987, prospective reimbursement took over gradually and would have made an impact on hospital financial performance. Hence, this time period captured the hospitals' transition from a retrospective payment system to a prospective payment system. The study period did not cover the years prior to 1983 because consistent and reliable data were unavailable for Indiana hospitals.

In 1983, there were 116 general, acute-care hospitals in Indiana (Indiana State Board of Health 1988, pp. 1–13). The number increased by one to 117 from 1984 through 1987 because a new hospital began operations in 1984. Four hospitals were excluded from the analysis for the following reasons: (a) a for-profit hospital whose financial statement included elements different from other not-for-profit hospitals; (b) two hospitals that are subsidiaries whose assets and liabilities were consolidated into the financial statements of their respective parent corporations; and (c) a major county welfare hospital that treats mostly medically indigent patients. This hospital is financed primarily by county funds. Therefore, its financial statements were configured differently

from the financial statements of the other private not-for-profit hospitals in the state. The resulting sample size therefore consisted of 112 general, acute-care hospitals in Indiana for 1983; and 113 hospitals for the other years, 1984–1987.

Financial Ratios

Computation of Working Capital Flow and Cash Flow for Hospitals. In their study, Gombola and Ketz (1983, p. 107) were interested in differentiating among three asset flow measures: "Net Income Plus Depreciation;" "Working Capital From Operations;" and "Cash Flow From Operations." Since their sample consisted primarily of manufacturing and retailing firms whose financial statements could be obtained from COMPUTSTAT tapes, the methods of computing Working Capital From Operations and Cash Flow from Operations were based on items that commonly appeared in such financial statements. These methods were applied in accordance with Accounting Principles Board Opinion 19 (APB 1971).

The hospital industry, on the other hand, consists mostly of not-for-profit service entities whose financial statements do not have some of the items usually shown in the financial statements of for-profit manufacturing and retailing firms. In this population considered for our study, all but one of the hospitals were not-for-profit. As was mentioned earlier, the for-profit hospital was excluded from the analysis. Therefore, although the computation methods were based on the same accounting logic, some of the items used in the Gombola and Ketz computation—such as those related to taxes, dividends, and minority interest—were irrelevant when dealing with hospitals, and thus were omitted. The methods of computing Working Capital From Operations and Cash Flow From Operations for our study are shown in Table 1.

Selection of Hospital Financial Ratios. Gombola and Ketz used 40 financial ratios in their study. However, 31 hospital financial ratios were used in our study. There are two reasons for using fewer hospital financial ratios. First, hospitals, being providers of patient care services, do not show cost of goods sold in their financial statement. Hospitals do not carry high volumes of inventories comparable to that of manufacturing/retailing firms. Thus, financial ratios using cost of goods sold or inventory in their calculations were excluded from our analysis.

Second, there is a difference in the definition of the Acid-Test ratio. In the manufacturing/retailing industries, the Acid-Test ratio is defined as:

$$(\text{cash} + \text{marketable securities} + \text{net receivables})/\text{current liabilities}.$$

The numerator represents the sum of "quick assets." Hospitals, however, typically amass a large amount of patient accounts receivable because of pending third-party reimbursement and self-pay amount (uninsured patients) which often represent medically indigent patients. Collection of these patient

Table 1. Method of Computing Net Income Plus Depreciation, Working Capital From Operations, and Cash Flow from Operations for the Hospital Industry[a]

Net Income:
Add: Depreciation and Amortization[b]
Net Income Plus Depreciation (NIPD)
Add:
Loss from disposal of fixed assets
Increase in deferred third-party reimbursement
Loss from refunding of debt
Loss from retirement of debt
Subtract:
Gain from disposal of fixed assets
Decrease in deferred third-party reimbursement
Gain from refunding of debt
Gain from retirement of debt
Working Capital from Operations (WCFO)
Add:
Decrease in patients accounts and notes receivable
Decrease in inventory
Decrease in prepaid expenses
Increase in trade accounts and notes payable
Increase in accrued liabilities
Subtract:
Increase in patient accounts and notes receivable
Increase in inventory
Increase in prepaid expenses
Decrease in trade accounts and notes payable
Decrease in accrued liabilities
Cash Flow from Operations (CFFO)

[a]The format of this table is adapted from Gombola and Ketz (1983, p. 107). The following items used in the Gombola and Ketz study (1983, p. 107) were not applicable to the computation of Working Capital from Operations for hospitals and were omitted in our study: (a) deferred investment tax credits; (b) deferred income taxes payable; (c) pro-rata share of reported income (losses) in excess of cash dividends recognized from unconsolidated stock investments under the equity method; (d) minority interest in consolidated subsidiaries' net income (loss). Note also that Gombola and Ketz used the abbreviations "NIPD," "WCFO," and "CFFO" in their study. Further, many of the items that Gombola and Ketz (1983, p. 107) added and subtracted from WCFO to obtain CFFO were used in our study.

