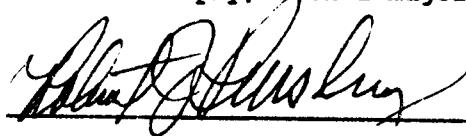


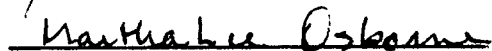
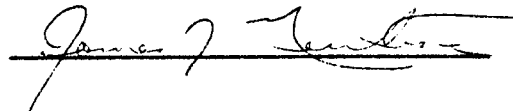
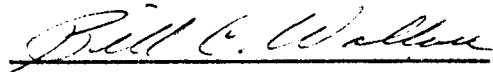
To the Graduate Council:

I am submitting herewith a dissertation written by Lorraine Bem, entitled "An Analysis of Profit Ratios of Maryland Hospitals: 1970-1988." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Education.



Robert J. Pursley, Major Professor

We have read this dissertation
and recommend its acceptance:



Accepted for the Council:



Associate Vice Chancellor and
Dean of The Graduate School

AN ANALYSIS OF PROFIT RATIOS
OF MARYLAND HOSPITALS:
1970-1988

A Dissertation
Presented for The
Doctor of Education
Degree

The University of Tennessee, Knoxville

Lorraine Bem
December 1989

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DEDICATION

This dissertation is dedicated to Lila Hurt for her unfailing encouragement of my educational endeavors.

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ABSTRACT

In recent years the financing of health care has changed drastically. The American health care industry spends at least 50 percent more than other developed countries. Thus, health planning has become of paramount importance as expectations and costs continue to soar. Higher levels of indigent care, lower Medicare rates, and higher nursing salaries contribute to the increased costs. Exploration of reimbursement incentives and competition is occurring as institutions attempt to initiate cost containment behaviors.

Prospective payment systems (PPS) were developed to provide a means of addressing the exorbitant increases in health care spending. Rates are set in advance and may not be adjusted by the provider to cover actual costs. There are several types of PPSs; each promotes efficiency but by different means.

The Maryland rate-setting system is an all-payer system which was one of the first mandatory state-level hospital review programs in the nation. The Maryland PPS uses a quasi-utility approach to regulate hospital costs. Its rate-setting and planning functions are located in independent commissions. Rates are adjusted for inflation, volume changes, and pass through costs. The purpose of the study was to determine whether the Maryland rate-setting system resulted in a gain or loss of hospital profitability.

Five profitability ratios were explored using repeated measures. Three two-year periods were selected to examine the impact of the cost based reimbursement system as well as the early and late effects of

the Maryland PPS. A sample of 40 hospitals was selected. Subgroups were constructed using geographic location and number of beds. The study showed profitability ratios were lower than industry standards under cost-based reimbursement and rate-setting. Prolonged low profitability ratios indicates poor financial viability.

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CHAPTER I

OVERVIEW

I. INTRODUCTION

The financing of health care has changed dramatically over the past 50 years. Health care was first viewed as a privilege for the affluent, later as a right for all with no expense spared, and now in the 1980's as a right for all, but with the grim realization that resources are finite (Allison, 1983; Fuchs, 1980; Sweeney & D'Itri, 1985). At the same time, the responsibility for health care financing has shifted from total personal responsibility to a variety of aggregate financing systems (Levit, 1982; McMahon, 1982; Silvers, Zelman, & Kahn, 1983).

Unfortunately, early financial health-system planning was haphazard in the U.S. and has resulted in rapidly escalating health care costs. In 1935 health care costs in this country were \$2.9 billion and amounted to four percent of the Gross National Product (GNP) (National Center for Health Statistics, 1983). By 1986 expenditures were 10.9 percent of the GNP, totalling \$458 billion (Division of National Cost Estimates, 1987; Morgan & Koppel, 1985; National Center for Health Statistics, 1986; Waldo, Levit & Lazenby, 1986). Today health care expenditures account for over \$500 billion

and amount to 11.1 percent of the GNP (Health Care Spending, 1988, December 5; Owen, 1989; Rosenberg, 1989). The American health care industry spends at least 50 percent more than other developed countries and double that of Japan (Hertzinger, 1989). This continued escalation has lead to a prolonged scrutiny of health care cost containment and health care payment systems. Even third party payers are becoming increasingly unwilling to pay the entire bill (Fuchs, 1986; Leavitt & Numbers, 1985; Levit, 1985).

Hospital Expenditures

Hospital expenditures were restrained in rate-setting states; however, many non-rate-setting states also experienced low growth rates during the same period (Finkler, M.D. 1987). Medicare hospital costs were reduced somewhat by the Prospective Payment System (PPS); however, health care expenditures are still increasing (Effects of PPS, 1989, February 17; Feder, Hadley, & Zuckerman, 1987; Freedland & Schendler, 1984). While the Consumer Price Index (CPI) in 1988 remained at 4.4 percent, medical care costs expanded by 6.9 percent, hospital room charges mushroomed 10.4 percent, and other hospital costs swelled 12.7 percent (Effects of PPS, 1989, February 17; Medicare Margins Down, 1988, December 19; Tokarski, 1989).

Total health care expenditures are expected to increase 10.7 percent in 1989 to \$618.4 billion (Kimball, 1989). Hospital care is projected to rise 10.4 percent to \$238.7 billion. Physician care is expected to mount by 13 percent to \$127.6 billion. Nursing-home care is expected to expand by 11.4 percent to \$48.8 billion (Health Care

Spending, 1988 December 5; Health System Change, 1989, February 20).

It is anticipated that equipment costs will increase 7.6 percent to \$8.3 billion (Appleby, 1989). These increases are attributed to higher levels of indigent care, lower Medicare payment rates, and higher nursing salaries (Business Facts 1989, January 23; Effects of PPS 1989, February 17).

Hospital rates will be increased to cover a 6.5 percent rise in the labor component of the established rates. The estimated worth of this increase to hospitals is \$181 million. Nursing salary increases will cost \$153 million. Health care costs are predicted to double every six years in the U.S. if there is little or no change in the present health care system (Leavitt & Numbers, 1985).

Many changes are occurring in health care; for health care in the 1980 is a time to promote competition and transform reimbursement incentives (Latham, 1983; Rakich, Longest, & Darr, 1985). Hospital costs are a major part of health care expenditures. Alternative health care delivery systems are being developed as institutions are initiating cost containment behaviors (Eastbaugh & Eastbaugh, 1986; Hospital-room Increases, 1988, December 5; Report Details Ways, 1988) In the mid-1960's, hospital costs rose rapidly from the absence of cost-containment plans, retrospective billing, and unilateral costs established by individual institutions (Crawford & Fottler, 1985; Dowling, 1976). Hospital industries consume the largest portion of the health care dollar (National Center for Health Statistics, 1986). In 1977, 42 percent of the \$68 billion total health care expenditure was

spent on hospital care (Jacobs, 1980). By 1985 hospital expenditures had jumped to \$167 billion (Waldo et al., 1986).

Financial Viability

Historically, the financial viability of many hospitals has been in question; as many as 25 percent operated at a deficit during cost-based reimbursement. Data on hospital closures are difficult to analyze since there is no standard format used to indicate the reason for closure; often outdated facilities are grouped with those institutions experiencing financial instability (Rosenstein, 1986). Estimates show that over 400 hospitals have closed since 1980. Eighty-one hospitals closed in 28 states in 1988; there were no closings in Maryland (Record Hospital Closure, 1989, January 27).

Small community hospitals experience more unrestrained cost increases caused by low occupancy than do the large, more complex hospitals. Therefore, small community hospitals receive more revenue under the PPS than under the previous cost-based reimbursement system (Ready, 1989). Unfortunately, hundreds of rural hospitals and inner-city hospitals, which are the sole or major source of patient care, remain in financial distress (Eastbaugh & Eastbaugh, 1986; Hospitals See Drop, 1989, February 3; McCarthy, 1989, April 24). Rural hospital payment reform is being proposed in several U.S. House of Representative and Senate bills (Bentsen Dole Propose Rural Pay Reform 1989, January 30; ProPac Recommendations for 1990, 1989, February 3; Proposed Rules, 1989, February 9; Rural reform, 1989). PPS

adequacy and equity are imperative for the survival of rural hospitals (PPS Equity Crucial, 1989, February 27).

The inner-city hospital also deserves some consideration, as costs are significantly higher even after controlling for case mix, higher wage levels, and teaching activity (ProPac on Big City Hospitals, 1989, January 13). The Prospective Payment Assessment Commission (ProPAC) has recommended that Congress continue to raise Medicare rates for large, inner city hospitals faster than for small inner city institutions (ProPac on Big City Hospitals, 1989, January 13).

Sources of Revenue

Over 90 percent of hospital revenue comes from third-party payers which include insurance companies, the government and employers (McMahon, 1982). About 39 percent of the U.S. medical dollar goes to hospitals, and inpatient services constitute 80-95 percent of hospital revenue (Rosenstein, 1986). However, most hospitals generate about 40 percent of their revenues from Medicare patients, and even though the number of Medicare-eligible patients increases every year, Medicare margins decrease each year (Manheim & Friedman, 1982). Statistics show that the number of people 65 years and over will double by the year 2000. Hospitals are pressured to cut the growth rate in per-case costs to 1.3 percent above inflation. If per-case costs are reduced and the same reimbursement rate is maintained, hospital financial performance may improve (Glandon, Counte, Holloman, & Kowalczyk, 1987; Medicare Margins Down, 1988, December 19; Medicare Margins Fall, 1989; Wzsewianski, Thomas, & Friedman, 1987).

Historically, hospital financial management has directed its efforts not to cost-containment issues, but to maximizing the utilization of services or expansion of services (Rosenstein, 1986). Since attention has been crisis oriented, focusing on individual components rather than coordinating functions, there is a definite need to assess the financial aspects of hospital management.

Expenditure growth has been associated with gains in accessibility and the success of health care (McMahon, 1982). Exploration of effective tools to contain health care costs has led to the development of hospital-focused prospective rate-setting systems (Berman & Weeks, 1982). Now the role of the hospital in American health care is being transformed (Kotelchuck, 1986a), and hospital costs are being carefully scrutinized. Certain hospitals will perish if they do not cut losses and maximize their profit.

PPSs Curb Expenditures

PPSs were developed to cope with the great increase in health care expenditures that began in the mid-1960's. PPSs provide incentives to reduce costs by externally establishing prices for specific services in advance. Providers are not free to adjust rates; they are not reimbursed the actual costs incurred in delivering services; and the provider may not adjust charges to cover costs. This action results in a restraint on revenue, since the providers must contain their costs. PPSs also reverse the incentives by which hospitals have historically been managed (Coelen & Sullivan, 1981; Young, 1986).

Under prospective payment an external authority has the final decision regarding rates (Dowling, 1976). Review and approval processes are mandatory for providers to set or change rates. As a result, market incentives are introduced into the private sector via this price-fixed payment system. If costs are below designated prices, a profit is realized--if not, a loss is incurred. The PPS is not compatible with historical case mix, staffing trends, length of stay, and a range of cost influencing features (Crawford & Fottler, 1985).

There are several kinds of PPSs. Some systems focus on a per-unit cost to promote efficiency and productivity, while other aggregate PPSs target hospital costs to emphasize efficiency and utilization. Another type of aggregate system concentrates on efficiency utilization and services. The PPS recognizes the need to preserve the hospital's ability to provide quality care and maintain financial viability.

Roughly 17 states have some form of PPS other than the federally mandated Diagnostic Related Groups, but none of them are identical. Commonalities of the PPS include recognition of inefficiencies as a direct expense and efficiencies as a source of capital. The PPS does not guarantee a drop in costs because hospitals can institute a variety of strategies without addressing the inefficiencies present.

1990 Recommendations

Based on a projected inflation rate of 5.7 percent, ProPAC is recommending 1990 DRG price updates of 5.0 percent for large urban hospitals, 4.5 percent for other urban facilities, and 5.6 percent for rural hospitals. In the past, Congress used ProPAC recommendations as

upper limits for establishing payment schedules (ProPac: Give Hospital, 1989, February 6; ProPac Recommends, 1989, February 3). However, the present administration plans a \$5 million cut. By cutting payments for capital improvements and medical education, the hospital system will be pressured to improve its efficiency (Dine, 1989; Reddy, 1989). Future recommendations for reimbursement changes will focus on outlying or excessive costs rather than on elevated lengths of stay (Bibisi, 1989). With these additional cuts, the PPS is projected to save Medicare 20 percent in 1990 (PPS Save, 1989, February 20). This is much higher than pre-PPS estimates.

An early rate review showed moderate cost savings by curbing hospital inflation (Coelen & Yaffe, 1979; Dowling, 1976; Hamilton, Walter, & Lee, 1980; Sloan, 1982). Rate-setting was thought to be best if coordinated with complementary programs, such as program planning or utilization review. Cost-containment strategies were thought to be promoted by the use of external authorities that establish rates (Sloan, 1981b).

Prospective Payment System Characteristics

One form of prospective payment is the all-payer rate-setting system. An all-payer rate-setting system eliminates cost or charge shifting. Charge-shifting occurs when one or more providers are not reimbursed for the true economic costs incurred (Thorpe, 1987). Charge-shifting is thought of as a cost subsidy. The all-payer rate-setting system manages charge-shifting by charging each payer about the same. This is to maintain economic equity within the system. If costs

are truly different, the individual payers must present their expenses and justification to the cost review commission for an exception. One component of the all-payer rate-setting system is to provide equitable distribution of care and improve access to service. Hospitals are not discouraged from providing non-market services under this system.

The most commonly noted characteristic of the system is that payment is determined before the service is received. For example, if a client is admitted to a hospital to have an appendectomy, the hospital is reimbursed at a set rate for the appendectomy. Whether the client leaves the hospital early, late, or on time, it receives the same reimbursement. The obvious incentive here is to curb resource use by discharging the client as early as possible.

Now medical records personnel are responsible for determining payment levels by selecting the most appropriate patient classifications (Shaffer, 1984a). A variety of monitoring tools must be developed to aid in this selection. Patient classifications are very important, as lost revenues may occur if inaccurate or inappropriate patient classifications are made.

The number of days that a patient stays in the hospital is a major determinant of health care costs (Shaffer, 1984b). Hospitals are attempting to reduce the length of stay as a cost-containment mechanism (Kotelchuck, 1986b). However, when patients are discharged early, a lower patient census can result (decreasing volume), and a loss of revenue can occur (Kotelchuck, 1986b). Kotelchuck stated that decreasing volumes result in competition for patients by the

development of alternative care settings as well as a variety of creative and innovative services (Kotelchuck, 1986b).

As a result of PPS, certain outpatient procedures are becoming more prevalent. After some trend analysis, ProPac has predicted that these services will become losers under the present system and has recommended a blended payment system to address potential financial problems (Ambulatory Surgery, 1989, January 20).

Forecasting the financial impact of new hospital services is essential to maintain the delicate balance of financial viability. New health care programs might include chemical abuse, psychiatric care, rehabilitation and long-term care, and aggressive marketing techniques that could include contracting for off-site programs.

Prospective payment forces hospitals to maintain the quality of care at a lower cost (Kotelchuck, 1986a). By evaluating the appropriateness of patient services and justifying the cost-benefit of purchasing new technology, hospitals can adapt to controlling health care costs via the PPSs. Improvements in the PPS may preserve access, quality of care, efficiency, and a balance of service line (Eastbaugh & Eastbaugh, 1986).

PPSs can use case-mix statistics to determine reimbursement limits. Reimbursement is now determined on a case-by-case fixed fee-for-service reimbursement mechanism. The law stipulates that hospitals must accept the PPS-based amount as payment in full for the service provided. This results in across-the-board reduction in total Medicare reimbursements for all hospitals bound by the Tax Equity and Fiscal Responsibility Act of 1983 (TEFRA) (Sloan & Valvona, 1986). The

PPS reshuffled the health care dollars and established a precedent. As other third-party payers adopt similar prospective payment systems, an extensive impact on the national health care delivery system is probable (Sweeney & D'Itri, 1985). However, this may result in lower standards of care for some patient groups as financial incentives for reduced hospital resources are implemented (Sweeney & D'Itri, 1985; Young, 1986). The health care objective of the future may be to provide adequate care within the financial limits (Muringen, 1982).

Hospitals need to determine profitable diagnoses and establish strong market strategies to maintain and increase these product lines. Services for unprofitable diagnoses may be limited or even discontinued to decrease financial risk and loss (Young, 1986). Several key aspects are essential to insure coping effectively with PPSs. This includes teaching physicians successful management practices, planning and controlling hospital production, effective planning, market protection and expansion, and effective lobbying (Morgan & Koppel, 1985; Teaching Physicians Proposed Rules, 1989).

Challenges for Physicians

The physician is faced with the challenge of learning new effective management behaviors to insure financial viability (Glandon & Morrissey, 1986). Physicians dominate hospital discharge policies and procedures. They are responsible for deciding when a patient will be discharged; therefore, effective discharge management will focus on physicians (Sweeney & D'Itri, 1985). Physicians need to be educated regarding issues such as the importance of choosing patient

classifications to maximize reimbursement, appropriate resource utilization, and the importance of maintaining high occupancy rates. Historically, hospitals and physicians had a symbiotic relationship. With the implementation of PPSs this relationship has been altered by changing revenue centers into cost centers. Hospitals now want to control expenses by limiting costly services and developing markets that generate a profit.

Some analyses of physician PPS charges have been completed. Generally physician PPS charges for surgical admission were more expensive than those for medical admission (Mitchell, 1985), and Medicare spending for physician services has increased 15 percent annually (Mitchell, 1985; Physician Fee, 1988, December 16). Congress required the Secretary of the Department of Health and Human Services submit a feasibility report pertaining to physician PPSs (Culler & Ehrenfried, 1984). A physician PPS would redistribute payments among attending physicians. Proposed rules for physicians in teaching settings have been issued; these rules specify criteria for determining when reimbursement should be based on reasonable costs or on reasonable charges (ProPac recommendations, 1989, February 3; Proposed Rules, 1989, February 9).

Changes as a Result of Prospective Payment Systems Reimbursement

The effects of the PPS constitute a major change in the U.S. health care system (Allen & Wilson, 1985). The reimbursement for PPSs has resulted in a series of changes in financial planning and reporting. Management focus has also been altered by necessity,

resulting in new emphasis based on PPS criteria. New reporting systems have been developed to monitor actual results (Monroe & Grant, 1985).

Organization design and focus are important components in successful financial planning as hospitals strive to plan carefully to control and reduce expenses (Biles, Schramm, & Atkinson, 1980). Cost controls force increased monitoring, better cost analyses, and in the states with the most stringent PPSs there is a prompt adjustment of cost influencing factors (Morrisey & Sloan, 1983).

The unintended consequences of rate regulation are of concern to many. Currently Connecticut, Maine, and New Jersey are re-examining their rate-setting systems. In order to meet its costs, Connecticut has increased its rates 18, 10, and 4 percent, respectively, during the three years that its rate-setting system was in existence (Friedman, 1989). A task force of Connecticut Hospital Association representatives drafted a proposal to repeal the state rate-setting system. It recommended automatic approval of hospital budgets as long as increases were limited to the inflation rate plus two percent (Connecticut, 1989, January 2). After a perusal of the Maine rate-setting system, its commission recommended that \$30 million be set aside to cover the shortfalls of the system (Maine: Health Care, 1988, December 19). Under the present Maine PPS, 65 percent of the hospitals are operating at a deficit (Maine New Rate, 1989, February 13). New Jersey has drastically changed its rate-setting system in order to obtain a satisfactory system (New Jersey Uncompensated Care, 1989; Rosko, 1989; Rosko & Broyles, 1986).

Management will need to become more sophisticated and keep up with changing legislation; hospitals will no longer be able to tolerate inefficiency. Cost-shifting to private payers is likely to cease as prospective payment establishes a one rate system. High levels of insurance coverage will be coupled with a growing intensity in technological services provided. As third-party payers become unwilling to undertake the entire bill, cost-sharing programs will become more common. The PPS appears to have great effects on public programs and third party payers by establishing efficiency incentives. PPSs are changing the delivery of health care (DesHarnais, Kobrinski, Chesney, Long, Ament, & Fleming, 1987).

II. PURPOSE OF THE STUDY

The purpose of the study was to determine whether the Maryland rate-setting method of prospective payment systems resulted in a gain or loss of hospital profitability in Maryland hospitals.

III. STATEMENT OF THE PROBLEM

To determine profitability of Maryland hospitals the following questions were addressed:

1. How has the implementation of the Maryland rate-setting system affected the operating margin ratio?

2. How has the implementation of the Maryland rate-setting system affected the return on assets ratio?

3. How has the implementation of the Maryland rate-setting system affected the return on equity ratio?

4. How has the implementation of the Maryland rate-setting system affected the markup ratio?

5. How has the implementation of the Maryland rate-setting system affected the deductible ratio?

IV. NEED FOR THE STUDY

Prospective payment systems have been used for years on a limited basis. Such a system has been implemented since 1977 in Maryland as a cost containment mechanism (Salkever, 1979; Salkever, Steinwachs, & Rupp, 1986). The Maryland rate-setting system controls the average revenue per diagnostic case or department specific average revenue per unit of service, and costs are apportioned to payers by discounting (Esposito, Hupfer, Mason, & Rogler, 1982). An analysis of the PPS's impact on profitability in Maryland has not been done, but data are now being generated about the Maryland PPS experience (Maryland Hospital Association Information Services, Financial Condition Report, 1988; Maryland Hospital Association Information Services, Financial Ratios, 1988). Maryland charge data are more closely related to the cost of providing the services because hospitals must set prices to curtail cross subsidization (Lave, 1985). If rate-setting is not an effective mechanism, the State of Maryland may change its own financial approach

to one more appropriate to its circumstances and specific standards.

Today PPSs are rapidly replacing cost-based health care reimbursement systems. By regulating reimbursement, state hospital rate-setting programs may have a profound influence on hospitals (Worthington, Cromwell, Kamens and Kanak, 1980; Worthington & Piro, 1982). The PPSs constitute a major change in the financing of the U.S. health care system, and the time for beginning a detailed analysis to draw conclusions about the early effects of the system is now.

Since a significant attraction to the prospective payment mechanism has occurred and will continue to gain impact as PPSs become more common, an analysis of the impact of PPSs is needed to understand short- and long-term effects, trends, and appropriate objectives for future planning. There is an increasing demand for health care services, and it is unlikely that a reduction in services will be received favorably. As the population ages, demands for health services will grow.

Health care in the U.S. is big business, and it is presumed that the health care industry will become increasingly competitive. The reimbursement system is likely to become more prospective payment oriented, with other third-party payers adopting such payment mechanisms. This increased orientation to prospective payment will result in a substantial decline in internal cost-shifting. Increased restrictions on all aspects of health care are likely to be the norm, with consumers having service options from which to choose.

Health planning will become more evident in hospitals influenced by rate regulation and cost containment. The rate of inflation for

health care expenditures may remain the same if the amount of resources stabilizes and the demand for technology flourishes. However, Berki (1985) predicted that the population using health services would increase, and the amount of resources would continue to flourish. The enlarged health services sector will use a greater portion of the GNP. The cost of medical care increased at three times the inflation rate (Crawford & Fottler, 1985). Federal officials viewed the 14.2 percent profit margin as too profitable. Prior efforts to cut costs and shrink hospital assets were not acceptable (Eastbaugh & Eastbaugh, 1986). As an aggregate, the health care industry will extend its demands for external supplies of capital. It seems highly plausible that the combination of the above factors will result in decreased health care spending to a degree. The government will continue to support large portions of the national health care expenditures. Since it did not provide incentives to curb costs it is highly improbable that the federal government will return to cost-based reimbursement as a payment mechanism. Competition for revenue-producing clients will become more crucial as will innovative financial planning. It is anticipated that providers will execute major cost revisions based on an analysis of short-term PPS effects and cost-benefit projections. It is probable that certain traditional services that are not money-makers will be curtailed or eliminated.

Private enterprise is often distinguished from public enterprise by its ability to make and preserve capital. Private enterprise is often thought of in terms of profit-making. At present, the government provides or maintains health care services that cannot or will not be

furnished by private enterprise, such as health care services for the indigent. The benefits of PPSs are not proven, and it would be advantageous to identify the effects of such systems for successful health planning. PPS will likely affect resource allocation and effect changes in hospital financing. There will be a need to set rates that preserve the quality of hospital care while maintaining financial viability. Complete and accurate financial data can serve as a useful tool for the hospital manager as well as other agency personnel. Careful analysis of the PPS can provide valuable financial information for future health care planning.

V. ASSUMPTIONS

1. Financial data will be reported in a consistent, accurate and complete way.
2. PPS implementation will be uniform among the selected hospitals.

VI. DELIMITATION

The following was considered to be a delimitation of the research problem:

The data collection was limited to three two-year periods within a 19 year period from 1970 to 1988. The years of collection are 1970-71, 1979-80, and 1987-88.

VII. LIMITATION

A limitation of the study was the accuracy of reporting in the data supplied by the Maryland Hospital Association.

VIII. DEFINITIONS

For the purposes of this study the following definitions were adopted:

1. Prospective payments system--refers to a method of externally determining in advance what hospitals can charge for patient care.
2. Profitability measures--refers to variables which are a combination of efficiency and viability measures; revenues in excess of expenses suggest financial health and operational efficiency; return of monies on patient revenues. Excess revenues are the source for working capital.
3. Operating margin--measures profits from operations per dollar of operating revenue.
4. Return on assets--shows the net income or profit generated from existing operating and nonoperating assets.
5. Return on equity--measures net income or profit per dollar of equity invested in assets.
6. Markup--measures the relationship between revenues and expenses from hospital operations; defines the multiple by which rates are set above expenses.

7. Deductible--measures patient charges not collected (i.e., contractual allowances, bad debts, charity care, and courtesy discounts).

Appendix A contains the specific formulas used to construct the ratios for this study.

IX. SUMMARY

In summary, the aim of this research problem was to determine whether the implementation of PPS affected the profitability of Maryland hospitals. Studies of the effect of PPSs have not yet been completed. Other PPS programs have been well studied for several years but in general the effects of PPSs on hospitals are not yet well documented. By obtaining and using PPS information, one can maintain effective health policy goals such as access, quality, and financial viability. This information is essential for policy decisions. The study has been introduced in Chapter I. The purpose and the statement of the problem was described. The need for the study, the basic assumptions, the delimitations, and limitations were described. Terms used in the study were also defined.

Chapter II provides a Review of Literature that includes a description of the history of health care financing. Furthermore, prospective-payment systems and rate-setting are described. The research methods are detailed in Chapter III.

CHAPTER II

REVIEW OF LITERATURE

I. INTRODUCTION

Over the last 50 years health care financing and delivery have changed drastically. Challenges to health care have arisen from rapidly developing technology, longer life spans, increasing consumer demands, and rising health care costs. An early innovation in health care financing was the commercial U.S. health insurance program.

Health insurance is a contractual agreement between an insurer and insuree for the payment of health care costs, with the insuree paying a prepaid premium in return for certain specified benefits (Clemen-Stone, Eigsti, & McGuire, 1987). Health insurance is a form of risk sharing for health care costs. It is often called "third-party payment." One of the first recorded health insurance plans was the Baylor University Plan of 1929 (Clemen-Stone, Eigsti, & McGuire, 1987). This plan was a predecessor to the contemporary Blue Cross Blue Shield health insurance programs that originated in 1939 (Clemen-Stone et al., 1987). Before 1939, health insurance was virtually unknown in the U.S. (McMahon, 1982).

The Wagner Act of 1935 allowed organized unions to collectively bargain to secure employee benefits, including health insurance, and

the Social Security Act of 1935, as amended, provided health-care programs. These initial Social Security Act programs have been expanded over the years. The period of 1940 to the early 1960's saw rapid growth in health care technology, resources, and services. The public experienced increased health care purchasing power and a heightened interest in health care. This increased the demand for health care and resulted in a shortage of health care facilities.

The Hill Burton Act of 1946 helped to deal with shortage of health care facilities in this country by providing financing for hospital and nursing-home renovations and construction. Men and women returning to the civilian sector following military service in World War II expected comprehensive health care benefits like those offered them while in the military (McMahon, 1982) and made demands on the health care system for such services. The increased provision of services established a need for more trained health care professionals. To meet this need, in 1956, the federal government began financial support for education and training of health care personnel (Clemen-Stone et al., 1987). By the early 1960's, many Americans had access to payment for hospital care. By this time hospital insurance coverage had increased to cover 70 percent of all Americans (McMahon, 1982).

Federal Programs

The 1965 enactment of the Social Security Act with its Medicare and Medicaid programs had a phenomenal impact on health spending in the U.S. (Fuchs, 1985). Even early cost projections for these programs were exceeded as the poor, elderly, and disabled now had access to

health care. Today these programs play an increasingly major role in health care financing. In 1979, 28 million people received Medicare benefits, while 23 million received Medicaid. In 1981, 35 percent of hospital payments were by Medicare (McMahon, 1982), and the usage of Medicare is expected to increase dramatically with the extension of the life span. Because of the implementation of Medicare and Medicaid in 1965, the federal government's share of health care expenses had risen from 10.1 to 29.6 percent by 1984 (National Center for Health Statistics, 1985).

The last 50 years have been typified by cost-based reimbursement for health care services. This system lacked incentives for cost-effective practices or penalties for wasteful practices. Health care providers had little reason to provide cost-effective care. At the height of the cost based reimbursement, hospitals obtained 50 percent of the revenues from cost plus payers (Banta, 1982; Ponn and Manning, 1988).

The cost of health care in the U.S. has increased three times faster than the total inflation rate (Crawford & Fottler, 1985). In 1935 health care expenditures in the U.S. accounted for \$2.9 billion (National Center for Health Statistics, 1983); today these expenditures account for spending of more than \$400 billion each year. By the close of 1989 it is expected that \$618.4 billion will be spent on health care (Health Care Spending, 1988, December 5).

Cost-Containment Programs

Rapidly escalating health care expenditures made both the government and private sector aware that cost-containment in health care was needed. However, there was no consensus on how this cost-containment should be accomplished. Suggestions for containing health care costs have included increased federal government regulations, the restructuring of private and governmental financing systems, the development of state rate-setting commissions, federal caps on health care expenses, increased competition in the health care marketplace, and the development of new consumer health care options (Ashby, 1984; Cone & Dranove, 1986; Pearson & Abernathy, 1980).

At present, health insurance companies are developing contracts with providers on a selected basis and are also considering some benefit exclusions to hold down policy costs. There was a consensus in government that the cost inflation of the 1960's could be traced to the absence of cost-containment strategies and the retrospective payment system (Davis, 1986; Dowling, 1976; Fanara & Greenberg, 1985; McMahon, 1982). Therefore, the government explored prospective payment systems as a method of controlling health care costs by a restraint-incentive system.

One effort to slow or stop rising health care costs included the Economic Stabilization Program (ESP) (1971-1974) of the Nixon administration (McMahon, 1982). This program influenced health care costs based on the theory that inflation in the economy drives up the unit cost of goods and services purchased for health care. ESP limited

charges for a limited time; after ESP ended, hospital expenses again began to climb.

In 1977 President Carter introduced a hospital cost-containment bill to control rising hospital costs, but Congress did not pass it. The Carter Administration and groups associated with the hospital industry formed the Voluntary Effort (VE) and set voluntary goals for limiting increases in hospital costs. However, hospital industry performance did not meet the goals set, and problems still existed in controlling costs.

The Social Security Act Amendment of 1982, Tax Equity and Fiscal Responsibility Act (TEFRA) (PL 97-248), mandated many cuts in health care spending in the U.S. The Act set forth a system of prospective payment for Medicare services, called Diagnosis Related Groups (DRG's) (Clemen-Stone et al., 1987). The Social Security Act Amendments of 1983 (PL 98-21) established a prospective-payment plan for hospital reimbursement under Medicare (Clemen-Stone et al., 1987). The Deficit Reduction Act of 1984 (PL 98-369), another amendment to the Social Security Act, set additional restrictions on Medicare reimbursement in an attempt to contain costs.

Prospective Payment Systems (PPS)

Prospective hospital payment as a method of cost-containment reform appears to be a promising way to control escalating health care costs. It involves payment of a predetermined cost for a specific health care activity and is an alternative to the traditional cost-based health care reimbursement system. This cost-containment

strategy empowers an external agency to establish health care service charges. Rates are predetermined by the external authority and cannot be changed without a review and approval process.

The PPS generates incentives for efficiency in the provision and utilization of health care services. Other than the federal DRG system, more than 35 prospective-payment systems exist in the U.S., but the effectiveness of these systems has not been studied (Cromwell, 1987; Dowling, 1976). The theoretical idea of adhering to budgeted costs, as set forth in a PPS system, is logical but difficult to implement and places providers at risk for financial losses (Dowling, 1976).

Physicians and hospital administrators are greatly concerned about the change in the hospital reimbursement system. They have had great financial success with the cost-based, retrospective payment system. Retrospective payment permitted the provider to set or increase charges at will and generate revenues to surpass actual costs. With a PPS, per-case rates or specific-service rates are set by cost review commissions to be just high enough to cover costs and provide an agreed-upon operating margin. The commission sets rates in advance of the prospective year. Physicians and hospitals are not overly optimistic about the DRG reimbursement system nor strong advocates of it, and they are both powerful political forces to overcome.

Another major concern is the failure of the DRG system to include a range of clinical severity for patients within a given DRG. DRG's omit the clinical differences between patients and their differing

intensities of resource consumption. It is thought that this omission affects accurate measurement of patient resource consumption.

Since rates are set as a result of budget review, providers now must give cost more weight in planning and decision-making to accurately budget and justify needs. Under cost-based reimbursement, there was no need to worry about the impact of actual costs. Today financial forecasting skills must be developed to reflect actual costs associated with new programs.

Program evaluation and capital studies are necessary to justify rate increases or develop new patient services. This serves to define appropriate targets for cost-reduction, but exact comparison among hospitals is often an object of controversy (Edwards, 1981). Patient utilization information on the service population of a hospital could lead to selective action to control services offered while restructuring programs and costs.

Some studies have focused on shared support and ancillary services. Eighty-four percent of community hospitals participated in some form of shared services (Bennett & Ahrendt, 1981; Cromwell, 1982). Prospective-payment systems will limit funds available to develop new services to such facilities (Baxter, 1981). Services must be closely supervised to maintain efficiency. The revenue implication of everything from productivity and purchasing to the case mix of patients must be considered. A conventional break-even model used to analyze financial incentives of the PPS would theoretically suggest total revenue and would increase by direct proportion to volume. Under PPSs, hospital budgets are reviewed for accuracy. Hospitals could earn

surplus monies above the preestablished rate. Surpluses could enable hospitals to expand or modernize. A penalty would be imposed for exceeding costs under the PPS.

The basis of payment under PPS affects the incentives established by the pay units. Influencing factors include cases treated, case mix, length of stay, intensity of services, scope of service, amenity level, quality level, efficiency, input prices, investment in resources, and teaching programs (Dowling, 1976). It has been hypothesized that cost-efficient hospitals will have an easier transition under the PPS than inefficient hospitals (Dowling, 1976). Continued efficiency would enable expansions, while inefficiencies would be penalized continually until hospitals became more efficient.

Selective admissions of low resource consuming diagnoses (i.e. less seriously ill patients) and early discharge to alternative health care sites are possible ways of controlling costs. Outpatient services is another alternative. Delays in adding services or lowering the amenity level, quality level, and intensity of service could also occur. Efficiency can be improved by shifting toward less costly patients and increasing input productivity to target profitable diagnoses.

Programs to boost human resources could also be curtailed, although this could result in increased expenses from new employee orientation. Teaching programs would be discouraged because case mix, intensity of services, and scope of services could increase as a result. PPSs would limit increases in quantity and cost per unit.

Selection of the payment unit influences how the hospital budget may be affected. The tightness of the prospective rate would be very influential. If rates were very stringent, hospitals would be forced to maintain extreme measures to decrease financial risks. Rewards and risks experienced would affect the institution. The present hospital state of operation, including physician rate-setting behaviors, would be influenced by PPS.

Classifications of PPSs

Most of the existing PPSs are unique with only the common goal of cost containment; however, the method used to contain costs varies (Rate Review, 1980). The first PPS programs concentrated on individual hospital budget revenues. Most were voluntarily relying on peer-hospital pressures. These early programs focused on excessive changes in budgets and reports were not geared for comparative analysis. Therefore, the analysis centered on the cost trends within the individual hospital.

The next group of PPSs implemented focused on promoting efficiency by holding per-diem rates in line with inflation without requiring budgets to be submitted. Formulas were used to calculate prices by audited costs. Comparison groups were formed from these data reports and economic change indices were constructed.

Another subgroup of PPSs target improvement of hospital productivity. Comparative analysis of costs and budgets is a primary activity and direct costs per unit of service is the main focus. More detailed information is obtained from uniform accounting procedures.

Each hospital adds to its own set of schedules to justify expenses and needs.

Other kinds of PPSs use a wider variety of criteria, including management efficiency to examine direct costs by cost centers, while others still look at total expenditures. Trends of the financial status of hospitals are closely monitored in a variety of ways. Most methods attempt to consider future health-service needs and thus request a capital budget for a several-year period. A variety of supportive documents may be submitted by the institutions. Primary methods to curb escalating costs include reducing excess bed capacity and unnecessary duplication of services.

Prospective payment for physician services encourages the physician to cut back on marginal procedures (Mitchell, 1985). Data forecasting, the probable impact of services, or termination of services require detailed analyses and sound information.

Most rate-setting programs adapted to the data that were available when they were developed. Most of the data forms used by rate-setting programs are a modification of Medicare case reporting forms or similar cost reports. This occurred for several reasons. The time from the passage of the rate-setting legislation until its implementation was usually limited to a period of months. Furthermore, good models were not readily available, and in existing models the level of detail was not immediately identified as being more precise than prior cost reporting.

The hospital industry is diverse, and a wide range of traits are readily encountered. In order to homogeneously classify hospitals, one

must consider carefully the variables depicting the predominant characteristics of the hospital and the economic environment in which its function must be made.

Economic indices illustrate national trends, not local events. Some hospitals object to the use of such indices because they are crude. Some areas, such as New York, have elaborate indices that are continually being refined. Massachusetts had an index which could be individually applied to each hospital to weigh the distribution of cost according to the historical amounts.

Data for each PPS are constantly evaluated and modified in an attempt to provide significant statistics and reflect needs appropriately. Objective standards of hospital efficiency are desirable from a rate-setting viewpoint, just as each hospital wants its individuality to be recognized.

PPS reimbursement is expected to change the relationships among the hospital, patient, physician, and third-party payer. The financial solvency of the hospital will be determined by the medical management of patients. Efficiency will be a primary goal; therefore, patient care strategies will need to be analyzed to determine the relationship of PPSs and the financial viability of hospitals. Inefficient medical management will result in hospital losses (Nickeson, 1985). If patient care is deficient, the hospital is under financial pressure under PPS reimbursement to take corrective action. Omission of necessary tests would result in preventable patient complications. Outpatient testing is a possible solution. Although proposed guidelines were issued, the

physician PPSs are not mandated, so there is no pressure to omit necessary tests.

Under the PPS, hospitals and physicians will not be rewarded for inefficient patient management (Sloan, 1981a; Wzsewianski, Thomas, & Freidman, 1987). Many alterations in behavior and practices are imperative, but attitudinal changes must precede them. Continuous analysis, evaluation, and forecasting to link analysis with financial rewards will have a major impact.

Prospective payment is based on the merging of clinical and financial data; therefore, new, sophisticated information systems are crucial. Different kinds of reports are indispensable for effective financial monitoring, utilization review, marketing, and product planning. The use of computers can improve reporting capabilities. In fact, computers have made the DRG system possible because they reduce the interval between the collection of data and its availability for management's use. The development and implementation of information systems can have far reaching effects on the four management functions: planning, organizing, directing/motivating, and controlling.

According to Crawford and Fottler (1985), it is likely that prospective payment system methods will be used by other third-party insurers. If this happens the impact could be monumental. Probable consequences include increased competition among hospitals; more specialization of services; and a proliferation of regulatory legislation that imposes more guidelines. The influence of people in the medical-care process is unclear. It is likely that professional influences will occur, because patient care must be coordinated with

costs. Market constraints will increase. The power and influence of third-party payers will flourish. Specific goals and objectives will be forecast for services; it is expected that they will also be continually analyzed, evaluated, and changed to maintain appropriate planning resource inputs, and risk avoidance. Planning strategies will be very detailed and based on the provision of profitable services. Traditional expectations regarding the provision of inpatient hospital services and employee staffing will diminish as alternate methods of delivering health care become more common.

Rate-Setting

The goal of rate-setting is to establish fair but stringent rates. The particular rate-setting method used affects the hospital's incentives. A variety of factors are taken into account in attempting to set rates (Eby & Cohodes, 1985; Lemer, & Willman, 1974). The two more common ways to set rates are: (a) budget review to determine the fairness of the prospective year's costs; and (b) projection using the past year's budget and some economic indices, normative standards, and peer-group costs. Negotiation is often one of the last steps in the process.

Formulas may include almost any rule-like method for defining acceptable parameters for costs or directly establishing rates. Formulas use economic indices, coefficients derived from statistically estimated costs, or arbitrary cost functions and peer-group trends (Dowling, 1976). Formulas are used to define or translate costs and limits. Once a formula is applied, it is followed by a detailed

review. The formula method of rate-setting may be less costly as it provides an opportunity to identify questionable situations for close scrutiny while arbitrarily handling the simple aspects of rate-setting.

The characteristics chosen to group similar hospitals for comparison must be able to accurately identify similar hospitals (Schramm, Renn, & Biles, 1986). Common cost-influencing characteristics include ownership, size, scope of services, outpatient programs, and teaching programs. The equity of the prospective rate-setting system depends on the techniques and characteristics used to group hospitals. If hospitals treating the same complexity of case mixes were grouped together, rates based on a peer-group means would be appropriate. In this instance outlying expenses would be indicative of inefficient operations.

Projection methods using the past year's budget to forecast the prospective year employ some base such as normative standards, economic indices, or group means. However, there is not a real cost-containment incentive under this method, and changes in services are not recognized immediately. A positive aspect of this method is that individual differences between hospitals are noted. Therefore, the rate-setting methodology recognizes changes over time and attempts to introduce incentives with the possible addition of diagnostic-specific case rates. Prospective rate-setting can encourage hospitals to improve efficiency, decide what type of cases to treat, and make cost effective decisions regarding duplication of services. Not adjusting rates immediately places additional pressure on hospitals to behave

proactively. Hospitals are motivated to spend up to their projected rates. Decreasing spending results in lower rates and lower revenues. A possible answer is basing hospital rates on peer-group performance.

Rate-setting in concert with other controls can be very cost beneficial. Rate-setting entities progressing toward the goal of cost-containment encourage better financially managed practices, appropriate resource utilization, monitoring of expansions according to patient needs, and the curtailment of total expenditures.

Only a few states have review commissions empowered to regulate health care costs. Most of these were implemented in the mid-1970's. Recent studies have found that state cost review commissions have had a significant effect on rate increases. States with rate-setting programs monitored by such commissions averaged fewer increases than states without such programs (Averill, 1985; Biles et al., 1980; Grimaldi & Micheletti, 1985; Smith & Fottler, 1985).

Budget Review Methods

Budget review methods are sensitive to differences among hospitals. Unfortunately, they are also more time consuming and expensive than other methods. Under this method, a review agency examines each hospital and recognizes each cost influencing factor. Each side defends its position and is free to question the other. However, this method permits the review agency maximum opportunity to influence specific hospital plans. Rate-setting agencies can get very involved, requiring an expertise that may not be present. Focusing on appropriate case data permits hospitals to identify problems. Another

process, targeting only outlying budgets for scrutiny, is a possibility in fair budget review. The level of detail of review varies. Time, effort, and data requirements are considerations. Usually the budget review procedures demand uniform financial reporting so that very fine comparisons can be made. A sophisticated, well-trained staff is required for budget review.