[b]Some hospitals reported depreciation and amortization as a combined line item in their financial statements, making it impossible to separate one from the other. Consequently, depreciation and amortization are also treated as a combined number in this study.

accounts receivable from the third-party is significantly slower than for manufacturing and retailing and there is always a degree of uncertainty when collecting from self-pay patients. Because of this time lag and uncertainty, the Acid-Test ratio for hospitals is defined in the following way based on Cleverly (1987, p. 60):

$$(\text{Cash} + \text{marketable securities})/\text{current liabilities}.$$

The numerator in this Acid-Test ratio is a much more stringent measure of hospital liquidity and was used in our study. Since net receivables were excluded from the computation of the Acid-Test ratio, the numerator of quick assets (cash plus marketable securities), was essentially the same as "cash and cash equivalents," which was reported as a single item, "cash," in most hospital balance sheets. Therefore, a ratio that used quick assets would be identical to a ratio that used cash. Thus, quick asset ratios were excluded from our study and only cash ratios were used. The financial ratios used in this study are listed in Table 2.

Table 2. List of Financial Ratios (the abbreviation for each ratio is in parentheses)[a]

[b]Cash/current liabilities (CASH/CL)
[b]Cash/patient revenues (CASH/PR)
[b]Cash/total assets (CASH/TA)
[b]Cash/total liabilities (CASH/TL)
Cash flow from operations/equity (CFFO/EQ)
Cash flow from operations/patient revenues (CFFO/PR)
Cash flow from operations/total assets (CFFO/TA)
Cash flow from operations/total liabilities (CFFO/TL)
Current assets/current liabilities (CA/CL)
Current assets/patient revenue (CA/PR)
Current assets/total assets (CA/TA)
Current liabilities/total liabilities (CL/TL)
[c]Earnings before interest/equity (EBI/EQ)
[c]Earnings before interest/patient revenues (EBI/PR)
[c]Earnings before interest/total assets (EBI/TA)
Long-term liabilities/total assets (LTL/TA)
Net income/equity (NI/EQ)
Net income/patient revenues (NI/PR)
Net income/total assets (NI/TA)
Net income plus depreciation/equity (NIPD/EQ)
Net income plus depreciation/patient revenues (NIPD/PR)
Net income plus depreciation/total assets (NIPD/TA)
Net income plus depreciation/total liabilities (NIPD/TL)
Receivables/patient revenues (REC/PR)
Total liabilities/total assets (TL/TA)
Working capital/patient revenues (WC/PR)
Working capital/total assets (WC/TA)
Working capital from operations/equity (WCFO/EQ)
Working capital from operations/patient revenues (WCFO/PR)
Working capital from operations/total assets (WCFO/TA)
Working capital from operations/total liabilities (WCFO/TL)

[a]The format of this table is adapted from Gombola and Ketz (1983, p. 108).

[b]Cash = cash + marketable securities. Cash does not include board-designated funds for plant replacement, self insurance, and other purposes. Although board-designated funds may be substantial in amount, they are funds set aside by the board for specific uses and are not available for daily operational use.

[c]Not-for-profit hospitals are exempt from taxes. This ratio is a substitute for what would be Earnings Before Interest and Taxes in for-profit industries.

Statistical Method

The ratio distributions calculated in our study were highly skewed. Natural log transformations were applied to all ratios to reduce the impact of outliers and to improve normality. Factor analysis was used to sort the 31 financial ratios into independent groups or factors. Each factor contains a number of financial ratios that have the highest correlations with that factor. These correlations, known as "factor loadings," were extracted through the orthogonal varimax rotation technique (Kleinbaum and Kupper 1978, pp. 376–413), and only factors whose eigenvalues were equal to one or more were included. The factor analysis was performed using the SPSS-X computer program (SPSS-X User's Guide 1988, pp. 481–498).

Results

Eight factors of financial ratios emerged from the analysis: (a) Return On Investment; (b) Cash Position; (c) Debt Structure; (d) Working Capital Flow; (e) Return On Equity; (f) Short-Term Liquidity; (g) Receivables Intensiveness; and (h) Cash Flow. These eight factors accounted for a significant portion of the total variance among the ratios. Table 3 shows the factor groups, their ratios, the highest factor loadings for each year of the five-year period under study, and the percentage of total variance explained in each year.