A compliance-review process based on a cost-review model may be used in order to ensure that rates are not excessive. With per-case, per-day, and per-specific services, hospitals tend to increase volume to buffer operating margins. With the review process, volume and rates are monitored. The review process promotes recognition and rewards for the efficiently managed hospital. Careful attention to operating margins is necessary even when the review agency has thoroughly scrutinized each hospital to determine the nature of surpluses and to reward appropriately for them. Costs are given more attention in the budgeting process. Fundamentals in budgeting, cost-funding, and control are the results as managers must identify the problems and attempt to solve them.

Early budget reviews of PPSs showed ambiguous results after some refinement in the various systems. An analysis of the principles of prospective payment is very complex. Most hospitals need a growth and development component—excess of revenue over expenses—to replace or modernize facilities. It takes a long time to build up sufficient monies to do this. A goal of the PPS is to curb expenses; also the long-term effects, if unaltered, could decrease the financial viability. To counteract this problem, long-range planning is

essential. Debt is usually the common method of financing new services and facilities. The PPS must be appropriately designed to accommodate debt financing. With rate-setting all third-party payers must agree to the rates before implementation. Data for budget reviews may include various financial statements, scope of services statements, case complexity and mix, planning data of the individual hospital, and economic indicators.

II. MARYLAND RATE-SETTING SYSTEM

History of the Prospective Payment System of Maryland

A Maryland commission to study methods of curbing hospital costs was formed in 1964 before passage of the Medicare and Medicaid legislation (Consumers Guide to Maryland Hospitals, 1986). The first bill for rate control in the Maryland hospital industry was introduced by a commission member in 1967. Although a variety of legislation was submitted annually, it took four years to get a rate regulation law passed (Maryland Health Services Cost Review Commission, 1986). Fifty percent of the budget for the Council of Maryland Hospitals was provided by Blue Cross; therefore, in an attempt to maintain its differential Blue Cross mobilized an impressive lobby against the bill (Maryland Health Services Cost Review, 1983; Worthington, 1982). The rate regulation bill would have spread the bad debts among all third party payers and thus, enable other commercial insurers to compete with Blue Cross on a price basis. Prior to rate control, Blue Cross paid an

average of 86 to 90 percent of charges and refused to recognize charity care or bad debt.

In 1970 the Maryland Hospital Association was reorganized to make hospital trustees the constituent members; formerly, it was composed of hospital administrators. Trustees were perceived as having a broad perspective while administrators would focus only on their institutions.

By 1971 the economic environment of hospitals had degenerated. This decline made hospitals more receptive to consider utility rate regulation (Kinney, 1987). The Baltimore metropolitan hospitals had a poor financial status because of disproportionate amounts of charity care and bad debt. Increased state regulation was considered preferable to the anticipated federal control. Other hospital associations lobbied for independent commission formats rather than those organized within the executive department of a state government in the belief that there would be more opportunities to exert influence.

Health Services Cost Review Commission

The Maryland Health Services Cost Revenue Commission was created as an independent statutory commission in 1971 (Kinney, 1987; Maryland Health Services Cost Review Commission Report, 1983). It took three years to establish the rules and policies the Commission would follow in setting rates. The law mandated that the Governor appoint seven commission members 'who have an interest in health care' to serve staggered four-year terms. Appointees were limited to two consecutive

terms. All commissioners were appointed by September 1971. This commission performed the rate-setting function with minimal supervision and coordination by the State Health Department. Only three members could be affiliated with the hospital industry; the other four members were consumers. Although hospital management and policy makers were supposed to be excluded from membership, a hospital administrator was appointed to lend credibility (Worthington, 1982).

The commission has a staff of about twenty-five. Included are an attorney, an economist, and a number of mathematicians and computer engineers. The staff is divided into Administrative, Institutional Analysis, and Methodology Development sections. The Administration Section is responsible for general administrative duties and maintains an advisory relationship with external parties. Individual service rates are recommended by the Institutional-Analysis Section which also monitors hospital activities. The Methodology-Development Section maintains the data bases and conducts research on rate-setting methods.

Commission Responsibilities

Commission responsibilities include three primary areas. The first duty focuses on determining reasonable costs of services. To expedite the Commission's inspection of costs and enable it to set appropriate rates, each hospital is required to disclose its financial position. This requirement was effective with the passage of the law and provided the Commission with a data base to begin to construct its rate-control system. A need for uniform accounting was soon identified; by 1973, an appropriate system had been developed and

implemented. The second responsibility focuses on the collection of reports of hospital business activities and firms with which their trustees have an interest. The last obligation is more complex, since it charges the Commission with monitoring institutions to make sure total costs are reasonably related to services offered. The Maryland rate-setting statute (19-216 a 2,3 supplement 1986) requires that hospitals have aggregate rates related to aggregate costs and that rates be set equitably among all purchasers.

Access to care for uninsured patients is promoted by reorganizing the costs incurred by hospitals. Maryland's rate-setting system recognizes bad debt and charity care as an integral part of the institutional financial requirements. Setting equitable prospective rates is imperative since efficient institutions must be permitted to remain solvent.

The rate-review program is classified as mandatory because it was created by state legislators, and it is also regulatory in that it determines rates by budget review negotiation process and may penalize non-compliant hospitals (Maryland Hospital Association, 1980).

Rate Review

On July 1, 1974, the Maryland Health Services Cost Review Commission began setting rates for all hospitals (Worthington, Tyson, and Chin, 1980). Rates paid by charge-based payers were frozen, and an inflation adjustment mechanism was applied every six months until the entire rate review process was completed. Initially, the appropriate data from all hospitals were to be reviewed immediately to construct

rates. Unfortunately, sufficient resources were not allocated to complete the review process in a short amount of time; therefore, establishing the rates was a slow and tedious process extending over several years (Worthington, 1982). This development phase was characterized by extensive planning and revision. Budget review and formula methodologies were used to construct rates. During this time rules and procedures were designed, the revision of earlier works was continued, guidelines were distributed for feedback, and case-mix regulations were established. Since the Commission staff was limited in size, much of the developmental work was performed by contracted professionals. Also, the collection of medical record abstracts used in determining rates was begun.

Originally hospitals determined their total financial requirements, and the Commission reviewed the data for reasonableness. If the estimated requirements were deemed appropriate, rates were set to capture the approved amount. To calculate these costs hospitals added departmental operating costs, mortgages and equipment, bad debts and charity care, and discounts. Departmental costs, including revenue and cost centers, represented more than 90 percent of the total expenditures; the specific method for allocating support services to revenue-producing services was developed by the Commission. A capital facilities allowance was used instead of traditional depreciation to allow hospitals to meet mortgage requirements and to replace certain plant and equipment items. Uncompensated care was acknowledged as financial requirement. Since third-party payers receive a discount for prompt payment, the rate had to be adjusted to accommodate their

lowered payment; therefore, a markup was applied to the total financial requirements. Hospitals are not forced to charge unit rates, but when they do, average patient charges must equal those unit rates. To change its base rate, a hospital may submit request for a full rate review, a partial rate review, or apply to use the inflation-adjustment system.

Waiver Granted

In 1977 the Department of Health and Human Services granted the Maryland Commission a waiver from Medicare and Medicaid reimbursement regulations. Maryland's earlier Medicare waiver was granted according to the regulations of the Social Security Amendment of 1967. This was amended again in 1972 to establish a performance criterion that the rate of increase in Medicare payments could not exceed the national rate of inflation (Schramm, Renn, Patrick, Lessing, & Cohen, 1987). Maryland was the first state to get such a waiver from the nationally implemented system.

The Health Care Financing Review Administration awarded almost \$1.5 million to the Commission to perform research and duties while under the waiver. Through use of the waiver, a system was established to reimburse all payers according to the same methodology. For the first three years the waiver was extended on a year-by-year basis. However, Federal regulations changed in 1980 to broaden the scope of waivers; then waivers were effective for three-year periods. In 1983, the Social Security Amendments created new provisions for Medicare waivers and limited the amount of Medicare monies paid to states with

waivers to amounts equal to or less than monies which should have been paid to them had they had no waivers (Zuckerman & Holahan, 1986).

States such as Maryland with preexisting waivers continued them. More regulations pertaining to waivers were published in the July 15, 1985 Federal Register. Regulations have been modified again. Now for Medicare patients in Maryland, the waiver remains in effect as long as the patient per-admission rate of increase for the most recent three years is less than the rate of increase nationally (Federal Register, July 15, 1985).

Currently, the waiver has a clause to protect the federal government from excess increases. It is believed that the waiver is attractive because it provides consistent incentives and payment methods. There are provisions for reasonable free care or bad debt expenses. It also uses service utilization as a basis to apportion costs and payment obligations. Hospitals have a high degree of flexibility and predictability in their financial operations. Cost control is a major component of the waiver.

Rate-Setting Methodology

Reasonable costs are of paramount importance under the Maryland rate-setting system. Hospitals are expected to review each department before its expenses are allocated to revenue producing departments in order to determine any inefficiency at its source. Allocations to revenue-producing departments must be reasonable. Questions posed by hospitals are reviewed on a case-by-case basis, and input from commercial insurers, defined by the system as 'designated interested

parties', is encouraged. Full rate reviews are by hospital request only and are infrequent.

Late in 1976 the Commission began establishing per-case rates. The per-case rate system was used with roughly one-third of the state's hospitals. At present all but three hospitals use this system. This system guarantees inpatient revenues and is designated as a Guaranteed Inpatient Revenue (GIR) (Maryland Hospital Association, 1978; Maryland Hospital Association, 1979; & Maryland Hospital Association, 1980). The basic premise of the GIR is to focus on costs or revenues per admission. The GIR includes financial incentives and penalties. Although the rates are set prospectively, they are adjusted annually.

Hospitals file quarterly reports and may request a full rate review if they are dissatisfied with results of the automatic adjustment. Specific items are negotiated, and public hearings are scheduled to resolve conflicts. The Commission has six public meetings each year.

The commission establishes approved rates per unit of service. The per-service rates are set for the prospective year based on a study of prior years. Adjustment factors are applied to determine how much profit will be permitted, as well as how much loss will be compensated. This prospective-payment system superseded an ineffective attempt to voluntarily hold down costs.

Cross-subsidization or using patient revenues to provide services for certain types of patients, is prohibited by Maryland's system; however, it is acceptable to use non-patient revenue to reduce some rates. Therefore, monies obtained from parking or the gift shop could

be used to offset expenses, but patients could not be billed higher rates. Individual hospital rates include a provision for bad debt or charity care, and all payers share this cost. This provision eliminated the added financial burden placed on the self-pay patient under the cost-based system.

Planning Commission

The planning functions are performed by the Health Resources Planning Commission (HRPC). Originally, the HRPC was a unit within the State Department of Health and Mental Hygiene; pressures from the departments resulted in moving the HRPC to alleviate excess political influence. This move conferred commission status on the unit, thus enabling the HRPC to charge user fees. The Maryland Hospital Association believed a commission format was essential for effective interaction. State policy-makers believed the restructuring of the HRPC was necessary to improve the planning function. Both commissions are under the jurisdiction of the Department of Health and Mental Hygiene for budgetary purposes.

Several other rate-setting states have adopted the commission structure as a way of sheltering the commission from political pressures exerted by policy-makers. However, such a distance can also diminish commitment to support rate-setting programs perceived as restrictive. Historically, research has shown that hospital associations support the commission format, because they believe they can exert more influence (Leven, Sommers, and Sommers, 1975). Recent research by Kinney (1987) also supports these findings. Maryland is

unique in that both rate-setting and planning functions use commission formats.

Maryland's organization is like that of West Virginia and Connecticut, but differs markedly from other rate-setting states. The Maryland Planning Statute has a goal of promoting the appropriate use of resources. It is here that the rate-setting commission and planning commission differ. The rate-setting commission believes that excess capacity in the hospital system occurred because the planning commissions standards were based on cost-based reimbursement rather than reimbursement under rate-setting.

Rate-Setting Linkages to Certificate of Need

Maryland has several formal linkages that were designated by statute. The statute required HRPC to consider the HSCRC's recommendations. In addition, the rate-setting and planning commissions have a memorandum of understanding (MOU) to clarify execution of these statutory requirements.

The HRPC sends all proposed changes to the HSCRC for review and comments pertaining to finance. The comments of the HSCRC are not binding in the HRPC; by statute the HSCRC must consider all costs when setting rates for hospitals. It is important to note that rates are based on cost projections and that the actual higher capital costs incurred are not recognized.

Maryland, more than any other state, has emphasized system wide linkages. The HRPC has also developed institution specific plans to reduce excess hospital capacity and provide rate incentives.

At the present, most hospitals do not have full or partial rate reviews, but receive rate increases under the Inflation Adjustment Systems (IAS). The IAS uses a complex formula to make retrospective adjustments for factors such as cost, inflation, price, volume, and other variances to provide for the future.

A modification of IAS is the Guaranteed Inpatient Revenue (GIR) system. It includes additional incentives to reduce intensity of services at each hospital. Resource standards are computed for each diagnosis for a selected base period. The GIR adjustment rewards hospitals for reducing inpatient service volume and provides penalties for increasing intensity level for costly inpatient services.

The enabling legislation specified three basic objectives: Costs must be reasonably related to services, charges must be related to costs, and all payers must be treated equitably. These objectives have been maintained since the implementation of the PPS.

Maryland has a very stringent system and attributes its success to the cooperating hospitals. Costs above a certain percentile are automatically reviewed. The Maryland rate-setting system is characterized by an extensive level of authority covering all payers and mandatory (cumulative) compliance mechanisms. Its scope of analysis during a review includes department-level screens and adjustments (Worthington & Piro, 1982). Worthington & Piro's (1982) description of the State of Maryland's rate-setting system stated that

systems that use per-diem rates create different incentives than similar systems that base reimbursement on charges per unit, create different incentives than systems that use per-diem rate. Worthington and Piro (1982) contended that per-unit, charge-based systems provide fewer incentives to increase admissions or length of stay.

Volume related incentives are associated with rate-setting. A specific proportion of the established rate is for marginal costs for services in excess of those budgeted under rate-setting. This reflects the premise that rates are set to reflect costs accurately. If actual volume increases beyond budgeted volume, it is assumed that fixed costs are the same. If actual volume is below budgeted volume, fixed costs are not met, and full compensation is permitted. The Maryland system has created a set of stringent rules to keep hospitals from increasing volume. The GIR applies to roughly one-third of all hospitals. It directly encourages hospitals to constrain average length of stay and ancillary procedures. Maryland's system, as compared to those in other states, is very stringent. It is ranked just below New York, the most stringent state PPS.

The PPS of Maryland was implemented from 1976 to 1977. The system forced hospitals to understand, control, and reduce costs to remain viable. Apparently the Maryland PPS had been flexible, as it was sensitive to legitimate changes. Other purchasers of health care are now developing plans to establish reimbursement limits for specific services. Plans of this nature would curtail cost-shifting to private payers. Thus financially viable health care institutions would be low cost providers.

Maryland's rate-setting system establishes limits on payments to hospitals and therefore results in a decreased utilization. It also regulates payer differentials and reduces anti-competitive behavior. Hospitals respond to the constraints by monitoring budgetary practices to keep costs below pre-established rates. In Maryland the all payer rate-setting system compensated for bad debt by allowing for uncompensated care in the rates via regression analysis. A reasonable limit is identified. The outcome is that all payers pay a proportional amount of uncompensated care at an individual hospital. Maryland hospitals spend roughly 7.2 cents of each total operating cost dollar for uncompensated care (Cohen & Schramm, 1980).

All payer rate-setting protects research and medical education by allocating costs. This method spreads the cost of a benefit that society recognizes as worth while. Recent proposals for the federal Medicaid system included recommendations to cut reimbursement for teaching hospitals. Indirect medical education was cut from 7.7 to 6.6 percent (Peterdorf, 1989). There are 1300 urban teaching hospitals that could be negatively influenced by this proposed change in reimbursement (Health Care Access, 1989). The average percent changes in per-case revenues between 1982-1984 were higher in PPS hospitals than in waiver hospitals. However, when additional research controlled differences in hospital characteristics, the differences were not statistically significant (Zuckerman, 1988).

On April 20, 1983, Title VI of Public Law 98-21, the Social Security Amendments Act, was signed by President Reagan. This Act

radically changed payment to hospitals for Medicare patients from the traditional cost-based retrospective reimbursement to a predetermined payment schedule (Allen & Wilson, 1985; Crawford & Fottler, 1985).

Rate-setting was encouraged by the federal government as early as 1967. If it had been enacted, the Hospital Cost Containment Act, proposed in 1977, would have excluded successful rate-setting states from its system.

There is no evidence that hospitals functioning under all-payer programs have had lessened access to capital (Cohen, 1987). Early studies support the belief that profitability of hospitals in mandatory rate-setting is less than that in unregulated areas, while Sloan's studies on mature programs obtained no effect.

It was announced February 1, 1989, for the thirteenth consecutive year, that the cost of a hospital admission in Maryland was 1.57 percent less than the national average. This resulted in an estimated savings of \$38 million in 1988. Without the program, the increased cost of an admission for 1988 was estimated to be about 32 percent or \$845 million. The Maryland Health Services Cost Review Commission was the first hospital rate-review agency in the United States established to regulate rates for all who purchase health care. Outpatient adjustments are recognized by a statistic formulated by the Cost Review Committee.

III. SUMMARY

A review of literature pertaining to the research problem has been presented in Chapter II of the study. The historical background of health care reimbursement and expenditures has been reported. Prospective payments systems and rate-setting have been delineated in Section I. The Maryland Rate-Setting System has been reported in Section II.

The impact of PPSs on health care financing could be monumental. Identification and evaluation of the most common PPS could provide major insights into planning. Many articles are now being published which give general information about PPSs. Due to its recent implementation, research regarding its effects is still being

CHAPTER III

METHODOLOGY

I. INTRODUCTION

There is an increasing awareness of the need to analyze the impact of the PPS, especially its effectiveness in controlling health care costs. Health care managers want to know how they could seize the opportunities available while avoiding or ameliorating the negative consequences of decreased access or diminished quality of care associated with controlling health care costs.

Excesses and shortages may be equalized and careful attention should be given to the weighing system in allocating finances. By prudent analysis of the effects of the PPS, management policies can be developed or modified to benefit the health care consumer, health care worker, or health care organization.

The Maryland Prospective Payment System moved from cost based reimbursement to a three-part system based on rate review, inflation adjustment, and a guaranteed inpatient revenue. The Maryland PPS uses a quasi-utility approach to regulate hospital costs. Rates are adjusted for inflation, volume changes, and pass-through costs. In this study the implementation of a health policy change occurred in 1977 when the Maryland rate-setting system was placed in operation. The primary purpose of this study was to determine the effects of the

Maryland rate-setting system on hospital profitability. The study sought to address the following research questions:

1. How has the implementation of the Maryland rate-setting system affected the operating margin ratio?
2. How has the implementation of the Maryland rate-setting system affected the return on assets ratio?
3. How has the implementation of the Maryland rate-setting system affected the return in equity ratio?
4. How has the implementation of the Maryland rate-setting system affected the markup ratio?
5. How has the implementation of the Maryland rate-setting system affected the deductible ratio?

Subsequent sections will describe the manner in which the research questions were answered.

II. METHODOLOGY

The first step was to specify the financial ratios. Specific formulas used to construct the ratios of interest were consistent with the Maryland chapter of the Health Care Financial Management Association, the extensive publications of W.O. Cleverley, as well as the work of Neumann (Amataykul, 1985; Choate & Kazuaki, 1980; Cleverley, 1977; Cleverley, 1982; Cleverley, 1986; Finkler, S. A., 1982; Maryland Hospital Association 1978-1980; and Neumann, Suver, & Zelman, 1988). Five profitability ratios were chosen: operating

margin, return on assets, return on equity, markup, and deductible. See Appendix A for the formulas. These five performance ratios were measured and analyzed for 40 hospitals for three, two-year periods to determine the effect Maryland's rate-setting system on hospital profitability.

Two year periods were arbitrarily selected to provide a more stable base for ratio construction. The first two-year period, 1970 through 1971, provided data for the cost-based reimbursement system. By convention, rate-setting systems are judged to be mature two years after implementation. Because the Commission staff was limited, the initial analysis of the financial status of each hospital was completed by contracted consultants and consumed more time than allotted. Implementation was delayed and extended over two years; most hospitals initiated rate-setting at the end of this period. Therefore, two years were added to the ending date to ensure that the rate-setting program was mature for all hospitals. The middle two-year period, 1979 through 1980, measured the earliest years of rate-setting, while the last two-year period, 1987 through 1988, contained the latest data available for the rate-setting program.

III. LITERATURE REVIEW

Chapter II, a review of pertinent literature, explored both the health and finance fields. Historical and current health information provided a thorough understanding of the field and promoted a meaningful basis for the investigation. Literature pertaining to

financial analysis enhanced some basic concepts found in health literature. Financial analysis techniques applicable to health care were gleaned from the review of literature.

III. STUDY POPULATION

The population of hospitals for this study was defined as the 40 Maryland hospitals which had implemented the rate-setting system by 1977. By 1987, there were approximately 60 Maryland hospitals subject to uniform reporting requirements; however, many of these organizations did not submit complete information or simply did not exist during the first period studied, 1970-1971. This resulted in large amounts of missing data for the first period. Therefore, the 40 hospitals with complete data for all three periods of time were used for this study.

The size of the hospitals was measured by the number of beds and ranged from less than 100 to more than 900. The number of beds was obtained from the American Hospital Association Guide and A Legislator's Guide to Maryland Hospitals for the years covered by this study and reflects the total number of licensed beds--not the number of beds in operation. An average number of beds was calculated for each hospital for the three periods.