Ratio Groups of Hospitals Versus Industrial Firms

In our study, five factors emerged with ratios identical to studies using industrial firms: (a) Return On Investment; (b) Cash Position; (c) Debt Structure (or Financial Leverage); (d) Receivables Intensiveness; and (e) Short-Term Liquidity. Our results suggested that these five aspects of an entity must be evaluated regardless of whether one is analyzing for-profit industrial firms or not-for-profit hospitals because these five dimensions are crucial to the well-being of either type of entity. However, unlike the Gombola and Ketz (1983, pp. 109–114) study, Cash Flow did not emerge consistently as an independent factor. Instead, Working Capital Flow and Return On Equity emerged as two distinctly separate factors. The ratios that were associated with the Working Capital Flow factor in our study had typically loaded into the Return On Investment, Capital Intensiveness, and Debt Structure factors in previous studies. The ratios that loaded into the Return On Equity factor in our study had loaded into the Return On Investment factor in previous studies.

A consistently independent Working Capital Flow factor suggests that hospital asset flow measures do not conform to the same patterns as do the asset flow measures of industrial firms. For hospitals, the difference between net income plus depreciation and working capital from operations consists of: (a) various amortizations; (b) gain and loss from disposal of fixed assets; (c) change in deferred third-party reimbursement; (d) gain and loss from debt

Table 3. Factor Groups and Factor Loadings, 1983–1987

Factor Group	Year									
	1983		1984		1985		1986		1987	
Return on Investment	NI/PR	.92	NI/PR	.86	NI/PR	.91	NI/PR	.96	NI/PR	.94
	NI/TA	.86	NI/TA	.91	NI/TA	.95	NI/TA	.98	NI/TA	.95
	EBI/TA	.88	EBI/TA	.94	EBI/TA	.96	EBI/TA	.96	EBI/TA	.93
	NIPD/PR	.87	NIPD/PR	.80	NIPD/PR	.91	NIPD/PR	.95	NIPD/PR	.93
	EBI/PR	.86	EBI/PR	.84	EBI/PR	.90	EBI/PR	.93	EBI/PR	.88
	NIPD/TA	.85	NIPD/TA	.88	NIPD/TA	.95	NIPD/TA	.97	NIPD/TA	.92
	NIPD/TL	.73			EBI/EQ	.94	NIPD/TL	.77	CFFO/TA	.55
	CFFO/TL	.60			NIPD/EQ	.93			CFFO/PR	.52
					NI/EQ	.90				
Cash position	CASH/PR	.97	CASH/PR	.96	CASH/PR	.96	CASH/PR	.96	CASH/PR	.97
	CASH/CL	.95	CASH/CL	.97	CASH/CL	.95	CASH/CL	.89	CASH/CL	.94
	CASH/TA	.94	CASH/TA	.94	CASH/TA	.92	CASH/TA	.94	CASH/TA	.95
	CASH/TL	.78	CASH/TL	.65	CASH/TL	.69	CASH/TL	.77	CASH/TL	.73
	WC/PR	.65	WC/PR	.64	WC/PR	.88			CA/CL	.56
			CA/CL	.63	CA/CL	.75			CA/PR	.73
					CA/PR	.76				
					WC/TA	.71				
					CA/TA	.55				
Debt structure	LTL/TA	−.95	LTL/TA	−.95	LTL/TA	−.91	LTL/TA	−.91	LTL/TA	−.83
	CL/TL	.94	CL/TL	.93	CL/TL	.92	CL/TL	.93	CL/TL	.89
	TL/TA	−.89	TL/TA	−.94	TL/TA	−.93	TL/TA	−.89	TL/TA	−.80
	CA/TA	.61	CA/TA	.53	NIPD/TL	.68			NIPD/TL	.67
			NIPD/TL	.74	CFFO/TL	.64				
			CFFO/TL	.67						
			WC/TA	.53						