Occupancy rates were used to measure the number of available beds used by inpatients. Ambulatory care patients and nursing home patients are generally excluded. Occupancy rates range from 39 percent to 104 percent. The institutions exceeding 100 percent occupancy included their nursing-home patients with acute-care patients instead of

separating the information. The number of beds and the occupancy rate were used to construct a contrast variable 'bed-occ'. It was used in the repeated measures design to determine whether the number of beds combined with the percent occupancy exerted an effect on the rate-setting system.

The geographic location and size of the hospitals were used to determine four subgroups or regions. The largest group, Baltimore area hospitals, contained 18 hospitals of varying sizes and occupancies. This group had a history of severe financial difficulties under the cost-based reimbursement system and was receptive to the concept of rate-setting. The six hospitals in the Maryland suburbs of Washington, D.C. were of moderate size and had less variation in occupancy rates. The Washington area hospitals or hospitals in the Maryland suburbs were financially healthy. The third group contained nine large hospitals located in areas other than the Baltimore metropolitan section or the Maryland suburbs of the District of Columbia. The last group of seven small hospitals are the rural hospitals. These groups correspond to divisions by the Maryland Hospital Association and the American Hospital Association Guide.

The population of Maryland hospitals included in 1970 through 1988 was sampled for the three two-year periods. Nineteen years of data existed. Three focal points were chosen to examine the effects of rate control. Each period studied has two years of data and has its variables averaged to diminish the effect of extreme events possible in a single year. In the first two-year period, (1970-1971), those hospitals were under the cost-based reimbursement system. The second

two-year period, (1979-1980), examined the effects of the early years of the mature rate-setting system, while the last two-year period, (1987-1988), represented the late years of the matured rate-setting program.

IV. INSTRUMENTATION

The Lotus 1,2,3 version 2.0 data source diskette supplied by the Maryland Hospital Association included 40 items on unadjusted balance sheets and income statements for all hospitals from 1970 to 1988. Five financial ratios were constructed from these factors to measure profitability using Lotus 1,2,3 version 2.0. The appropriate columns were selected from the given variables. The data were translated to d-Base 3.0 to add the number of beds, occupancy rates, and regions for each hospital. Then the ratios were examined by repeated measures using Statistical Packages for the Social Services on the personal computer (SPSS-PC). See Appendix B for a sample program.

V. DATA COLLECTION AND ANALYSIS

Sources of Data

Hospital financial reports must be submitted annually to public agencies as a part of a regulatory process. Maryland hospital financial reports are submitted to the Maryland Hospital Association and the Maryland Health Cost Review Commission. Uniform reporting requirements are in effect. All data used in the analysis of the

prospective payment system on Maryland hospitals were obtained from documents in the public sector (i.e. American Hospital Association Guide and Maryland Hospital Association). Financial data were collected from financial balance sheets and income statements as necessary. Accurate financial ratio construction required the exclusion of hospitals with large amounts of missing data on the given variables. Forty hospitals were included in the Maryland study group. Using six years of the 19-year data collection for these 40 hospitals gives a total of 240 cases. For further analysis, the hospitals were grouped according to urban, suburban, or rural status as well as the number of beds and occupancy. Comparisons were made for the profitability measures, which include the variables operating margin, return on assets, return on equity, markup, and deductible.

Collection

Data were extracted from the Maryland Hospital Association's collection of data via computer. Each of the five variables was obtained from financial reports for each hospital in the study from the years 1970 to 1988. The earliest two years of data available, 1970 and 1971, have been arbitrarily selected as the period before the implementation of the rate-setting system to gather pretest data. Post-test data were gathered in two-year blocks, once in 1979 through 1980 to detect changes in the early years of the matured PPS and once in 1987 through 1988 to analyze the effect on the late years of the matured PPS (after ten years of implementation).

Pre-multiple and post-multiple observations are carried out. "0" represents observation years. "X" represents the event or implementation of the rate-setting system (Figure 1).

Intervening factors may also heighten or ameliorate the effect of the Maryland FPS. A few of these factors include local and nationwide events, such as interest rates, inflation, or level of economic activity. Therefore, it is not easy to determine whether only the FPS had an effect or whether there is a combination of factors.

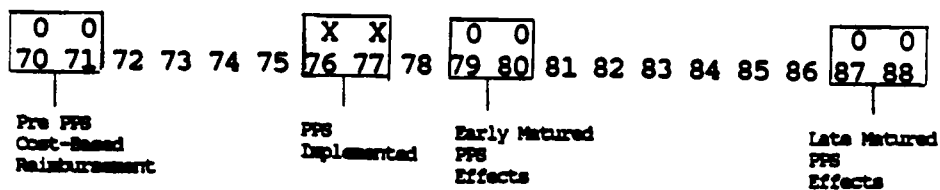


Figure 1

Diagram of Experiment

Analysis of Data

Analysis of covariance with repeated measures in a quasi-experimental design were used to compare changes in financial ratios due to the rate-setting intervention. Each ratio is subjected to a separate analysis and is measured across three conditions of reimbursement. The appropriate columns were selected from the Lotus 1,2,3 version 2.0 diskette for each hospital for the six selected years. The six years were collapsed into three two-year periods to construct financial ratios. The three two-year periods provided greater stability than information from a single year. Each hospital was then measured three times on the same five profitability ratios. Since dependent variables were measured repeatedly, they required different statistical measures (Huck, 1974; Stevens, 1986). These 40 hospitals were blocked or grouped into pre-existing homogeneous subgroups by urban or non-urban status, number of beds, and percent occupancy. Hospitals within each block or group may score more similarly on the dependent variable ratios than those hospitals in other groups (Stevens, 1986). Through the use of repeated measures all of the variability among hospital blocks is removed. This results in a test more sensitive to the differences among groups being compared (Stevens 1986). MANOVA, multiple analysis of variance, or repeated measures, was performed on the five dependent variables for the three pooled time periods.

Repeated measures analyses were used because each hospital subject provided more than one piece of data. The five dependent variables (or financial ratios) were subjected to a separate analysis. Each hospital

was measured across three levels of reimbursement. The within-subjects factor is a series of measurements across time. In this instance the 40 hospitals are measured three times for each of the five profitability ratios.

Other repeated measures factors include the between variables that group or classify the subjects. The hospital subjects are grouped according to region. The number of beds and percent of occupancy are combined and used as a covariate.

A quasi-experimental design was used because the researcher had limited experimental control. Only the timing of the observations was regulated. It was not possible to control the application of the intervention or the members of the groups. Quasi-experimental designs have more control over external than internal threats to validity. Mortality of subjects, an internal threat to validity, appeared to be a strong threat; many of the institutions did not exist during all three periods studied. If all institutions had been included the results may have differed. Another threat to internal validity is history; political and economic events occur continually and their interpretation is subjective as well as controversial.

There was no random assignment to groups; pre-existing groups were used. Hospitals were grouped or blocked into subgroups before the effects of rate-setting were measured. This technique, blocking on a variable, is a technique used to reduce error variance. This technique is carried to an extreme because the repeated measures design blocks on each subject and thus removes the variability of individual differences from the error term. Hospitals within each group or block may score

more similarly on a given independent variable than hospitals in other groups. The smaller error term resulted in increased precision. A disadvantage would be a carryover effect from prior treatments.

The hospital subjects were being pretested and post-tested on the five dependent variables. Selection of repeated measures design permitted comparison of financial viability among the three periods of time. This design was particularly appropriate since a limited number of subjects were available.

VI. SUMMARY

The design and methodology of the study have been described in Chapter III. Rate-setting, the independent variable, is also the controlled intervention. The financial ratios were specified. The years of interest as well as the number, size, and types of hospitals were identified. Repeated measures is the data analysis method of choice for evaluating the effects of a policy change.

CHAPTER IV

ANALYSIS OF DATA

I. INTRODUCTION

Chapter IV is an analysis of the data obtained from examining the effects of the Maryland rate-setting system on hospital profitability by the methods described in Chapter III. Maryland hospitals are used as a group to analyze changes in the profitability ratios over a span of 19 years. The first step was to construct the financial ratios. Specific formulas used to construct profitability ratios were consistent with the Maryland chapter of the Health Care Financial Management Association, the extensive publications of W.O. Cleverley, as well as the work of Neumann (Amataykul, 1985; Choate & Kazuaki, 1980; Cleverley, 1977; Cleverley, 1982; Cleverley, 1986; Finkler, S. A., 1982; Maryland Hospital Association 1978-1980; and Neumann, Suver, & Zelman, 1988). Five profitability ratios were chosen: operating margin, return on assets, return on equity, markup, and deductible. See Appendix A for the formulas. These five performance ratios were measured and analyzed for 40 hospitals for three two-year periods to determine the effect Maryland's rate-setting system on hospital profitability. Two-year periods were arbitrarily selected to provide a more stable base for ratio construction. By focussing on three two-year periods, the effects of mandatory rate-setting on financial

performance measures are determined. The analyses of the five performance measures show that profitability was exceptionally low during cost-based reimbursement and during rate-setting. This low percentage of return on patient revenue resulted in a decrease in working capital available. Working capital is a necessity but not reimbursable under many government programs. Health care service expansion or changes in utilization are necessary to survive within a more competitive environment. At present there is a growing move to justify expenditures by monitoring cost benefits, cost effectiveness, or utilization rates. In 1987, Maryland enacted legislation to require utilization review.

Net income from patients provides a source of working capital for the health care institution. It is the most quoted and used financial measure and is the source of money for expansion of services to modify the capital structure of the hospital. Hospitals need net income as a source of equity. Reimbursement changes the effect of net income. Hospitals may experience a lower rate of occupancy as ambulatory care services are expanded; hence, the number of operating beds may shrivel. Unprofitable hospitals may have their services drastically altered to meet their financial requirements and the needs of the community.

II. ANALYSIS OF PROFITABILITY RATIOS

The following sections present the analysis of the five profitability ratios. Additional information regarding the trend of

each profitability ratio by number of beds per hospital and occupancy is presented in Appendices C and D.

Operating Margin

Research question one: How has the implementation of the Maryland rate-setting system affected the operating margin ratio?

The most commonly cited measure of profitability is operating margin. Operating margin (OM) is the profit from operations per dollar of operating revenue. All hospitals require an operating margin to maintain and expand services. The higher the operating margin, the better the financial condition of the institution. Growing utilization rates (e.g. hospital services) necessitate capital or plant expansion. Historically a 2- to 3-percent operating margin is considered essential. Higher operating margins are necessary with higher inflation rates.

Cost-based reimbursement effects on the operating margin ratio. A perusal of the descriptive statistics for the first period, 1970-1971, shows the sample as a whole had a substandard and negative mean operating margin under cost-based reimbursement. This is far below the median hospital industry standard of .019 and indicates questionable financial viability. The eighteen Baltimore metropolitan hospitals had an unfavorable negative mean operating margin. Almost half of the hospitals sampled were performing below the acceptable industry standard. The six Washington area hospitals had a high favorable mean operating margin; their financial position was acceptable. The third

area, nine large hospitals in the other areas of the state, had a substandard mean operating margin. The seven remaining small hospitals had an extremely unfavorable mean operating margin. This low operating margin contributes to an environment favoring rate-setting --if hospitals assume that some factor to ensure a low but healthy OM will be included in the rate-setting methodology. The results are presented in Table 1.

Early effects of rate-setting on the operating margin ratio. The mean operating margins for the second period studied were measured for 1979-1980. This period captures the early effects of the rate-setting system. Details are presented in Table 2. For the group as a whole, the results were similar to those obtained under cost-based reimbursement. The mean operating margin of the Baltimore metropolitan hospitals improved, but still remained low and unfavorable. At a glance the early effects of rate-setting appear to have been detrimental to the hospitals surrounding the Washington area as the mean operating margin plummeted from a high, favorable position to a low, negative, and unfavorable average. The group of 'other large hospitals' experienced a minimal decrease in the mean operating margin. Small hospitals throughout the state continued to have an extremely unfavorable mean operating margin, thus maintaining a stable but poor position. The operating margin of the entire sample was unchanged. The industry norm for the OM is .022.

TABLE 1
CELL MEANS AND STANDARD DEVIATIONS
OPERATING MARGIN VARIABLE FOR PERIOD 1

REGION	Mean	Std. Dev.	N
BALTIMORE METROPOLITAN HOSPITALS	-.012	.068	18
MARYLAND SUBURBS OF D.C.	.043	.084	6
OTHER LARGE HOSPITALS	.009	.023	9
OTHER SMALL HOSPITALS	-.056	.053	7
FOR ENTIRE GROUP	-.007	.066	40

TABLE 2
CELL MEANS AND STANDARD DEVIATIONS
OPERATING MARGIN VARIABLE FOR PERIOD 2

REGIONS	Mean	Std. Dev.	N
BALTIMORE METROPOLITAN HOSPITALS	.002	.038	18
MARYLAND SUBURBS OF D.C.	-.005	.035	6
OTHER LARGE HOSPITALS	.007	.024	9
OTHER SMALL HOSPITALS	-.047	.068	7
FOR ENTIRE GROUP	-.007	.045	40

Late effects of rate-setting on the operating margin ratio. The mean operating margins of 1987-1988 capture the effects of a well established system and are slightly more favorable. The operating margin for the entire sample rose to a low, positive number but remained unfavorable; the sample does not appear to have been greatly affected by the rate-setting system. Baltimore metropolitan hospitals experienced an additional increase in the mean operating margin. Although this is a slight improvement, it is still well below the accepted industry norm of .039. The mean operating margin for Washington area hospitals increased to a more favorable position but remained below acceptable norms. These hospitals still have not regained their performance levels established under cost-based reimbursement. The group of 'other large hospitals' continued to have a sound mean operating margin. Small hospitals experienced performance difficulties shown by a persistent, negative, unfavorable mean operating margin. Details are presented in Table 3.

Inferential statistics for the operating margin ratio. The operating margins are transformed into new variables and used in a multivariate analysis. The transformed variables give the same multivariate test value (Stevens, 1986). The variables are orthogonal or uncorrelated and scaled such that the sum of squares of the coefficients is equal to one. Table 4 depicts the partitioned between-groups sums of squares or the matrix of covariances between the three periods measured; each partition has 1 degree of freedom (df). By convention the sphericity assumption is a less restrictive correlation

TABLE 3
CELL MEANS AND STANDARD DEVIATIONS
OPERATING MARGIN VARIABLE FOR PERIOD 3

REGION	Mean	Std. Dev.	N
BALTIMORE METROPOLITAN HOSPITALS	.007	.037	18
MARYLAND SUBURBS OF D.C.	.013	.014	6
OTHER LARGE HOSPITALS	.021	.026	9
OTHER SMALL HOSPITALS	-.013	.076	7
FOR ENTIRE GROUP	.008	.042	40

TABLE 4
ORTHONORMALIZED TRANSFORMATION MATRIX (TRANSPosed)
FOR THE OPERATING MARGIN

	CONS	DIF12	DIF12V3	TC1	TC2	TCS
OM1	.577	-.707	-.408	.000	.000	.000
OM2	.577	.707	-.408	.000	.000	.000
OM3	.577	.000	.816	.000	.000	.000
C1	.000	.000	.000	.577	-.707	-.408
C2	.000	.000	.000	.577	.707	-.408
C3	.000	.000	.000	.577	.000	.816

structure than compound symmetry; it states that the covariance matrix for transformed variables is a diagonal matrix with equal variances on the diagonal (Stevens, 1986). Since the off-diagonal elements, or covariates, are equal to zero, the covariances for all transformed variables are zero and correlates are likely to be zero. This group is one 40-member group that has been divided into four unequal subgroups.

OM designates the dependent-variable operating margin for periods one through three. For each period the covariates, number of licensed beds multiplied by the occupancy, are indicated by C1, C2, and C3. The difference between the first two periods is depicted in the DIF12 column and the difference among all three periods is noted in the DIF12V3 column. Transformed variables are indicated in the TC columns.

Effects of the contrast variable on the operating margin ratio.

The region or between-subjects effects were tested for significance through the use of unique sums of squares. The results from testing the significance of the contrast variable on the operating margin are presented in Table 5. The calculated F's were compared with critical F's but were not found to be significant at $p < .05$.

Tests involving operating margin within-subject effect. A regression analysis for the within-cells error term or measurement error of the dependent variable, was completed using the contrast variable as the dependent variable. The sample had a standard error of .000 indicating no variability in this particular case.

TABLE 5
TESTS OF SIGNIFICANCE FOR THE CONTRAST VARIABLE USING UNIQUE SUMS OF
SQUARES FOR THE OPERATING MARGIN

Source of Variation	SS	DF	MS	F	Sig of F
WITHIN CELLS	.12	35	.00		
REGRESSION	.01	1	.01	2.13	.154
CONSTANT	.01	1	.01	2.00	.166
REGION	.03	3	.01	2.88	.050

N = 40
p < .05

was 1.458 while the calculated significance of t was .154 and nonsignificant as it surpassed the $p < .05$ cutoff.

Next, the transformed variable, the difference between the periods, was used to measure the within-subject effect through the use of the operating margin's using several multivariate tests. Chi square was calculated to equal 4.92511 and has 2 df. The tabled chi square is 5.99 at $p < .05$. Since the calculated chi square value is less than the critical value at $p < .05$, there is no significant difference between observed and expected numbers; the null hypothesis cannot be rejected. The Mauchly test for sphericity was .86136; this test is highly sensitive to data that deviates from multivariate normality, and some controversy exists regarding its appropriate use (Stevens, 1986). Epsilons reflect the extent to which the covariate matrix deviates from sphericity. If sphericity is met then $E = 1$. The Greenhouse-Geisser Epsilon is one parameter that reflects the extent to which the covariate matrix deviates from sphericity; at .87824 it is less than one and approaches sphericity. Another measure, the Huynh-Feldt Epsilon, meets sphericity at .99667. Since the sphericity assumption is met, the F-ratio is not positively biased and the results have not been rejected too often.

Tests of significance for within-cells regression for the operating margin ratio. Four multivariate tests of significance were performed to measure the within-cells regression. Details are presented in Table 6. The significance of F obtained in all cases was far beyond the cutoff of $p < .05$. Smaller values are desired to

TABLE 6
EFFECT WITHIN-CELLS REGRESSION FOR THE OPERATING MARGIN
MULTIVARIATE TESTS OF SIGNIFICANCE

Test Name	Value	Approx. F	Hypoth. DF	Error DF	Sig. of F
Pillais	.04963	.43261	4.00	68.00	.785
Hotellings	.05194	.41553	4.00	64.00	.797
Wilks	.95050	.42420	4.00	66.00	.791
Roy's	.04682				

N = 40
p < .05

provide more evidence for treatment effects. To measure the within-cells error term for the transformed dependent variable, regression analysis was performed. The differences of the operating margin between the first two periods was used as the dependent variable. T values of $-.060$ and $.289$ were obtained; the significance of t was calculated and found to be much greater than $p < .05$ at $.952$ and $.774$. Examining the differences in operating margins for all periods resulted in t values of -1.219 and $.609$ with a significance of t at $.547$ and $.231$.

Additional examination of the effects of region by the operating margin occurred by the multivariate tests and is presented in Table 7. The significance of all of the F's were far beyond the $p < .05$ parameters.

Multivariate tests were performed to test the effect of operating margin. The F's were far beyond $p < .05$. cutoff. Results are presented in Table 8.

Testing the within-subject effect using unique sums of squares partitioned the source of variation but again the significance exceeded $p < .05$. Table 9 illustrates these results.

Summary of Effects on the Operating Margin Ratio

The national median operating margins have risen each year and are thought to reflect financially viable ratios. To increase the operating margin, management must raise rates on existing services or reduce expenses.

TABLE 7

EFFECT REGION BY OPERATING MARGIN

MULTIVARIATE TESTS OF SIGNIFICANCE

Test Name	Value	Approx. F	Hypoth. DF	Error DF	Sig. of F
Pillais	.17153	1.06319	6.00	68.00	.393
Hotellings	.18929	1.00952	6.00	64.00	.427
Wilks	.83519	1.03649	6.00	66.00	.410
Roy's	.11097				

N = 40

p < .05

TABLE 8

EFFECT OPERATING MARGIN

MULTIVARIATE TESTS OF SIGNIFICANCE

Test Name	Value	Approx. F	Hypoth. DF	Error DF	Sig. of F
Pillais	.02839	.48208	2.00	33.00	.622
Hotellings	.02922	.48208	2.00	33.00	.622
Wilks	.97161	.48208	2.00	33.00	.622
Roy's	.02839				

N = 40

p < .05

TABLE 9

TESTS INVOLVING OPERATING MARGIN WITHIN-SUBJECT EFFECT

AVERAGED TESTS OF SIGNIFICANCE FOR OM USING UNIQUE SUMS OF SQUARES

Source of Variation	SS	DF	MS	F	Sig of F
WITHIN CELLS	.14	71	.00		
REGRESSION	.00	1	.00	.36	.549
OPERATING MARGIN	.00	2	.00	.99	.375
REGION BY OPERATING MARGIN	.01	6	.00	1.10	.374

N = 40
p < .05

Return on Assets

Research question two: How has the implementation of the Maryland rate-setting system affected the return on assets ratio?

Indicating the revenue-generating potential on existing assets, return on assets, includes operating and nonoperating income. It is closely related to operating margin. Adequate levels of return on capital invested in operations are essential for continued viability and replacement of hospital assets. The return on assets could be thought of as the percentage of assets employed to provide patient care. A low value over a prolonged amount of time suggests a growing problem in generating funds for patient services.

A healthy return on assets is required to meet replacement needs and new technology needs, as well as political and economic impacts. Increasing the required return on assets could be accomplished by increasing the closely related operating margin or increasing the utilization of existing assets. National median trends vary but are far above these obtained from the data. This reflects an unfavorable standard comparison, as well as unfavorable trends.

Cost-based reimbursement effects on the return on assets. The descriptive statistics of mean return on assets (ROA) and standard deviation are presented in the following sections. For the cost-based reimbursement period, the mean return on assets ratio for Baltimore metropolitan hospitals was lower than the median industry standard of .028, but at the lowest acceptable limit. The Washington area hospitals had a high favorable ROA; this group had the healthiest

performance measure. Other large hospitals throughout the state had a below-average ROA. Small Maryland hospitals had extremely poor ROA's. The mean return on assets for the entire sample was below average. Therefore, hospitals were performing below established industry standards. Table 10 provides the details.

Early effects of rate-setting on the return on assets ratio. For the first period after the intervention, the ROA for Baltimore metropolitan hospitals was at the median industry standard. This move to the acceptable range appears to signal some change for the better. The mean ROA for Washington area hospitals plummeted; although the ratios are still within acceptable boundaries, the rate-setting system appears to be more adverse to this catchment. Other large hospitals showed improved performance and approached the industry established median. Small hospitals remained in financial peril with the same negative mean ROA. The entire sample experienced a slight increase in mean ROA. The industry norm for ROA during this period was .039. Details are provided in Table 11.

Late effects of rate-setting effects on the return on assets ratio. For the late period studied, the mean ROA for Baltimore metropolitan hospitals was below established parameters. The mean ROA for Washington area hospitals was far below the acceptable low point; they have not been able to regain a viable profitability measure in ten years. The group of other large hospitals throughout Maryland had a mean ROA that approached industry norms. The group of other small

TABLE 10
CELL MEANS AND STANDARD DEVIATIONS
RETURN ON ASSETS VARIABLE FOR PERIOD 1

REGIONS	Mean	Std. Dev.	N
BALTIMORE METROPOLITAN HOSPITALS	.023	.041	18
MARYLAND SUBURBS OF D.C.	.085	.055	6
OTHER LARGE HOSPITALS	.011	.015	9
OTHER SMALL HOSPITALS	-.020	.041	7
FOR ENTIRE SAMPLE	.022	.049	40

TABLE 11
CELL MEANS AND STANDARD DEVIATIONS
RETURN ON ASSETS VARIABLE FOR PERIOD 2

REGION	Mean	Std. Dev.	N
BALTIMORE METROPOLITAN HOSPITALS	.039	.045	18
MARYLAND SUBURBS OF D.C.	.028	.030	6
OTHER LARGE HOSPITALS	.037	.033	9
OTHER SMALL HOSPITALS	-.020	.044	7
FOR ENTIRE SAMPLE	.027	.045	40

hospitals had an extremely low, unfavorable mean ROA. The entire sample had a low and unfavorable mean ROA and was virtually unchanged from the early effects of rate-setting. The industry average for the ROA was .074. For details see Table 12.

Inferential statistics for the return on assets ratio. The return on assets ratios are transformed into new variables and used in a multivariate approach. The variables are independent or uncorrelated and scaled so that the sum of squares of the coefficients is equal to one. Table 13 depicts the matrix of covariances or the partitioned between-groups sums of squares; each partition has 1 df. The off-diagonal elements are equal to zero. By convention the sphericity assumption is a less restrictive correlation structure than compound symmetry; it states that the covariance matrix for transformed variables is a diagonal matrix with equal variances on the diagonal. Since the off-diagonal elements, or covariants, are equal to zero, the covariances for all transformed variables are zero and correlates are likely to be zero. This group is one 40-member group that has been divided into four unequal subgroups. There is one group divided into four unequal subgroups.

TABLE 12

CELL MEANS AND STANDARD DEVIATIONS

RETURN ON ASSETS VARIABLE FOR PERIOD 3

REGION	Mean	Std. Dev.	N
BALTIMORE METROPOLITAN HOSPITALS	.032	.037	18
MARYLAND SUBURBS OF D.C.	.023	.027	6
OTHER LARGE HOSPITALS	.033	.023	9
OTHER SMALL HOSPITALS	-.001	.078	7
FOR ENTIRE SAMPLE	.025	.044	40

TABLE 13

ORTHONORMALIZED TRANSFORMATION MATRIX (TRANPOSED)

FOR RETURN ON ASSETS

	CONS	DIF12	DIF12V3	TC1	TC2	TCS
ROA1	.577	-.707	-.408	.000	.000	.000
ROA2	.577	.707	-.408	.000	.000	.000
ROA3	.577	.000	.816	.000	.000	.000
C1	.000	.000	.000	.577	-.707	-.408
C2	.000	.000	.000	.577	.707	-.408
C3	.000	.000	.000	.577	.000	.816

ROA designates the dependent-variable return on assets for all three periods. Covariates are indicated by C1, C2, and C3. The difference between the first two periods is depicted in the DIF12 column and the difference among all three periods is noted in the DIF12V3 column. Transformed variables are indicated in the TC columns.

Effects of the contrast variable on the return on assets ratio.

The region or between subjects effects were tested for significance through the use of unique sums of squares. The results from testing the significance of the contrast variable on the operating margin are presented in Table 14. The calculated F's were compared with critical F's but were not found to be significant at $p < .05$.

Tests involving the return on assets within-subject effect. A regression analysis for the within-cells error term was completed using the contrast variable as the dependent variable. The sample had a standard error of .000 indicating no variability in this particular case. The t value was -.208 the calculated significance of t was .837 and nonsignificant as it surpassed the $p < .05$ cutoff.

Next, the transformed variable, the difference between the periods, was used to measure the return on assets' within-subject effect using several multivariate tests. The Mauchly test for sphericity was .96690; Chi-square was calculated to equal 1.11094 and has 2 df. The tabled chi square is 5.99 at $p < .05$. Since the calculated chi square value is less than the critical value at $p < .05$, there is no significant difference between observed and expected

TABLE 14
TESTS OF SIGNIFICANCE FOR THE CONTRAST VARIABLE USING UNIQUE SUMS OF
SQUARES FOR RETURN ON ASSETS

Source of Variation	SS	DF	MS	F	Sig of F
WITHIN CELLS	.07	35	.00		
REGRESSION	.00	1	.00	.04	.837
CONSTANT	.02	1	.02	10.55	.003
REGION	.04	3	.01	5.71	.003

N = 40
p < .05

numbers; the null hypothesis cannot be rejected. The Mauchly test for sphericity approached one. Epsilons reflect the extent to which the covariate matrix deviates from sphericity. If sphericity is met then $E = 1$. The Greenhouse-Geisser Epsilon, at .96796, approaches sphericity. Another measure, the Huynh-Feldt Epsilon, meets sphericity at 1.00000. Since the sphericity assumption is met, the F-ratio is not positively biased and the results have not been rejected too often.

Tests of significance for within-cells regression for the return on assets ratio. Four multivariate tests of significance were performed to measure the within-cells regression. Details are presented in Table 15. The significance of F obtained in all cases was far beyond the cutoff of $p < .05$. Smaller values are desired to provide more evidence for treatment effects.

To measure the within-cells error term for the transformed dependent variable, regression analysis was performed. The differences of the return on assets ratio between the first two periods was used as the dependent variable. T values of .727 and -2.075 were obtained; the significance of t was calculated and found to be less than $p < .05$ at .046. Examining the differences in operating margins for all periods resulted in t values of 1.147 and -1.402 with a significance of t at .259 and .170.

Additional examination of the effects of region by the return on assets occurred by the multivariate tests. The significance of all of the F's were far beyond the $p < .05$ parameters. Results appear in Table 16.

TABLE 15

EFFECT WITHIN-CELLS REGRESSION FOR RETURN ON ASSETS

MULTIVARIATE TESTS OF SIGNIFICANCE

Test Name	Value	Approx. F	Hypoth. DF	Error DF	Sig. of F
Pillais	.16481	1.52672	4.00	68.00	.204
Hotellings	.19239	1.53915	4.00	64.00	.202
Wilks	.83707	1.53446	4.00	66.00	.202
Roys	.15246				

N = 40
p < .05

TABLE 16

EFFECT REGION BY RETURN ON ASSETS

MULTIVARIATE TESTS OF SIGNIFICANCE

Test Name	Value	Approx. F	Hypoth. DF	Error DF	Sig. of F
Pillais	.29549	1.96473	6.00	68.00	.083
Hotellings	.38610	2.05920	6.00	64.00	.070
Wilks	.71435	2.01480	6.00	66.00	.076
Roys	.25724				

N = 40
p < .05

The effect of the performance measure return on assets was tested through multivariate tests of significance. All measures exceeded the cutoff of $p < .05$. See Table 17 for results.

Multivariate tests for the within-subject effect exceeded the cutoff of $p < .05$. The results are presented in Table 18.

Summary of the Effects on Return on Assets

Comparison of Maryland hospitals and regional or U.S. hospitals revealed a wide range of variation. Baltimore area hospitals improved the net income initially and then experienced a slight decline. The ROAs of Washington area hospitals were decreased by over 50 percent and continued to drop with the maturity of the rate-setting system. The other large hospitals were able to improve ROAs under the system. The remaining group of small hospitals has had negative ROAs across the board. The entire sample was able to show improved ROAs with rate-setting; however, it still remains below the industry standards.

TABLE 17

EFFECT RETURN ON ASSETS

MULTIVARIATE TESTS OF SIGNIFICANCE

Test Name	Value	Approx. F	Hypoth. DF	Error DF	Sig. of F
Pillais	.06891	1.22123	2.00	33.00	.308
Hotellings	.07401	1.22123	2.00	33.00	.308
Wilks	.93109	1.22123	2.00	33.00	.308
Roys	.06891				

N = 40
p < .05

TABLE 18

TESTS INVOLVING RETURN ON ASSETS WITHIN-SUBJECT EFFECT

AVERAGED TESTS OF SIGNIFICANCE FOR ROA USING UNIQUE SUMS OF SQUARES

Source of Variation	SS	DF	MS	F	Sig of F
WITHIN CELLS	.11	71	.00		
REGRESSION	.00	1	.00	.92	.340
RETURN ON ASSETS	.00	2	.00	.07	.932
REGION BY RETURN ASSETS	.02	6	.00	2.14	.059

N = 40
p < .05

Return on Equity

Research question three: How has the Maryland rate-setting system affected the return on equity ratio?

This performance ratio indicates profit per dollar of equity invested in assets. The return on equity (ROE) must be equal to or greater than the inflation rate to maintain a constant capital structure. If the return on equity is lower than the rate of inflation, the equity of the institution would shrink and higher debt financing would occur. The descriptive statistics of the mean return on equity and the standard deviation are presented in the following sections.

Cost-based reimbursement effects on the return on equity ratio.

For the first period under study, 1970-1971, the mean ROE for Baltimore metropolitan hospitals bordered on the lower perimeter of acceptability. The median industry standard was .053. Maryland hospitals located in the D.C. suburbs had a high, favorable mean ROE. The group of other large hospitals had a low, unfavorable mean ROE. The remaining small hospitals had a very unfavorable, negative mean ROE. The entire sample had a low, unfavorable mean ROE. See Table 19 for details.

Effects of early rate-setting system on the return on equity ratio. The second period studied, 1979-1980, showed Baltimore area hospitals with the same mean ROE of .059. Table 20 illustrates the details.

TABLE 19
CELL MEANS AND STANDARD DEVIATIONS
RETURN ON EQUITY VARIABLE FOR PERIOD 1

REGIONS	Mean	Std. Dev.	N
BALTIMORE METROPOLITAN	.058	.105	18
MARYLAND SUBURBS OF D.C.	.138	.071	6
OTHER LARGE HOSPITALS	.017	.027	9
OTHER SMALL HOSPITALS	-.060	.139	7
FOR ENTIRE SAMPLE	.040	.110	40

TABLE 20
CELL MEANS AND STANDARD DEVIATIONS
RETURN ON EQUITY VARIABLE FOR PERIOD 2

REGION	Mean	Std. Dev.	N
BALTIMORE METROPOLITAN HOSPITALS	.059	.059	18
MARYLAND SUBURBS OF D.C.	.050	.049	6
OTHER LARGE HOSPITALS	.050	.051	9
OTHER SMALL HOSPITALS	-.056	.109	7
FOR ENTIRE SAMPLE	.035	.077	40

The industry standard was .075. However, the range of ROEs had diminished, indicated by a reduced standard deviation. The Washington area hospitals had a mean ROE of .050 and a standard deviation of .049. The mean ROE for the remaining large hospitals was .050 with a standard deviation of .051. The seven small hospitals had a negative mean ROE of -.056 and a standard deviation of .109. For the entire 40-member sample, the mean ROE was .035; its standard deviation was .077. This was much lower than industry standards.

Late effects of rate-setting on the return on equity ratio. The third period analyzed, 1987-1988 indicated that the Baltimore metropolitan hospitals mean ROE increased to almost the middle of the range of acceptability while the Washington area hospitals had a low, unchanged mean ROE. The remaining group of other hospitals experienced an increase in the mean ROE. The seven small hospitals maintained an extremely low, unfavorable ROE. The late effects of rate setting show the sample had a very low mean ROE. The results are presented in Table 21. The industry median is .115.

Inferential statistics for the return on equity ratio. The return on equity ratios are transformed into new variables and used in a multivariate approach. The variables are orthogonal or uncorrelated and scaled such that the sum of squares of the coefficients is equal to one. Table 22 depicts the matrix of covariance among the three periods or partitioned between groups sums of squares; each partition has 1 df. By convention the sphericity assumption is a less restrictive

TABLE 21

CELL MEAN AND STANDARD DEVIATIONS

RETURN ON EQUITY VARIABLE FOR PERIOD 3

REGION	Mean	Std. Dev.	N
BALTIMORE METROPOLITAN HOSPITALS	.073	.094	18
MARYLAND SUBURBS OF D.C.	.050	.056	6
OTHER LARGE HOSPITALS	.071	.041	9
OTHER SMALL HOSPITALS	-.299	.860	7
FOR ENTIRE SAMPLE	.004	.372	40

TABLE 22

ORTHONORMALIZED TRANSFORMATION MATRIX (TRANSPOSED)

FOR RETURN ON EQUITY

	CONS	DIF12	DIF12V3	TC1	TC2	TCS
ROE1	.577	-.707	-.408	.000	.000	.000
ROE2	.577	.707	-.408	.000	.000	.000
ROE3	.577	.000	.816	.000	.000	.000
C1	.000	.000	.000	.577	-.707	-.408
C2	.000	.000	.000	.577	.707	-.408
C3	.000	.000	.000	.577	.000	.816

correlation structure than compound symmetry; it states that the covariance matrix for transformed variables is a diagonal matrix with equal variances on the diagonal. Since the off-diagonal elements, or covariants, are equal to zero, the covariances for all transformed variables are zero and correlates are likely to be zero. This group is one 40-member group that has been divided into four unequal subgroups.

ROE designates the dependent variable. Covariants are indicated by C1, C2, and C3. The difference between the first two periods is depicted in the DIF12 column and the difference among all three periods is noted in the DIF12V3 column. Transformed variables are indicated in the TC columns.

Effects of the contrast variable on return on equity. The region or between subjects effects were tested for significance using unique sums of squares. The results from testing the significance of the contrast variable on the return on equity are presented in Table 23. The calculated F's were compared with critical F's but only region was found to be significant at $p < .05$.

Tests involving return on equity within-subject effect. A regression analysis for the within-cells error term, the measurement of the error of the dependent variable, was completed using the contrast variable 'bed-occ' as the dependent variable. The sample had a standard error of .000 indicating no variability. The t value was .069 and the calculated significance of t was nonsignificant at .945.

TABLE 23

TESTS OF SIGNIFICANCE FOR THE CONTRAST VARIABLE USING UNIQUE SUMS OF
SQUARES FOR RETURN ON EQUITY

Source of Variation	SS	DF	MS	F	Sig of F
WITHIN CELLS	1.77	35	.05		
REGRESSION	.00	1	.00	.00	.945
CONSTANT	.00	1	.00	.09	.767
REGION	.54	3	.18	3.59	.023
N = 40					
p < .05					

Next a transformed variable, the difference between the periods, was used to measure the within-subject effect of the ROE through the use of several multivariate tests. Chi square was calculated to equal 44.45604 and has 2 df. The tabled chi square is 5.99 at $p < .05$. Since the calculated chi square value is greater than the critical value at $p < .05$, there is a significant difference between observed and expected numbers; the null hypothesis can be rejected. The Mauchly test for sphericity was .25998. Epsilons reflect the extent to which the covariate matrix deviates from sphericity. If sphericity is met then $E = 1$. The Greenhouse-Geisser Epsilon is one parameter that reflects the extent to which the covariate matrix deviates from sphericity; at .57471, it does not meet sphericity. Another measure, the Huynh-Feldt Epsilon, does not meet sphericity at .63093. Since the sphericity assumption is not met, the F-ratio is positively biased and the results may have been rejected too often.

Tests of significance for with-in regression for the return on equity ratio. Four multivariate tests of significance were performed to measure the within cells regression. The significance of F obtained in all cases was far beyond the cutoff of $p < .05$. Smaller values are desired to provide more evidence for treatment effects. For details see Table 24.

To measure the within-cells error term for the transformed dependent variable, regression analysis was performed. The differences of the return on equity ratio between the first two periods was used as

TABLE 24
EFFECT WITHIN-CELLS REGRESSION FOR RETURN ON EQUITY
MULTIVARIATE TESTS OF SIGNIFICANCE

Test Name	Value	Approx. F	Hypoth. DF	Error DF	Sig. of F
Pillais	.06448	.56638	4.00	68.00	.688
Hotellings	.06883	.55062	4.00	64.00	.699
Wilks	.93556	.55877	4.00	66.00	.693
Roy's	.06376				

N = 40
p < .05

significance of t was calculated and found to be greater than $p < .05$ at .964 and .200. Examining the differences in return on equity for all periods resulted in t values of .161 and $-.321$ with a significance of t at .873 and .750. The standard error was .000 in all of the cases.

Additional examination of the effects of region by return on equity occurred by the multivariate tests. The significance of all of the F 's were far beyond the $p < .05$ parameters. For details see Table 25.

Testing the effects of the return on equity ratio showed that the F 's did not approach significance. Table 26 shows the results.

The within-subjects effects for return on equity was tested using unique sums of squares. The results exceeded the $p < .05$ cut off. Details appear in Table 27.

A new variable, number of beds available time occupancy was created and named 'bed-occ'. Differences among the times were explored using bed-occ as a covariate. Holding the covariate bed-occ constant, there was a significant difference between regions. A constant was generated to depict the average response for all three periods studied.

Tests involving return of equity as a within-subjects effect require an assumption of homogeneity of variance for the repeated measure design. The Mauchly sphericity test was .000 and therefore, significant. However, this was not desirable; non-significance is preferred. Any interpretation of ROE based on this result must be made carefully. Multivariate tests of significance indicate the covariate

TABLE 25
EFFECT REGION BY RETURN ON EQUITY
MULTIVARIATE TESTS OF SIGNIFICANCE

Test Name	Value	Approx. F	Hypoth. DF	Error DF	Sig. of F
Pillais	.15424	.94707	6.00	68.00	.468
Hotellings	.16754	.89353	6.00	64.00	.505
Wilks	.85155	.92033	6.00	66.00	.486
Roys	.08975				
N = 40					
p < .05					

TABLE 26
EFFECT RETURN ON EQUITY
MULTIVARIATE TESTS OF SIGNIFICANCE

Test Name	Value	Approx. F	Hypoth. DF	Error DF	Sig. of F
Pillais	.02976	.50605	2.00	33.00	.607
Hotellings	.03067	.50605	2.00	33.00	.607
Wilks	.97024	.50605	2.00	33.00	.607
Roys	.02976				
N = 40					
p < .05					

TABLE 27

TESTS INVOLVING RETURN ON EQUITY WITHIN-SUBJECT EFFECT

AVERAGED TESTS OF SIGNIFICANCE FOR ROE USING UNIQUE SUMS OF SQUARES

Source of Variation	SS	DF	MS	F	Sig of F
WITHIN CELLS	3.33	71	.05		
REGRESSION	.01	1	.01	.24	.625
RETURN ON EQUITY	.09	2	.04	.92	.402
REGION BY RETURN EQUITY	.27	6	.04	.95	.467

N = 40
p < .05

bed-occ did not vary significantly over time; there was no reason to use bed-occ.

The interaction of region by ROE was insignificant. The effect of ROE was also insignificant as was the ROE as a within-subject effect.

Summary of Effects on the Return on Equity Ratio

The mean ROE for Baltimore metropolitan hospitals improved over the three periods. Washington area hospitals experienced a decline from periods 1 to 2, but were able to maintain a stable mean ROE from period two to three. The other large hospitals experienced some improvement in mean ROE's under the rate-setting while the remaining small hospitals mean ROE became more unfavorable. The entire sample experienced a slight decrease in ROE with the implementation of rate-setting.

Markup

Research question four: How has the implementation of the Maryland rate-setting system affected the markup ratio?

The markup ratio (MU) is a performance meter that is always positive. It is a multiple by which hospital charges are established—rates set above expenses. Theoretically, before prospective payment systems the markup ratios would be highest. High values imply higher rates per dollar of expenses and indicate greater profitability. After prospective payment, markups declined possibly because hospitals were controlling expenditures. The markup ratio and the deductible determine the operating margin. However, the deductible ratios must be favorable. Markups are influenced by the age of the plant and the debt principal schedule. Higher markups are essential for financial viability in hospitals with old plants or high debt service requirements. Markups can be at lower values if hospitals use nonoperating sources of income.

Cost-based reimbursement effects on the markup ratio. For the first period considered (1970-71), the Baltimore metropolitan hospitals had a mean MU that was at the national median of 1.15. Washington area hospitals had a slightly higher mean MU. The remaining large hospitals had a similar mean MU. The seven small hospitals had the lowest MU. The entire sample had an acceptable mean MU. Table 28 illustrates the details.

TABLE 28
CELL MEANS AND STANDARD DEVIATIONS
MARKUP VARIABLE FOR PERIOD 1

REGIONS	Mean	Std. Dev.	N
BALTIMORE METROPOLITAN HOSPITALS	1.156	.122	18
MARYLAND SUBURBS OF D. C.	1.195	.175	6
OTHER LARGE HOSPITALS	1.126	.060	9
OTHER SMALL HOSPITALS	1.057	.100	7
FOR ENTIRE SAMPLE	1.138	.121	40

Early effects of rate-setting on the markup ratio. Under rate-setting system the markup ratios dropped for all but the group of small hospitals. The industry standard was 1.18 for this period. Results are presented in Table 29. The group of small hospitals had the highest multiple to set rates while hospitals in the Baltimore area, the Washington area, and other large hospitals had mean MU's below industry standards. This lowered the entire sample's MU.