Working capital flow	WCFO/TA	.98	WCFO/TA	.97	WCFO/TA	.99	WCFO/TA	.97	WCFO/TA	.98
	WCFO/PR	.96	WCFO/PR	.97	WCFO/PR	.97	WCFO/PR	.92	WCFO/PR	.97
	WCFO/EQ	.91	WCFO/EQ	.91	WCFO/EQ	.94	WCFO/EQ	.74	WCFO/EQ	.65
	WCFO/TL	.86	WCFO/TL	.78	WCFO/TL	.85	WCFO/TL	.87	WCFO/TL	.92
Return on equity	EBI/EQ	.90	EBI/EQ	.93			EBI/EQ	.98	EBI/EQ	.95
	NIPD/EQ	.90	NIPD/EQ	.91			NIPD/EQ	.99	NIPD/EQ	.96
	CFFO/EQ	.84	NI/EQ	.74			CFFO/EQ	.95	CFFO/EQ	.96
	NI/EQ	.75					NI/EQ	.92	NI/EQ	.88
Short-term liquidity	CFFO/PR	−.78					WC/TA	.77	WC/TA	.91
	WC/TA	.68					CA/CL	.89	WC/PR	.83
	CA/CL	.66					WC/PR	.72		
	CFFO/TA	−.63								
Receivable intensiveness	REC/PR	.91	REC/PR	.89	REC/PR	.88	REC/PR	.91	REC/PR	−.79
	CA/PR	.72	CA/PR	.70			CA/PR	.66	CA/TA	−.63
							CA/TA	.52	CFFO/TL	.54
Cash flow			CFFO/PR	.89	CFFO/PR	.84	CFFO/PR	.89		
			CFFO/TA	.70	CFFO/TA	.77	CFFO/TA	.89		
			CFFO/EQ	.72	CFFO/EQ	.73	CFFO/TL	.74		
Percent of variance explained	89.9%		89.8		89.9		91.5		88.7	

refunding; and (e) gain and loss from debt retirement. Studies (Pinches et al. 1973; 1975; Chen and Shimerda 1981; Gombola and Ketz 1983) based on industrial firms showed no significant difference between asset flows as measured by net income plus depreciation or by working capital from operations. This means that net income plus depreciation must have been dominant in relation to the other adjustments.

For hospitals in our study period, however, there was enough of a difference between net income plus depreciation and working capital from operations for the working capital flow ratios to load into a separate factor every year. A further examination of the hospital financial statements revealed that the two most frequent adjustments, in addition to depreciation and amortization, were (a) gain and loss (mostly loss) from disposal of fixed assets; and (b) changes in deferred third-party reimbursement. Gain and loss from refunding or retirement of debt were reported very infrequently throughout the five-year period.

The frequency of gain (loss) from fixed asset disposal points to the possibility that technology obsolescence could be a frequent occurrence in the hospital industry. Furthermore, in our study, hospitals may have disposed of fixed assets because of cash flow problems associated with the new reimbursement environment.

Deferred third-party reimbursement arises from the difference between hospitals using the straight-line depreciation method for accounting purposes and an accelerated depreciation method for reimbursement purposes (Heinzeller et al. 1982, pp. 28–29). In our study, changes in deferred third-party reimbursement are reported as an adjustment to net income in deriving working capital from operations. The frequency of this line item in the hospital statements indicates it is a significant component of hospital working capital flow.

These two findings combine to form an important implication. If hospitals dispose of fixed assets primarily because of technology obsolescence, they would need to acquire new assets that have larger monetary values. Consequently, the accelerated depreciation of these new assets would provide an even larger sum of reimbursement from third-party payers. In this way, the Working Capital Flow of hospitals is distinctly different from industrial firms and therefore manifests itself as a separate factor in this study. Further studies are necessary to verify the validity of this implication.

In addition to a separate Working Capital Flow factor, an independent Return On Equity factor suggests that hospital equity may have unique characteristics that render its ratios independent from ratios related to total hospital assets (investments), which belong to the Return On Investment factor. However, it must be pointed out that Return On Equity and Return On Investment ratios loaded into the same factor in 1985. This one-year inconsistency indicates the need for an in-depth evaluation of the hospital equity's relationship to total hospital assets (investments), which is beyond the scope of our paper.

Stability of Hospital Ratio Groups, 1983–1987

Ratio groups did not remain consistently stable throughout all five years. Table 4 shows the grouping patterns for each of those five years. Seven factors emerged in 1983: (a) Return On Investment; (b) Cash Position; (c) Debt Structure; (d) Working Capital Flow; (e) Return On Equity; (f) Short-Term Liquidity; and (g) Receivables Intensiveness. In 1984, the Cash Position and Short-Term Liquidity ratios combined into one factor, and a separate Cash Flow factor emerged. In 1985, the Cash Position and Short-Term Liquidity ratios continued to load into one factor; Return on Investment and Return On Equity ratios also loaded into one factor; and a separate Cash Flow factor continued to exist. In 1986, the Cash Position and Short-Term Liquidity ratios separated into two factors as did the Return on Investment and Return on Equity ratios; and the separate Cash Flow factor continued to exist. In 1987, separate Cash Position, Short-Term Liquidity, Return On Investment, and Return On Equity factors were found; the Cash Flow ratios no longer loaded into a separate factor; and the factor formations were identical to the formations of 1983: (a) Return on Investment; (b) Cash Position; (c) Debt Structure; (d) Working Capital Flow; (e) Return On Equity; (f) Short-Term Liquidity; and (g)Receivables Intensiveness.