Late effects of rate-setting on the markup ratio. The most recent MUs for the ten-year-old system revealed Baltimore area hospitals increased their mean MUs and are close to the 1.25 industry standard. For Washington area hospitals the mean MU has returned to the same pre-rate-setting level and is now just below the national median. The two groups of other large and other small hospitals had similar mean MUs. Although the Baltimore and Washington area hospitals experienced an initial drop in the mean MU with the onset of rate-setting, the third period mean MUs are very close to the first period. This ratio is said to highlight the Maryland all-payer system. See Table 30 for details.

Inferential statistics for the markup ratio. The markup ratios are transformed into new variables and used in a multivariate approach. The transformed variables give the same multivariate test value. The variables are independent or uncorrelated and scaled such that the sum of squares of the coefficients is equal to one. Table 31 depicts the matrix of transformed variable or the partitioned between-groups sums of squares; each partition has 1 df. By convention the sphericity

TABLE 29
CELL MEANS AND STANDARD DEVIATIONS
MARKUP VARIABLE FOR PERIOD 2

REGIONS	Mean	Std. Dev.	N
BALTIMORE METROPOLITAN HOSPITALS	.843	.578	18
MARYLAND SUBURBS OF D. C.	.863	.365	6
OTHER LARGE HOSPITALS	1.000	.367	9
OTHER SMALL HOSPITALS	1.357	.798	7
FOR ENTIRE SAMPLE	.971	.570	40

TABLE 30
CELL MEANS AND STANDARD DEVIATIONS
MARKUP VARIABLE FOR PERIOD 3

REGIONS	Mean	Std. Dev.	N
BALTIMORE METROPOLITAN HOSPITALS	1.142	.058	18
MARYLAND SUBURBS OF D. C.	1.122	.025	6
OTHER LARGE HOSPITALS	1.134	.027	9
OTHER SMALL HOSPITALS	1.119	.083	7
FOR ENTIRE SAMPLE	1.133	.054	40

TABLE 31
ORTHONORMALIZED TRANSFORMATION MATRIX (TRANSPosed)
FOR MARKUP

	CONS	DIF12	DIF12V3	TC1	TC2	TCS
MU1	.577	-.707	-.408	.000	.000	.000
MU2	.577	.707	-.408	.000	.000	.000
MU3	.577	.000	.816	.000	.000	.000
C1	.000	.000	.000	.577	-.707	-.408
C2	.000	.000	.000	.577	.707	-.408
C3	.000	.000	.000	.577	.000	.816

assumption states that the covariate matrix for transformed variables is a diagonal matrix with equal variances on the diagonal. If the off-diagonal elements are equal to zero, then the covariances for all transformed variables are zero and correlates are likely to be zero. There is one group divided into four unequal subgroups.

MU designates the dependent variable markup for periods one through three. For each period the covariates, number of licensed beds multiplied by the occupancy, are indicated by C1, C2, and C3. The difference between the first two periods is depicted in the DIF12 column and the difference among all three periods is noted in the DIF12V3 column. Transformed variables are indicated in the TC columns.

Effects of the contrast variable on the markup ratio. The region or between-subjects effects were tested for significance using unique sums of squares. The results from testing the significance of the contrast variable on the markup are presented in Table 32. Except for the constant the calculated F's were compared with critical F's but were not found to be significant at $p < .05$.

Tests involving markup within-subject effects. A regression analysis for the within-cells error term was completed using the contrast variable as the dependent variable. The sample had a standard error of .000, indicating no variability in this particular case. The t value was -1.704 while the calculated significance of t was .097 and nonsignificant as it surpassed the $p < .05$ cutoff.

TABLE 32
TESTS OF SIGNIFICANCE FOR THE CONTRAST VARIABLE USING UNIQUE SUMS OF
SQUARES FOR MARKUP

Source of Variation	SS	DF	MS	F	Sig of F
WITHIN CELLS	2.80	35	.08		
REGRESSION	.23	1	.23	2.91	.097
CONSTANT	51.77	1	51.77	646.94	.000
REGION	.05	3	.02	.20	.895

N = 40
p < .05

Next, a transformed variable, the difference between the periods, was used to measure the within-subject effect of the markup through the use of several multivariate tests. Chi square was calculated to equal 116.32242 and has 2 df. The tabled chi square is 5.99 at $p < .05$. Since the calculated chi square value is greater than the critical value at $p < .05$, there is a significant difference between observed and expected numbers; the null hypothesis can be rejected. Epsilons reflect the extent to which the covariance matrix deviates from sphericity. If the sphericity assumption is met, then $E = 1$. The Greenhouse-Geisser Epsilon is one parameter that reflects the extent to which the covariance matrix deviates from sphericity; at .50747 it is much less than one and does not approach sphericity. Other epsilons had similar results and did not meet sphericity. Since the sphericity assumption is met, the F-ratio is not positively biased and the results have not been rejected too often.

Tests of significance for within regression for the markup ratio.

Four multivariate tests of significance were performed to measure the within-cells regression. The results are in Table 33. The significance of F obtained in all cases was far beyond the cutoff of $p < .05$. Smaller values are desired to provide more evidence for treatment effects.

To measure the within-cells error term for the transformed dependent variable, regression analysis was performed. The differences of the markup between the first two periods was used as the dependent variable. T values of -1.405 and 1.181 were obtained; the significance

TABLE 33
EFFECT WITHIN-CELLS REGRESSION FOR MARKUP
MULTIVARIATE TESTS OF SIGNIFICANCE

Test Name	Value	Approx. F	Hypoth. DF	Error DF	Sig. of F
Pillais	.10289	.92198	4.00	68.00	.456
Hotellings	.10895	.87157	4.00	64.00	.486
Wilks	.89955	.89684	4.00	66.00	.471
Roys	.06574				

N = 40
p < .05

of t was calculated and found to be much greater than $p < .05$ at .169 and .246. Examining the differences in operating margins for all periods resulted in t values of 1.221 and -1.456 with a significance of t at .231 and .155.

Additional examination of the effects of region by the markup occurred by the multivariate tests and is presented in Table 34. The significance of all of the F 's were far beyond the $p < .05$ parameters.

Multivariate tests were performed to test the effect of the markup ratio. The F 's obtained were far beyond the cutoff of $p < .05$. The results are in Table 35.

The within-subject effect was tested by using unique sums of squares. The F 's exceeded the cutoff. See Table 36.

Summary of Effects on the Markup Ratio

The markup ratio most closely approximates a desirable performance ratio. From this ratio alone it would appear that Maryland's rate-setting system is not forcing hospitals to control expenditures.

TABLE 34
EFFECT REGION BY MARKUP
MULTIVARIATE TESTS OF SIGNIFICANCE

Test Name	Value	Approx. F	Hypoth. DF	Error DF	Sig. of F
Pillais	.14066	.85735	6.00	68.00	.531
Hotellings	.15832	.84437	6.00	64.00	.541
Wilks	.86148	.85143	6.00	66.00	.535
Roys	.12335				
N = 40					
p < .05					

TABLE 35
EFFECT MARKUP
MULTIVARIATE TESTS OF SIGNIFICANCE

Test Name	Value	Approx. F	Hypoth. DF	Error DF	Sig. of F
Pillais	.00223	.03694	2.00	33.00	.964
Hotellings	.00224	.03694	2.00	33.00	.964
Wilks	.99777	.03694	2.00	33.00	.964
Roys	.00223				
N = 40					
p < .05					

TABLE 36

TESTS INVOLVING MARKUP WITHIN-SUBJECT EFFECT

AVERAGED TESTS OF SIGNIFICANCE FOR MU USING UNIQUE SUMS OF SQUARES

Source of Variation	SS	DF	MS	F	Sig of F
WITHIN CELLS	8.63	71	.12		
REGRESSION	.18	1	.18	1.45	.233
MARKUP	.10	2	.05	.43	.655
REGN BY MARKUP	1.08	6	.18	1.48	.196

N = 40
p < .05

Deductible

Research question five: How has the implementation of the Maryland rate-setting system affected the deductible ratio?

The deductible ratio (DE) is a common profitability ratio that measures revenue write-offs. It measures the proportion of gross patient service revenue that is not expected to be realized in cash. Increasing values of the deductible ratio results in declining profitability because a larger percentage of the total revenue is not being collected. A high deductible indicates a large portion of cost paying patients instead of charge paying patients. Hospitals react to high deductibles by increasing markup or by increasing nonoperating sources of funding. Small changes in the deductible ratio can have a profound impact on profitability.

Cost-based reimbursement effects on the deductible ratio. For the cost-based reimbursement period, Baltimore metropolitan hospitals had mean deductible higher than the .12 industry standard. In this case, decreasing values and below-median values are favorable. The Washington area hospitals had a below standard mean deductible. The two groups of other groups of large and other small hospitals in Maryland had similar mean deductibles that were below the established norm. The entire sample had a mean deductible at the national median established by the industry. See Table 37 for details.

TABLE 37
CELL MEANS AND STANDARD DEVIATIONS
DEDUCTIBLE VARIABLE FOR PERIOD 1

REGIONS	Mean	Std. Dev.	N
BALTIMORE METROPOLITAN HOSPITALS	.139	.060	18
MARYLAND SUBURBS OF D. C.	.117	.058	6
OTHER LARGE HOSPITALS	.102	.039	9
OTHER SMALL HOSPITALS	.101	.064	7
FOR ENTIRE SAMPLE	.121	.057	40

Early rate-setting system results on the deductible ratio. Under the rate-setting system, the Baltimore metropolitan hospitals mean deductible diminished during the early years. The mean deductible for Washington area hospitals dwindled. The two groups of other large and other small hospitals had similar deductibles that were lower than the cost-based era. The mean deductible for the entire sample plummeted. The industry standard was .133. Results are presented in Table 38.

Late effects of rate-setting on the deductible ratio. The rate-setting system showed the Baltimore metropolitan hospitals with a higher mean deductible during the third period than the second period; the mean DE is below the .171 industry standard and favorable. The Washington area hospitals had the lowest deductible. The other large hospitals had a mean deductible that was similar. For the entire sample the mean deductible rose but did not attain its period one level. Table 39 presents the findings.

Inferential statistics for the deductible ratio. The markup ratios are transformed into new variables and used in a multivariate approach. The transformed variables give the same multivariate test value. The variables are orthogonal or uncorrelated and scaled such that the sum of squares of the coefficients is equal to one. Table 40 depicts the matrix of covariance for the transformed deductible or the partitioned between-groups sums of squares; each partition has 1 df. By convention the sphericity assumption states that the covariate matrix for transformed variables is a diagonal matrix with equal

TABLE 38
CELL MEANS AND STANDARD DEVIATIONS
DEDUCTIBLE VARIABLE FOR PERIOD 2

REGIONS	Mean	Std. Dev.	N
BALTIMORE METROPOLITAN HOSPITALS	.090	.019	18
MARYLAND SUBURBS OF D. C.	.078	.024	6
OTHER LARGE HOSPITALS	.082	.010	9
OTHER SMALL HOSPITALS	.079	.015	7
FOR ENTIRE SAMPLE	.085	.018	40

TABLE 39
CELL MEANS AND STANDARD DEVIATIONS
DEDUCTIBLE VARIABLE FOR PERIOD 3

REGIONS	Mean	Std. Dev.	N
BALTIMORE METROPOLITAN HOSPITALS	.119	.030	18
MARYLAND SUBURBS OF D. C.	.100	.017	6
OTHER LARGE HOSPITALS	.102	.013	9
OTHER SMALL HOSPITALS	.119	.035	7
FOR ENTIRE SAMPLE	.112	.027	40

TABLE 40
ORTHONORMALIZED TRANSFORMATION MATRIX (TRANSPOSED)
FOR THE DEDUCTIBLE RATIO

	CONS	DIF12	DIF12V3	TC1	TC2	TCS
DE1	.577	-.707	-.408	.000	.000	.000
DE2	.577	.707	-.408	.000	.000	.000
DE3	.577	.000	.816	.000	.000	.000
C1	.000	.000	.000	.577	-.707	-.408
C2	.000	.000	.000	.577	.707	-.408
C3	.000	.000	.000	.577	.000	.816

variances on the diagonal. If the off diagonal elements are equal to zero, then the covariance for all transformed variables are zero and correlates are likely to be zero. There is one group divided into four unequal subgroups.

DE designates the dependent-variable deductible for periods one through three. For each period the covariates, number of licensed beds multiplied by the occupancy, are indicated by C1, C2, and C3. The difference between the first two periods is depicted in the DIF12 column and the difference among all three periods is noted in the DIF12V3 column. Transformed variables are indicated in the TC columns.

Effects of the contrast variable on the deductible ratio. The region or between-subjects effects were tested for significance using unique sums of squares. The results from testing the significance of the contrast variable on the deductible are presented in Table 41. The calculated F's were compared with critical F's but were not found to be significant at $p < .05$.

Tests involving deductible within-subject effects. A regression analysis for the within-cells error term was completed using the contrast variable as the dependent variable. The sample had a standard error of .000 indicating no variability in this particular case. The t value was 2.000, while the calculated significance of t was .053 and nonsignificant as it was just beyond the $p < .05$ cutoff.

TABLE 41

TESTS OF SIGNIFICANCE FOR THE CONTRAST VARIABLE USING UNIQUE SUMS OF SQUARES
FOR THE DEDUCTIBLE RATIO

Source of Variation	SS	DF	MS	F	Sig of F
WITHIN CELLS	.05	35	.00		
REGRESSION	.01	1	.01	4.00	.053
CONSTANT	.33	1	.33	219.44	.000
REGION	.01	3	.00	1.18	.333
N = 40					
p < .05					

Next a transformed variable, the difference between the periods, was used to measure the pooled variance effect or the within-subject effect of deductible through the use of several multivariate tests. The Mauchly test for sphericity was .13764; this test is highly sensitive to data that deviates from multivariate normality. Chi square was calculated to equal 65.44333 and has 2 df. The tabled chi square is 5.99 at $p < .05$. Since the calculated chi square value is greater than the critical value at $p < .05$, there is a significant difference between observed and expected numbers; the null hypothesis can be rejected. Epsilons reflect the extent to which the covariate matrix deviates from sphericity. If sphericity is met then $E = 1$. The Greenhouse-Geisser Epsilon is one parameter that reflects the extent to which the covariate matrix deviates from sphericity; at .53695 it is much less than one and does not approach sphericity. Another measures have similar findings and do not meet sphericity.

Tests within-cells regression for the deductible ratio. Four multivariate tests of significance were performed to measure the within-cells regression. The significance of F obtained in all cases was far beyond the cutoff of $p < .05$. Smaller values are desired to provide more evidence for treatment effects. The results are presented in Table 42.

To measure the within-cells error term for the transformed dependent variable, regression analysis was performed. The differences of the deductible ratio between the first two periods was used as the dependent variable. T values of $-.981$ and $.069$ were obtained; the significance of t was calculated and found to be much greater than $p < .05$ at .379 and .946.

TABLE 42
EFFECT WITHIN-CELLS REGRESSION FOR DEDUCTIBLE
MULTIVARIATE TESTS OF SIGNIFICANCE

Test Name	Value	Approx. F	Hypoth. DF	Error DF	Sig. of F
Pillais	.17793	1.66005	4.00	68.00	.169
Hotellings	.21568	1.72540	4.00	64.00	.155
Wilks	.82236	1.69508	4.00	66.00	.162
Roys	.17633				

N = 40
p < .05

Examining the differences in operating margins for all periods resulted in t values of -2.079 and .487 with significance of t at .045 and .629.

Additional examination of the effects of region by the operating margin occurred by the multivariate tests and is presented in Table 43. The significance of all of the F's were far beyond the $p < .05$ parameters.

Multivariate test were performed to determine the effect of the deductible. The F's were all significant at .000. See Table 44 for details.

Testing the within-subject effect using unique sums of squares was completed. The deductible as a source of variation was significant. Table 45 presents the details.

Summary of Effects on the Deductible Ratio

All hospitals experienced a severe decline in the deductible ratio and have not reached their original mean deductible under rate-setting. Tests of significance of the region or covariate were nonsignificant.

III. SUMMARY OF ANALYSIS

Performance ratios are commonly-used indicators for determining financial health of hospitals. The efficiency of institutions in generating income is identified along with this measure of financial health. Over a period of time, zero or negative ratios indicate jeopardized viability of the institution. Financial strength and

TABLE 43
EFFECT REGION BY DEDUCTIBLE
MULTIVARIATE TESTS OF SIGNIFICANCE

Test Name	Value	Approx. F	Hypoth. DF	Error DF	Sig. of F
Pillais	.15185	.93120	6.00	68.00	.478
Hotellings	.16821	.89710	6.00	64.00	.503
Wilks	.85239	.91447	6.00	66.00	.490
Roy's	.11500				

N = 40
p < .05

TABLE 44
EFFECT DEDUCTIBLE
MULTIVARIATE TESTS OF SIGNIFICANCE

Test Name	Value	Approx. F	Hypoth. DF	Error DF	Sig. of F
Pillais	.64119	29.48594	2.00	33.00	.000
Hotellings	1.78703	29.48594	2.00	33.00	.000
Wilks	.35881	29.48594	2.00	33.00	.000
Roy's	.64119				

N = 40
p < .05

TABLE 45

TESTS INVOLVING DEDUCTIBLE WITHIN-SUBJECT EFFECT

AVERAGED TESTS OF SIGNIFICANCE FOR DE USING UNIQUE SUMS OF SQUARES

Source of Variation	SS	DF	MS	F	Sig of F
WITHIN CELLS	.09	71	.00		
REGRESSION	.00	1	.00	1.37	.246
DEDUCT	.01	2	.01	5.21	.008
REGION BY DEDUCIBLE	.01	6	.00	.72	.637
N = 40					
p < .05					

efficiency are demonstrated by consistent positive performance ratios. The hospital industry's criticism of rate regulation is that these regulations curb hospital costs by reducing profit margins. Drastically reduced profit margins diminish the ability of the hospitals to generate capital sufficient to finance future operations. Three ratios, operating margin, return on assets, and return on equity, indicate a diminished profitability. Since profits are low, the long run viability and quality can be compromised. Profit minimization is not in the best interest of society. The long-term implications of poor financial health--lack of quality patient care--can impact the health of the community adversely.

Profitability may also be documented through an analysis of the Statement of Financial Position. Nonprofit health care organizations use profit to pay outstanding debts, to acquire plant and equipment, or to increase working capital.

CHAPTER V

SUMMARY, FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

I. SUMMARY

The primary purpose of this study was to see what effect the Maryland health care rate-setting system had on five profitability ratios. The rate-setting system as a prospective payment method has been credited with curtailing hospital spending. Many studies indicate the success of PPSs by reductions in health care costs. The methods the hospital industry uses to reduce costs are beginning to be well explored. Time-limited reductions in costs occur through a variety of methods. Reductions in the quality of health care or unfavorable changes in hospital financial viability can occur. The effectiveness of rate-setting as a tool to curb health care costs is questionable if such decreases result in poor financial health of consumers or poor financial viability of the institution. Poor financial health has long term deleterious effects, such as the reduced capacity of the institution to borrow funding, diminished access to health care, as well as diminished access to the health care facility for the consumer.

The data were obtained from the Maryland Hospital Association. It was a collection of audited balance sheets and income statements for all health care facilities for nineteen years. Forty hospitals were

common to all three periods considered and had complete data for the five ratios of interest.

The five performance ratios were constructed through the use of Lotus 1-2-3 version 2.0. dBASE3 was used to develop a data base to include the number of beds, occupancy rate, and region. Since the size of the sample was small and the same hospitals were measured more than once, repeated measures was used. SPSS-PC was used.

An analysis of nineteen years of data was made by focusing on six years. For stability, the six years were collapsed into three, two-year periods. The earliest data available under cost-based reimbursement were from the years 1970-1971. This was designated as period one. The rate-setting system was implemented slowly over a greater than two-year period; therefore, early maturity for the rate-setting system were defined as occurring two years after the conclusion of implementation at 1979-1980 and was identified as period two. The last two years of data available, 1987-1988, were used to test the effects of the rate-setting system after ten years and was labeled period three. The descriptive statistics were compared to industry norms using the works of Cleverly and AHA established parameters. Descriptive statistics were used to compare the cost based and rate-setting methods of reimbursement. A covariate consisting of the number of beds in each hospital and its occupancy rate was used as a controlling variable.

The primary purpose of the study was to examine the profitability ratios of hospitals. The study focused on choosing the appropriate ratios to reflect most accurately the financial health of the

institutions and on developing the appropriate instrument for measurement. Health care financing literature has an abundance of material covering many ratios. Many health care institutions, especially the for-profit institutions, rely on financial indicators as a form of guidance. The health care industry is sometimes compared to the banking industry. Through review of the literature in health care financing and related business fields appropriate ratios and standards were determined.

Data tapes were obtained from the Maryland Hospital Association. The tapes included balance sheets and income statements for all Maryland hospitals for 19 years. Five profitability ratios were calculated for 40 hospitals for three periods of time. The first period 1970-1971 was the earliest amount of data available and under retrospective cost-based reimbursement. The second period, 1979-1980, focussed on the early years of rate-setting. All hospitals implemented the rate-setting system over a period of time that extended beyond two years. The third period of time, 1987-1988, was used to measure the latest effects of the rate-setting system.

The five profitability ratios were examined by a repeated measures analysis. Profitability was poor during the three periods.

II. FINDINGS

The results of the analysis of the impact of the Maryland rate-setting system on hospital profitability is summarized below in the Table 46. For a detailed explanation of these findings return to Chapter 4. For the convenience of the reader the findings are summarized as follows:

1. The results for the operating margin ratio were not statistically significant under rate-setting.
2. The results for the return on assets ratio were not statistically significant under rate-setting.
3. The results for the return on equity ratio were not statistically significant under rate-setting.
4. The results for the markup ratio were not statistically significant under rate-setting.
5. The results for the deductible ratio were not statistically significant under rate-setting.