To summarize, three factors stayed consistently independent throughout the five years of our study: Debt Structure, Working Capital Flow, and Receivables Intensiveness. The others fluctuated somewhat with each year. Return on Investment and Return on Equity remained as separate factors for all years except for 1985 when they combined into one factor. Likewise, Cash Position and Short-Term Liquidity remained as separate factors for 1983, 1986, and

Table 4. Factor Patterns, 1983–1987[a]

1983	1984	1985	1986	1987
ROI	ROI	ROI + ROE	ROI	ROI
CP	CP + STL	CP + STL	CP	CP
DEBT	DEBT	DEBT	DEBT	DEBT
WCF	WCF	WCF	WCF	WCF
ROE	ROE	REC	ROE	ROE
STL	REC	CF	STL	STL
REC	CF		REC	REC
			CF	

Key:ROI = return on investment
CP = cash position
DEBT = debt structure
WCF = working capital flow
ROE = return on equity
STL = short-term liquidity
REC = receivables intensiveness
CF = cash flow

[a]The format of this table is adapted from Gombola and Ketz (1983, p. 111).

1987, but combined into one factor for 1984 and 1985. Cash Flow emerged as a separate factor only in 1984, 1985, and 1986.

The unstable ratio patterns may be a reflection of the impact of financial constraints on hospital finances. As was mentioned earlier, the Medicare prospective payment system was gradually implemented beginning in 1983. Thus, the gradual impact of prospective payment would have been felt throughout 1983 and thereafter. It is possible that when prospective payment was first implemented on 25% of Medicare patient revenues in 1983, hospital cash flow did not differ significantly from net income adjusted for depreciation. However, as larger increments of Medicare patient revenues were subject to prospective payment in 1984 and thereafter, hospital cash flow and net income adjusted for depreciation became two distinctly different factors. Moreover, Cash Position and Short-Term Liquidity, which were separate factors in 1983, became one factor in 1985 and 1986. This could mean that hospital short-term liquidity consisted mostly of cash in those years.

Overall, factor patterns from 1984 through 1986 seem to indicate a different financial performance pattern from the standpoints of profitability, cash flow, cash position, and liquidity as compared to 1983. Yet in 1987, factor patterns returned to the patterns of 1983. This seems to imply that hospitals adjusted to the prospective reimbursement situation and their financial performance patterns once again returned to that of 1983. However, such a conclusion should be confirmed by extending the time period of this study beyond 1987 and to determine if consistently stable factor patterns emerge thereafter.

Working Capital Flow, Cash Flow, and Net Income Plus Depreciation as Alternate Asset Flow Measures

Working Capital Flow was defined as Working Capital From Operations (WCFO) and Cash Flow was defined as Cash Flow From Operations (CFFO) (see Table 1 for their respective computations). Because Net Income Plus Depreciation (NIPD) was used as a surrogate measure of Cash Flow in previous studies (Pinches et al. 1973, 1975; Chen and Shimerda 1981), NIPD was also compared with WCFO and CFFO to see whether there were any significant relative differences. In order to examine the relationship between asset flow and major elements of the financial statements, the three asset flows were converted into financial ratios. NIPD, WCFO, and CFFO were each standardized by four denominators: total liabilities, patient revenues, total assets, and hospital equity. Table 5 shows the Pearson product moment correlations coefficients for the NIPD, CFFO, and WCFO ratios, standardized by the four denominators, for the entire five-year period, 1983–1987.

The NIPD, CFFO, and WCFO ratios did not show extremely high correlations irrespective of the denominator. In particular, the correlations between NIPD and WCFO ratios ranged from .047 to .708. When standardized by hospital equity, their correlation was .047 with a significance level of 0.131.

Table 5. Pearson Product Moment Correlation Coefficients Among Net Income Plus Depreciation, Cash Flow From Operations, and Working Capital From Operations Ratios, 1983–1987[a]

	Standardized by total liabilities[b]	
	NIPD	WCFO
WCFO	.708	
CFFO	.662	.551
	Standardized by patient revenues[b]	
WCFO	.510	
CFFO	.546	.273
	Standardized by total assets[b]	
WCFO	.585	
CFFO	.557	.384
	Standardized by hospital equity[b]	
WCFO	.047 ($p = .131$)	
CFFO	.735	−.326

Key: NIPD = net income plus depreciation
CFFO = cash flow from operations
WCFO = working capital from operations

[a]The format of this table is adapted from Gombola and Ketz (1983, p. 110).

[b]The correlation coefficients presented in this table are average correlation coefficients over the five-year period 1983–1987. All correlation coefficients are significant at $p < .01$ except as noted.

The correlations between NIPD and CFFO ranged from .546 to .735. As for CFFO and WCFO, their average correlations were considerably lower, ranging from −.326 to .551. These results indicate the possibility that NIPD, CFFO, and WCFO ratios might load into separate factors. However, these correlations did not provide conclusive evidence that separate loadings would result because factor analysis takes into account the correlations among all 31 variables used in the study.

Results of the factor analysis showed that the WCFO ratios consistently loaded into a separate factor, regardless of the denominator, in all five years (see Table 3). The NIPD and CFFO ratios, however, loaded into the same factor in some years, and into different factors in other years. There was no strong evidence to support a consistent difference between the NIPD and CFFO ratios for hospitals. Table 6 shows the factors into which the NIPD and CFFO ratios loaded in each of the five years along with the factor loadings.

NIPD and CFFO Standardized by Total Liabilities (TL). NIPD/TL and CFFO/TL were loaded into the same factor in 1983, 1984, and 1985. In 1986, NIPD/TL and CFFO/TL were loaded into the Return On Investment and Cash Flow factors, respectively. In 1987, NIPD/TL was loaded into Debt Structure but CFFO/TL was loaded into Receivables Intensiveness with a highest factor loading of .54. However, in that same year, CFFO/TL was also

Table 6. Factor Group Comparison of NIPD and CFFO Ratios, 1983–1987

Ratio	Year and Factor Loading									
	1983		1984		1985		1986		1987	
NIPD/TL	ROI	.73	DEBT	.74	DEBT	.68	ROI	.77	DEBT	.67
CFFO/TL	ROI	.60	DEBT	.67	DEBT	.64	CF	.74	REC	.54 [a]
									DEBT	.49 [a]
NIPD/PR	ROI	.87	ROI	.80	ROI + ROE	.91	ROI	.95	ROI	.93
CFFO/PR	STL	−.78	CF	.89	CF	.84	CF	.89	ROI	.52 [a]
									STL	.49 [a]
NIPD/TA	ROI	.85	ROI	.88	ROI + ROE	.95	ROI	.97	ROI	.92
CFFO/TA	STL	−.63	CF	.70	CF	.77	CF	.89	ROI	.55 [a]
									STL	.49 [a]
NIPD/EQ	ROE	.90	ROE	.91	ROI + ROE	.93	ROE	.99	ROE	.96
CFFO/EQ	ROE	.84	CF	.72	CF	.73	ROE	.95	ROE	.96

Key: ROI = return on investment
DEBT = debt structure
ROE = return on equity
STL = short-term liquidity
REC = receivables intensiveness
CF = cash flow

[a]The small difference between these factor loadings suggests that this ratio could belong to either factor category.

loaded into Debt Structure with the second highest factor loading of .49 (see Table 6). Because of the minor difference between .54 and .49, CFFO/TL for 1987 could conceivably belong either to the Receivables Intensiveness or the Debt Structure factors with equal statistical validity. In this sense, CFFO/TL for 1987 could be considered as having loaded into the same factor, Debt structure, as did NIPD/TL. Thus, NIPD and CFFO, when standardized by total liabilities, loaded into the same factor every year except in 1986.

When NIPD and CFFO were standardized by total liabilities, they did not conform to the same factor patterns as when NIPD and CFFO were standardized by patient revenues, total assets, and hospital equity. In the latter cases, the CFFO ratios loaded into a separate Cash Flow factor in 1984, 1985, and 1986. This same inconsistency was noted by Gombola and Ketz (1983, pp. 112–113) in their study of 119 industrial firms. Similar findings in our study suggests that the inconsistent patterns are due to instability of the ratios themselves and not to industry-specific differences.