III. CONCLUSIONS

The Maryland rate-setting method of prospective payment systems resulted in a slight gain of hospital profitability. However, the gain was not statistically significant. Further it appears that rate-setting as demonstrated in this study will have a negative effect on growth and expansion of hospitals with respect to technological advances.

TABLE 46

SUMMARY OF ANALYSIS OF PROFITABILITY RATIOS

	ON	ROA	ROE	MU	DE
COST-BASED EFFECTS OF MARYLAND RATE-SETTING SYSTEM	UNFAVORABLE	UNFAVORABLE	UNFAVORABLE	FAVORABLE	FAVORABLE
EARLY EFFECTS OF MD RATE-SETTING SYSTEM	UNFAVORABLE	UNFAVORABLE	UNFAVORABLE	UNFAVORABLE	FAVORABLE
LATEST EFFECTS OF MD RATE-SETTING SYSTEM	UNFAVORABLE	UNFAVORABLE	UNFAVORABLE	FAVORABLE	FAVORABLE
TRANSFORMING THE PROFITABILITY RATIOS	COVARIANCE MATRIX WITH EQUAL VARIANCES	COVARIANCE MATRIX WITH EQUAL VARIANCES	COVARIANCE MATRIX WITH EQUAL VARIANCES	COVARIANCE MATRIX WITH EQUAL VARIANCES	COVARIANCE MATRIX WITH EQUAL VARIANCES
EFFECTS OF 'END-000' ON PROFITABILITY RATIOS	NOT SIGNIFICANT	NOT SIGNIFICANT	HELDING END-000 CONSTANT REGION IS SIGNIFICANT	NOT SIGNIFICANT	NOT SIGNIFICANT
WITHIN-SUBJECT EFFECTS OF PROFITABILITY	NOT SIGNIFICANT	NOT SIGNIFICANT	NOT SIGNIFICANT	NOT SIGNIFICANT	NOT SIGNIFICANT
WITHIN-CELLS REGRESSION FOR PROFITABILITY RATIOS	NOT SIGNIFICANT	NOT SIGNIFICANT	NOT SIGNIFICANT	NOT SIGNIFICANT	NOT SIGNIFICANT
EFFECTS OF REGION	NOT SIGNIFICANT	NOT SIGNIFICANT	NOT SIGNIFICANT	NOT SIGNIFICANT	NOT SIGNIFICANT
EFFECTS OF PROFITABILITY RATIO	NOT SIGNIFICANT	NOT SIGNIFICANT	NOT SIGNIFICANT	NOT SIGNIFICANT	NOT SIGNIFICANT
WITHIN-SUBJECT EFFECT	NOT SIGNIFICANT	NOT SIGNIFICANT	NOT SIGNIFICANT	NOT SIGNIFICANT	SIGNIFICANT AS A SOURCE OF VARIATION

IV. RECOMMENDATIONS

The following recommendations are based on the findings of the study.

1. Further exploration of other financial ratios to determine the total financial viability of the health care institutions.

2. Additional study of each subgroup to determine access, price, and quality of health care. This study should include an exploration of the number and kind of affiliations that have developed among the institutions. Existing incentives under the rate-setting system for each subgroup would be identified and explored.

3. Further exploration of modification of rate-setting under financial simulation.

CHAPTER VI

EPILOGUE

I. INTRODUCTION

Present methods for rate-setting are not sufficiently developed to project income and expenses accurately; thus, profitable patient care cannot be assured. New financial techniques that employ accurate indicators are essential for economic survival of health care institutions in a hostile environment. Traditional methods are ineffective and must be abandoned. Because of this old, inadequate system, health care management functions in a reactionary, crisis oriented mode rather than a carefully planned proactive state. At present there is a paucity of effective management tools to help managers manage more effectively. The rate-setting system needs a mechanism for budget forecasting.

Since the Maryland system is an all payer system, its budget forecasting techniques would permit one payment level for the same service. Organizing resources according to services is becoming more popular. Additional study of variations within these services would provide much needed information about patient mix and volume by diagnoses. Accurate standard costing, an accounting technique, is essential to capture intermediate products/services by payer source. This knowledge will enhance the accurate projection of expenses as well as revenues. The forecasting system must be flexible enough to

indicate the need for rapid changes when unexpected and undesirable trends emerge. In a resource-constrained environment, management needs to be able to detect dangers and respond quickly.

Computer simulation could be used to predict different scenarios for each hospital and permit justification of rate changes. At present, systems provide data much too late for it to be used effectively. With the popularity of computer technology, sliding-scale formulas could be explored by each institution to predict its benefits and areas of concern.

Success in the management of health care is like success in any other business; cost, price, and quantity must be balanced. Fewer resources applied to rectifying errors or lost to waste, maintaining quality, and reducing costs can be compatible goals.

In the past 50 years consumer expectations of health care have changed just as dramatically as the methods of financing health care have. Health was first taken for granted or viewed as a lucky state. Consumer health knowledge grew with advances in biomedical technology. Now in the 1980's expectations regarding favorable health care outcomes are high and increasing. But, expectations are rising at a time of resource constraints. To make matters worse, the health problems plaguing our society are chronic and pervasive; they are the result of life style choices—years of living. They will not be as easy to obliterate as were the diseases of the past. Nutrition, immunology, and sanitation exerted major impacts in the past.

Prevention or minimizing disease or disability states is the key to the future. Knowledge that will lead to the control or influence of

the status of one's health, to avoid disease, to ameliorate genetic related conditions, or to cope with the results of accidents is slowly increasing.

Total responsibility for health care financing has shifted from the individual to a variety of systems. With the use of any system, priorities are established and a finite amount of resources are available. Hospitals have attempted to use a variety of cost saving strategies. With the increasing demands by consumers some form of rationing is used to provide basic levels of care to all members of society. Patient education is mandated by the Joint Commission on the Accreditation of Healthcare Organizations and can be developed into specific protocols. Hospitals can use health education to maximize the health care dollar. Patient education is an integral and essential component of high quality care. But care must be taken to apply the resources to health education in a planned and purposeful manner. Careful planning, implementation, and evaluation are essential to maximize the effect of the health care dollar. Innovation will be the key in a continual search to find inexpensive, effective, and interesting methods to educate the consumer.

Patient education in the hospital setting is often crisis-oriented and brief. A variety of strategies can be employed to benefit the consumer and the institution. Medical costs can be curbed while the quality of care and favorable outcomes are enhanced. Patient education resources can be applied to the outpatient sector to extend the time patients have to absorb unfamiliar material; this bolsters understanding and compliance. The orientation to the hospital

experience can be provided in a variety of ways--video, group classes, individual instruction, and published literature. The hospitalized patient's education can be completed after discharge from the institution; this may increase comprehension and compliance. Patient education resources can also be applied per diagnosis; the specific educational approaches would vary according to the diagnosis.

II. PATIENT EDUCATION STRATEGIES

Pre-operative education is needed to alleviate patient anxieties. Research has proved that for many types of patients this type of strategy results in fewer complications, a reduction in the length of stay, and fewer resources consumed during the inpatient stay. Prospective pricing defines the average financial resources to be consumed. Programs of this nature would benefit both the consumer and the institution. Many economical, educational devices would be available. Pre-admission classes linked with outpatient testing could be done in groups, by videos, or individually to accommodate a variety of aptitudes, interests, and conditions. Hospitals could also use patient education as a marketing strategy.

Many patients are independent and require minimal intervention, while others have complicated treatment regimes. A variety of self-care programs have been created during the past few years to maximize the patient's involvement in their own care.

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APPENDICES

APPENDIX A

Profitability Measures: Definitions of Variables

Profitability Measures: Definitions of Variables

Operating Margin	= $\frac{\text{Total operating revenue} - \text{operating expenses}}{\text{total operating revenue}}$
Return/assets	= $\frac{\text{Excess revenues over expenses}}{\text{total assets}}$
Return/equity	= $\frac{\text{Excess revenue over expenses}}{\text{fund balance}}$
Markup	= $\frac{\text{Gross patient revenue} + \text{other operating revenue}}{\text{operating expenses}}$
Deductibles	= $\frac{\text{Total deductions}}{\text{gross patient revenue}}$

APPENDIX B

Sample Program

APPENDIX B

SAMPLE PROGRAM

COMPUTE C1=BEDS1*OCCU1.

COMPUTE C2=BED2*OCCU2.

COMPUTE C3=BED3*OCCU3.

MANOVA OM1 OM2 OM3

The raw data or transformation pass is proceeding

40 cases are written to the uncompressed active file.

BY REGN (1,4)

WITH C1 C2 C3

/WSFACTORS=OPMARG (3)

/CONTRAST (OPMARG) =DIFFERENCE

/RENAME=CONS DIF12 DIF12V3 TC1 TC2 TCS

/WSDSIGN

/PRINT=CELLINFO (MEANS) TRANSFORM

/DESIGN.

40 cases accepted.

0 cases rejected because of out-of-range factor values.

0 cases rejected because of missing data.

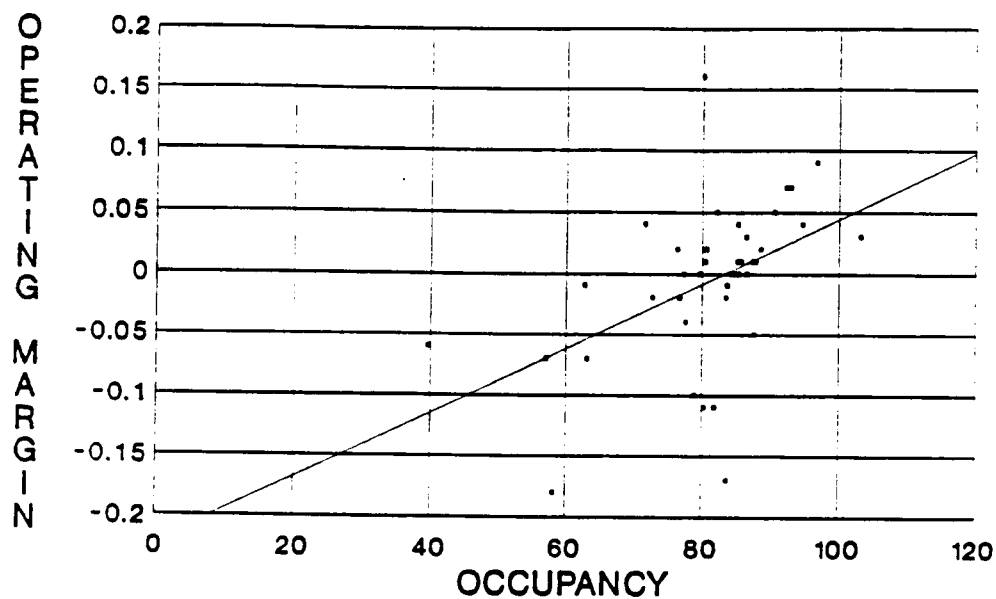
4 non-empty cells.

1 design will be processed.

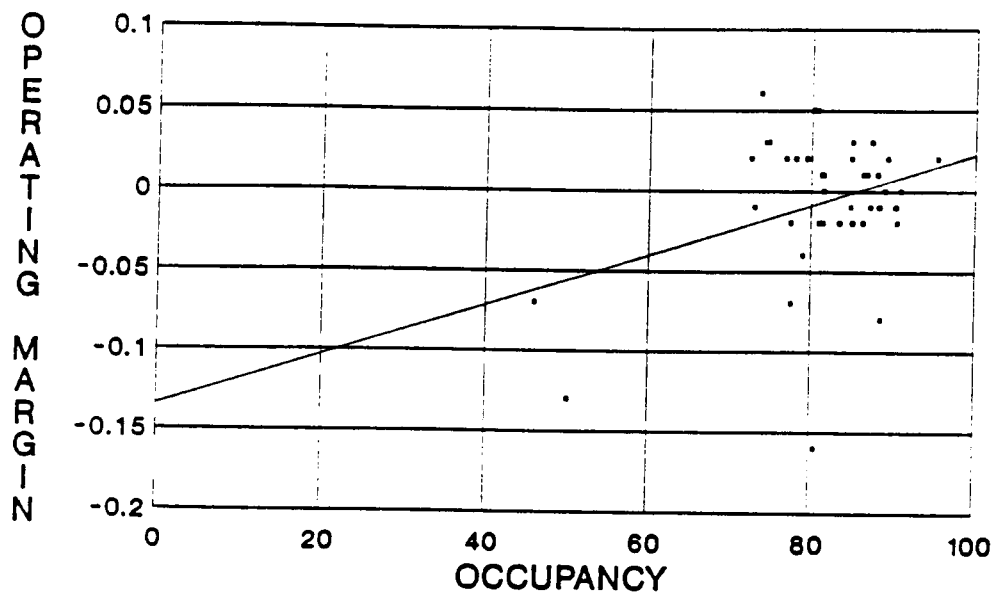
APPENDIX C

Trends in Profitability Ratios for Each Period by Occupancy

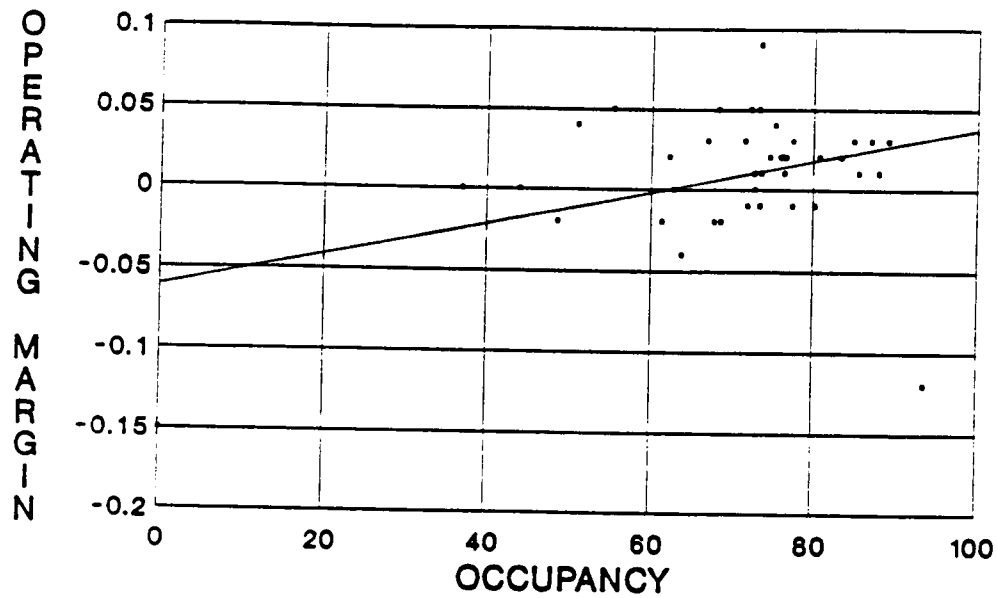
TRENDS IN OPERATING MARGIN BY OCCUPANCY FOR PERIOD 1



TRENDS IN OPERATING MARGIN BY OCCUPANCY FOR PERIOD 2



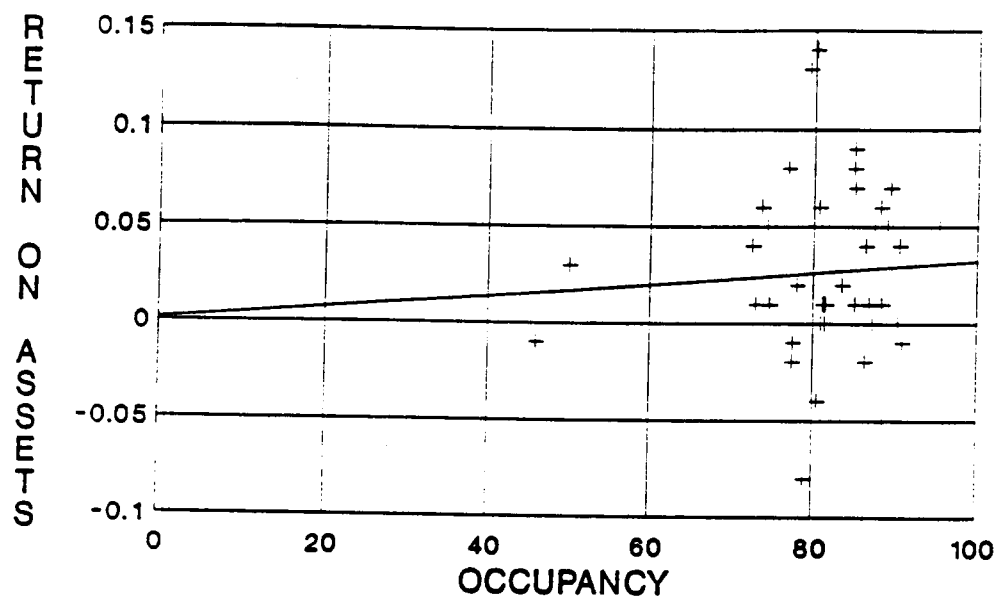
TRENDS IN OPERATING MARGIN BY OCCUPANCY FOR PERIOD 3



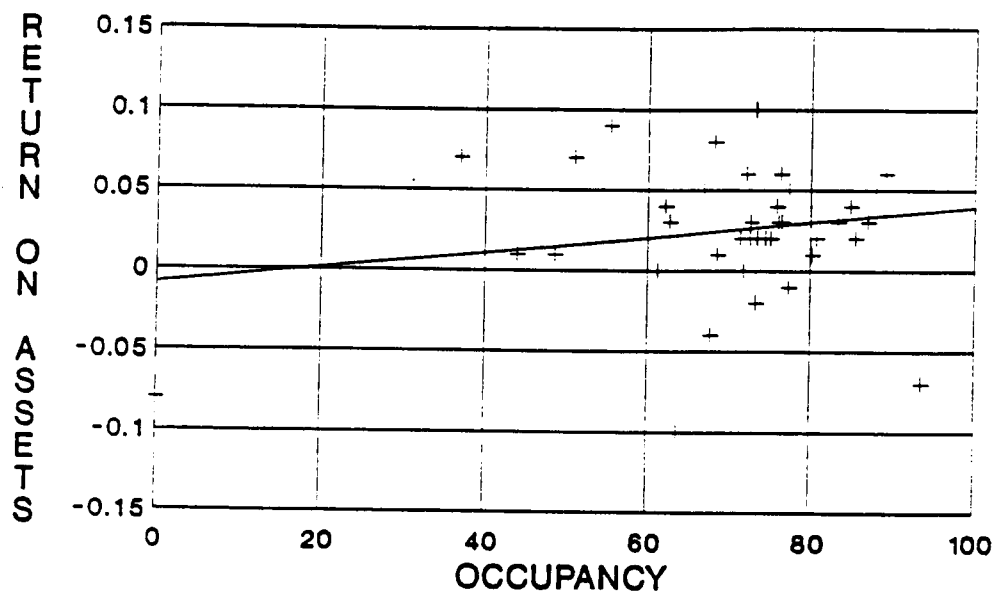
A scatter plot showing the relationship between Occupancy (X-axis) and Return on Assets (Y-axis). The X-axis ranges from 0 to 120 with major grid lines every 20 units. The Y-axis ranges from -0.1 to 0.2 with major grid lines every 0.05 units. A solid regression line is drawn through the data points, showing a positive correlation. The data points are represented by '+' symbols.