NIPD and CFFO Standardized by Patient Revenues (PR) and Total Assets (TA). The NIPD and CFFO ratios standardized by patient revenues and total assets showed identical patterns throughout the study period. The NIPD ratios consistently loaded into Return On Investment (and the combined Return On Investment and Return On Equity factor in 1985) while the CFFO ratios consistently loaded into: (a) Short-Term Liquidity in 1983; (b) Cash

Flow as a separate factor from 1984 through 1986; and (c) Return On Investment or Short-Term Liquidity in 1987.

NIPD and CFFO Standardized by Hospital Equity (EQ). Both NIPD/EQ and CFFO/EQ were loaded into the same Return On Equity factor in 1983, 1986, and 1987. In 1984 and 1985, however CFFO/EQ was loaded into the separate Cash Flow factor whereas NIPD/EQ was loaded into the Return On Equity factor.

In summary, the CFFO ratios appeared to load into a separate Cash Flow factor for the years 1984, 1985, and 1986; and for those years, the particular ratios that were loaded into the Cash Flow factor did not show a consistent identity. Only two CFFO ratios, CFFO/PR and CFFO/TA, consistently loaded into the Cash Flow factor in all three years (see table 3). CFFO/TL and CFFO/EQ did not load into the Cash Flow factor with any regularity.

Based on these results, the only asset flow ratios that showed any consistent independence as a group were the WCFO ratios: WCFO/TL, WCFO/PR, WCFO/TA, and WCFO/EQ. The CFFO ratios failed to emerge as a consistently independent group. Instead, they were loaded together with the NIPD ratios into the same factor in some of the years. This result differed from that of Gombola and Ketz (1983, P.112) in which the CFFO ratios loaded into a Cash Flow factor while the WCFO and NIPD ratios loaded into the Return On Investment factor.

Conclusions

In our study, five hospital ratio groups were identical to industrial ratio groups: (a) Return On Investment; (b) Cash Position; (c) Debt Structure; (d) Receivable Intensiveness; and (e) Short-Term Liquidity. A separate Cash Flow group emerged for some years but not for the entire study period. Instead, Return On Equity and Working Capital Flow emerged as two distinctly independent ratio groups. These ratio groups showed two different patterns throughout the five years. Similar patterns were observed for 1983 and 1987; and similar patterns were observed for 1984, 1985 and 1986. Furthermore, the Cash Flow ratios did not differ consistently from their surrogate measures—the Net Income Plus Depreciation ratios.

Our study provided evidence to suggest that analysts should pay closer attention to two aspects of hospital financial performance. First, hospital working capital flow must be analyzed as a separate aspect of hospital asset flow in addition to cash flow and/or net income plus depreciation. There is only weak evidence that hospital cash flow differs significantly from net income adjusted for depreciation. Second, hospital policy must be examined with respect to the relationship among fund equity, total assets, net income, working capital flow, and cash flow.

Recently, the AICPA Task Force on Not-For-Profit Organizations recommended (AICPA 1988, pp. 112–159; McLaughlin and Farley 1989, p. 82; Tillet and Titera 1988, pp. 48–52) that hospitals provide a Statement of Cash Flows based on Statement of Financial Accounting Standards 95 (FASB 1987). The results of our study point out that cash flows, while necessary, are not sufficient for a proper analysis of hospital financial statements. The results of our study showed that working capital flow and cash flow may be two independent dimensions of asset flow measurements. Therefore, in order to provide comprehensive information to the financial statement user, the accounting profession should strive to report working capital flow as well as cash flow measures.

Certain limitations of our study and suggestions for further research must be discussed. Despite efforts to ensure that all hospitals included in this study possess similar characteristics, a large degree of diversity still exists even in the not-for-profit hospital sector. Each hospital's mix of specialties and patients may differ depending on their geographic location and philosophy. These differences may not be directly observable from hospital financial statements alone. Sherman (1986, p. 527) best summarized the issue:

> Fair comparisons of hospitals require careful disaggregation of cost differences due to the volume and mix of health care services provided.

While audited financial statements constitute the major source of information for external parties, they only convey a limited amount of information about the hospitals. Nevertheless, analysis of financial ratios taken from the statements could serve as a starting point to more in-depth evaluations based on internal financial information.

Moreover, the financial statements used in our study were all taken from hospitals in Indiana. An inherent limitation of a study based on data from one state is that the population centers and age of the population served may be peculiar only to that state and may not be generalizable to the rest of the nation. Although hospital characteristics in Indiana may not differ significantly from hospitals in other states, it is important to replicate the results of this study using hospital samples from other states as well.

This study covered a period of only five years, during which hospitals were going through major changes in the reimbursement environment. However, the prospective payment system began in 1983 and may not have reached its full potential with respect to health care cost containment by 1987. Therefore, hospital financial performance will very likely continue to be in a transitory state. Our study can only be considered exploratory in nature. In order to analyze the long-term patterns of hospital financial ratio categories, future studies should extend the study periods to well beyond 1987.

Finally, our study focused only on financial ratios as indicators of performance. A noticeable shift in ratio patterns was found beginning in 1984 and

ending in 1986. Such a shift seems to indicate a significant difference between hospital financial performance during that period (1984–1986) compared to other years (1983 and 1987). Examining whether there were significant changes in hospital management philosophy and strategy before and after the prospective payment system is beyond the scope of our study, but would be an interesting focus for another study.

We would like to thank the two anonymous reviewers for their helpful comments and suggestions. The generous support of the Indiana State Board of Health and the hard work of Rob Myers are gratefully appreciated.

References

Accounting Principles Board (APB). 1971 *Accounting Principles Board Opinion No. 19: Reporting Changes in Financial Position*. New York: American Institute of Certified Public Accountants.

American Hospital Association (AHA). 1990. *AHA Guide to the Health Care Field*. Chicago: AHA.

American Institute of Certified Public Accountants (AICPA). Accounting Standards Executive Committee. Not-For-Profit Organizations Task Force. 1988. *Display in the Financial Statements of Not-For-Profit Organizations*. New York: AICPA.

Chen, K. H. and Shimerda, T. A. Spring 1981. An empirical analysis of useful financial ratios. *Financial Management* 10(1):51–60.

Cleverly, W. O. 1987. *FAS-Plus User's Guide: Financial Analysis Service*. Westchester, IL: Healthcare Financial Management Association.

Counte, M. A., Glandon, G. L., and Holloman, K. November 1988. Using ratios to measure hospital financial performance: Can the process be simplified? *Health Services Management Research* 1(3):173–180.

Ernst & Whinney. 1983. *The Medicare Prospective Payment System: Implementing Regulations—Their Implications for Hospitals*. E&W Publication Number J58475. Cleveland: Ernst & Whinney.

Financial Accounting Standards Board (FASB). 1987. *Statement of Financial Accounting Standards No. 95: Statement of Cash Flows*. Stamford, CT: FASB.

Gombola, M. J. and Ketz, J. E. January 1983. A note on cash flow and classification patterns of financial ratios. *The Accounting Review* 58(1): 105–114.

Heinzeller, M., Kramer, L. J., Fennessy, J. J, and Dabrowski, P. C. 1982. Financial statements. In *Handbook of Health Care Accounting and Finance* (W. O. Cleverly, ed.) Rockville, MD: Aspen Systems Corporation, pp. 21–47.

Indiana State Board of Health (ISBH). 1988. *Directory*. Indianapolis, IN: ISBH.

Kleinbaum, D. G. and Kupper, L. L. 1978. *Applied Regression Analysis and Other Multivariable Methods*. North Scituate, MA: Duxbury Press.

Kleiner, R. G., Garner, M., and Colbert, R. G. September 1989. A Preview of the New Healthcare Audit Guide. *Journal of Accountancy* 168(3):32–44.

McLaughlin, J. K. and Farley, A. April 1989. The changing landscape of not-for profit financial reporting. *Journal of Accountancy* 167(4):77–85.

National center for Health Statistics. March 1989. *Health, United States, 1988.* Department of Health and Human Services Publication Number (PHS) 89-1232. Public Health Service. Washington, D.C.: U.S. Government Printing Office.

Pinches, G. E., Mingo, K. A., and Caruthers, J. K. May 1973. The stability of financial patterns in industrial organizations. *The Journal of Finance* 28(2): 389-396.

Pinches, G. E., Eubank, A. A., Mingo, K. A., and Caruthers, J. K. October 1975. The hierarchical classification of financial ratios. *Journal of Business Research* 3(4): 295-310.

Sherman, H. D. July 1986. Interpreting hospital performance with financial statement analysis. *The Accounting Review* 61(3):526-550.

Smith, H. L. and Fottler, M. D. 1985. *Prospective Payment: Managing for Operational Effectiveness.* Rockville, MD: Aspen Systems Corporation.

SPSS-X User's Guide, 3rd Edition. 1988. *Chicago: SPSS Inc.*

Tillett, J.W. and Titera, W.R. February 1988. AICPA considers changes to hospital audit guide. *Healthcare Financial Management* 42(2):48-58.