Occupancy	Return on Assets
40	-0.01
55	-0.03
60	-0.01
65	-0.02
70	0.01
72	0.08
75	0.03
78	-0.01
80	0.07
80	-0.01
82	0.01
83	0.04
84	0.06
85	0.01
85	0.02
86	0.01
87	0.01
88	0.03
90	0.08
95	0.18
98	0.14
105	0.04
80	-0.10
85	-0.05

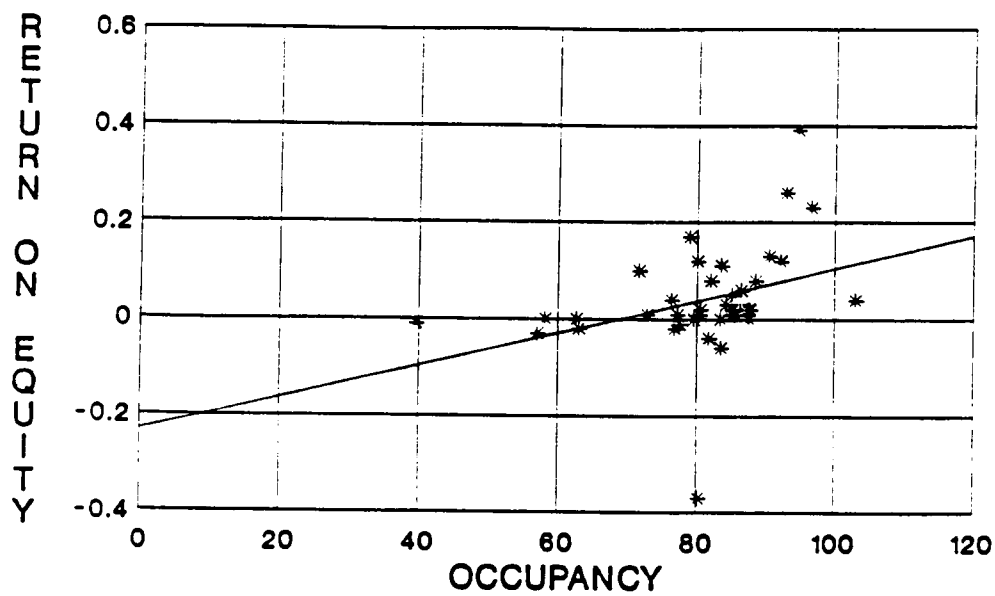
TRENDS IN RETURN ON ASSETS BY OCCUPANCY FOR PERIOD 2



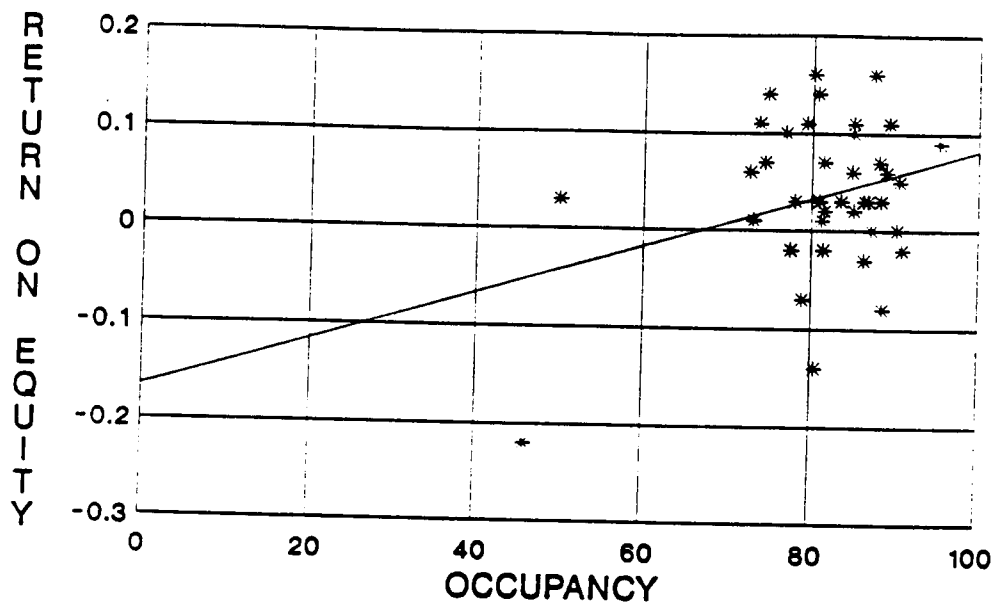
TRENDS IN RETURN ON ASSETS BY OCCUPANCY FOR PERIOD 3



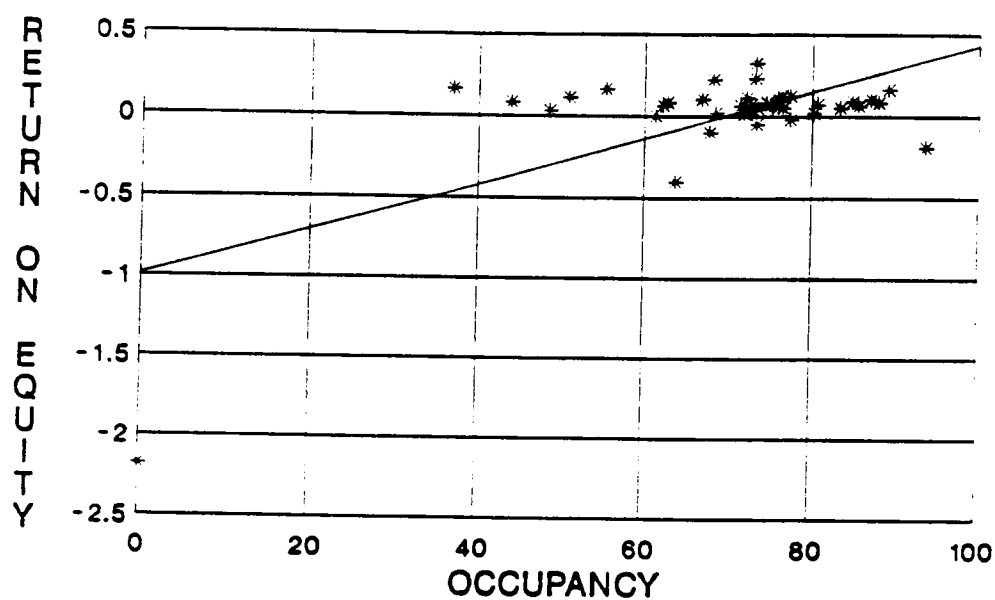
TRENDS IN RETURN ON EQUITY BY OCCUPANCY FOR PERIOD 1



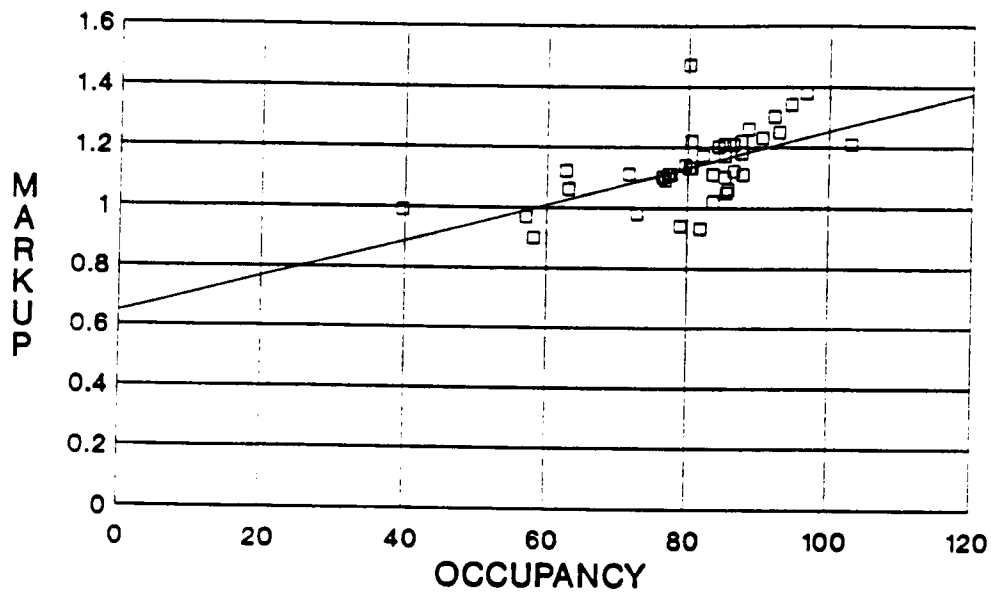
TRENDS IN RETURN ON EQUITY BY OCCUPANCY FOR PERIOD 2



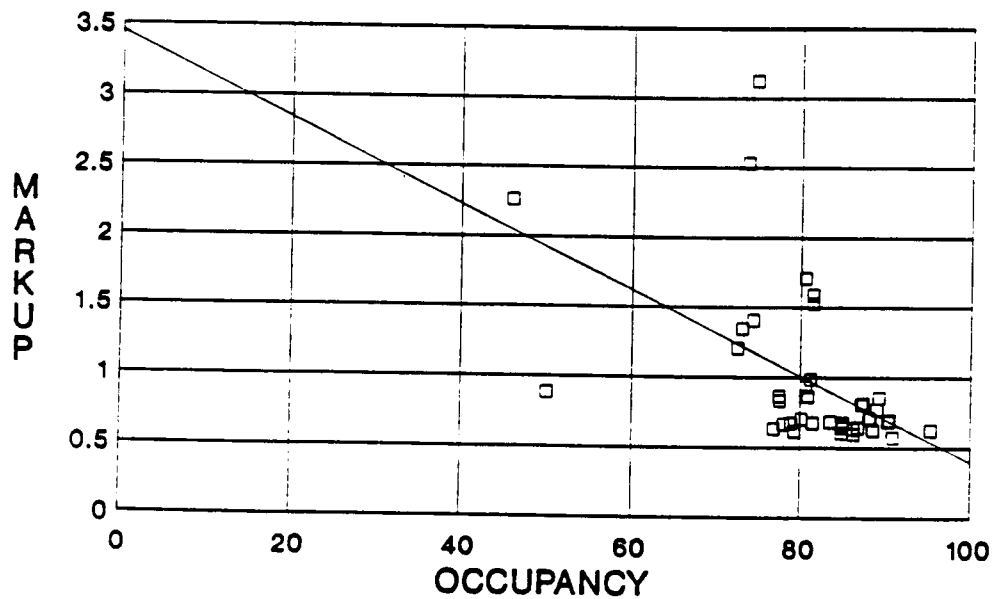
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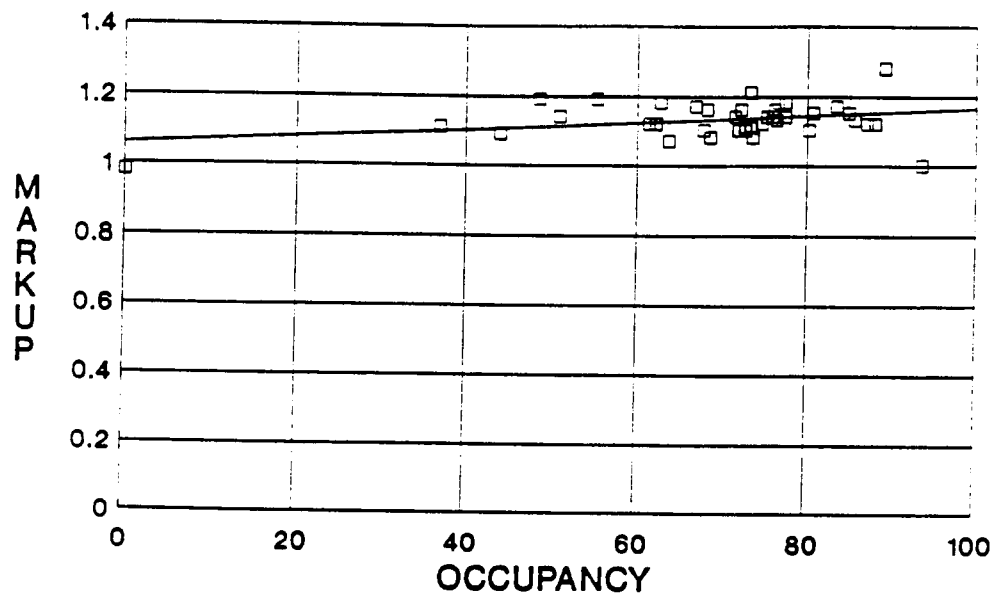
TRENDS IN MARKUP BY OCCUPANCY FOR PERIOD 1



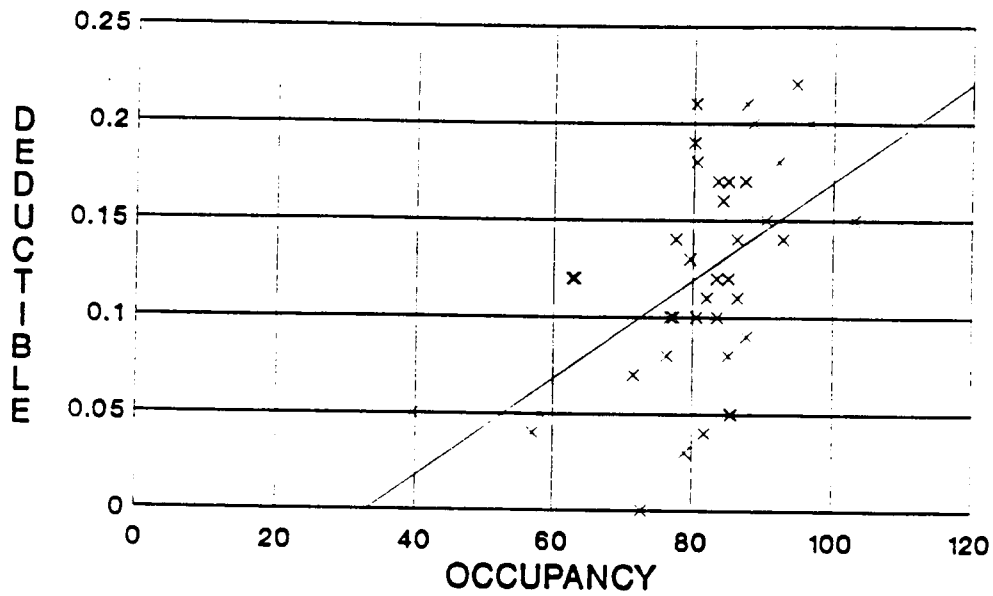
TRENDS IN MARKUP BY OCCUPANCY FOR PERIOD 2



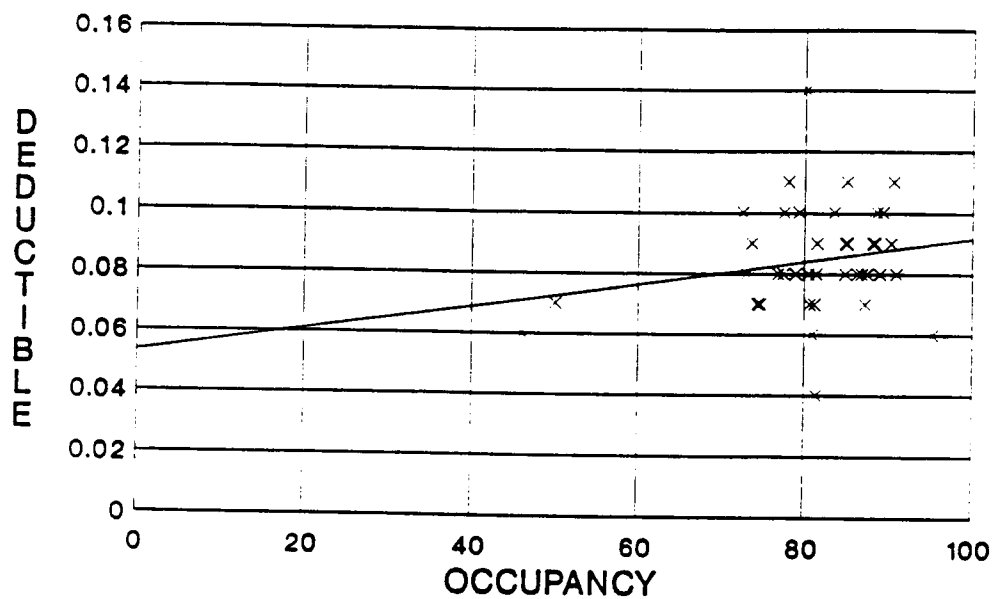
TRENDS IN MARKUP BY OCCUPANCY FOR PERIOD 3



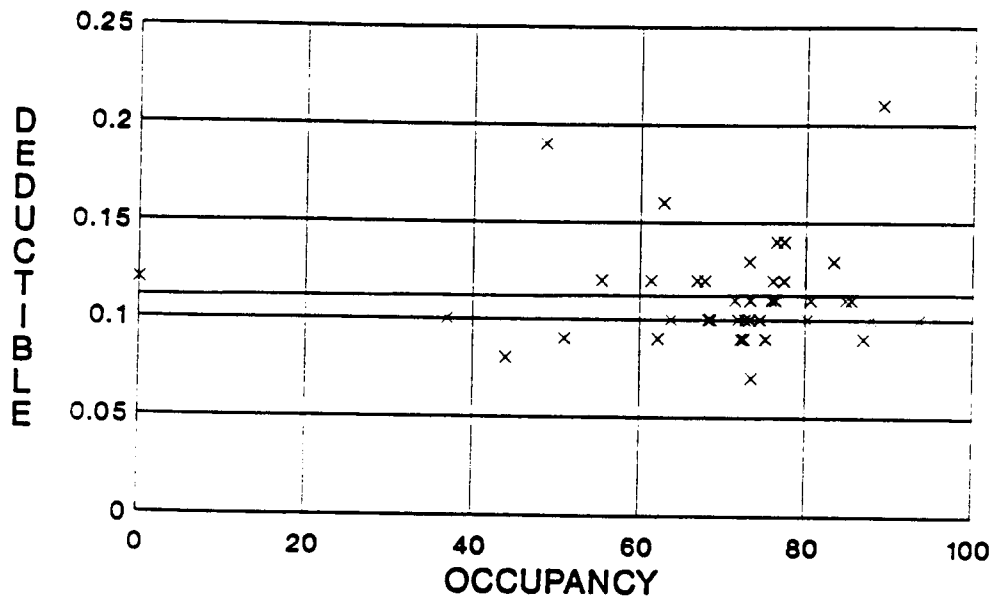
TRENDS IN DEDUCTIBLE BY OCCUPANCY FOR PERIOD 1



TRENDS IN DEDUCTIBLE BY OCCUPANCY FOR PERIOD 2



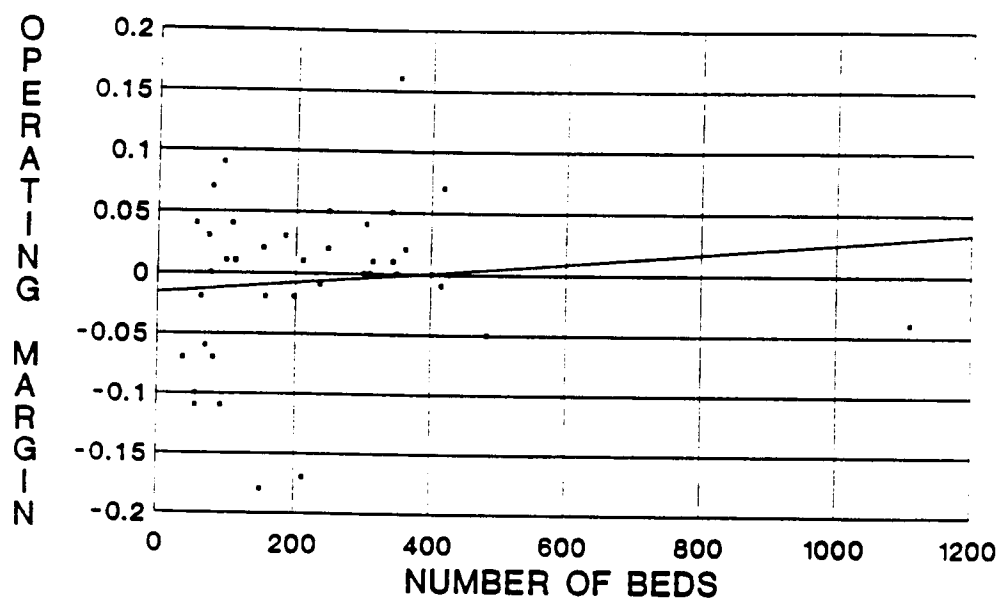
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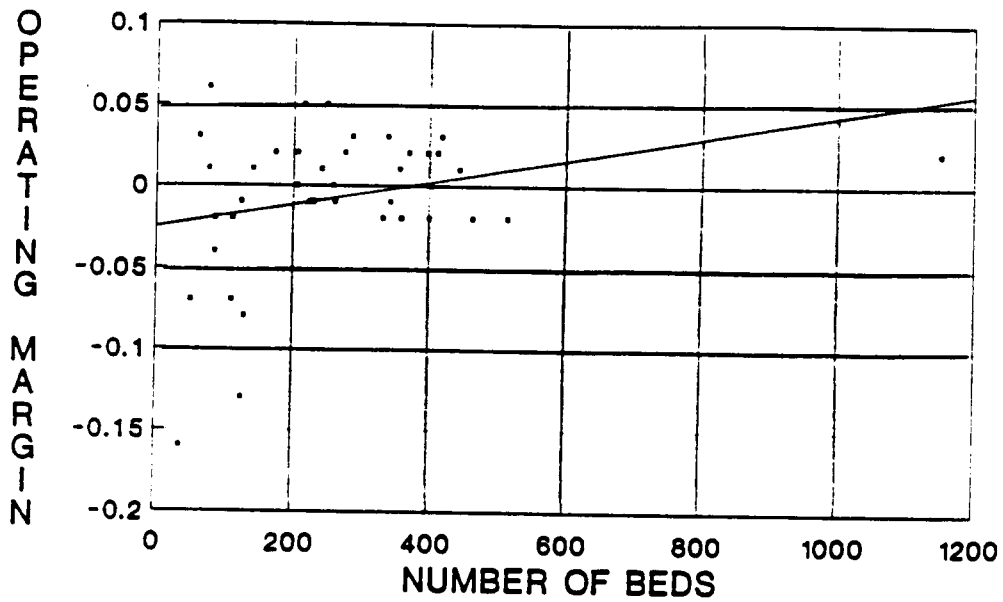
APPENDIX D

Trends in Profitability Ratios for Each Period by Number of Beds

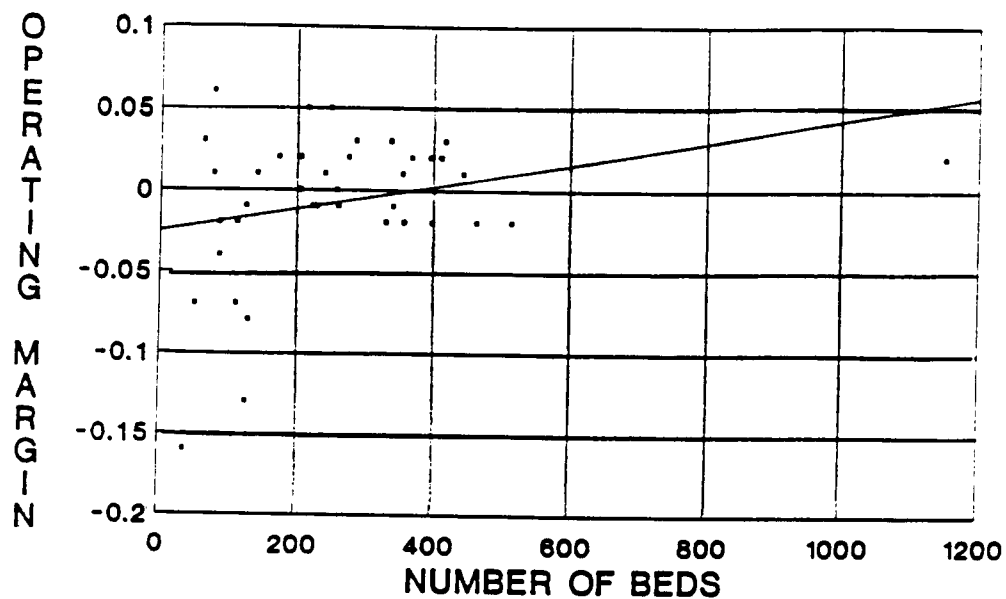
TRENDS IN OPERATING MARGIN BY NUMBER OF BEDS FOR PERIOD 1



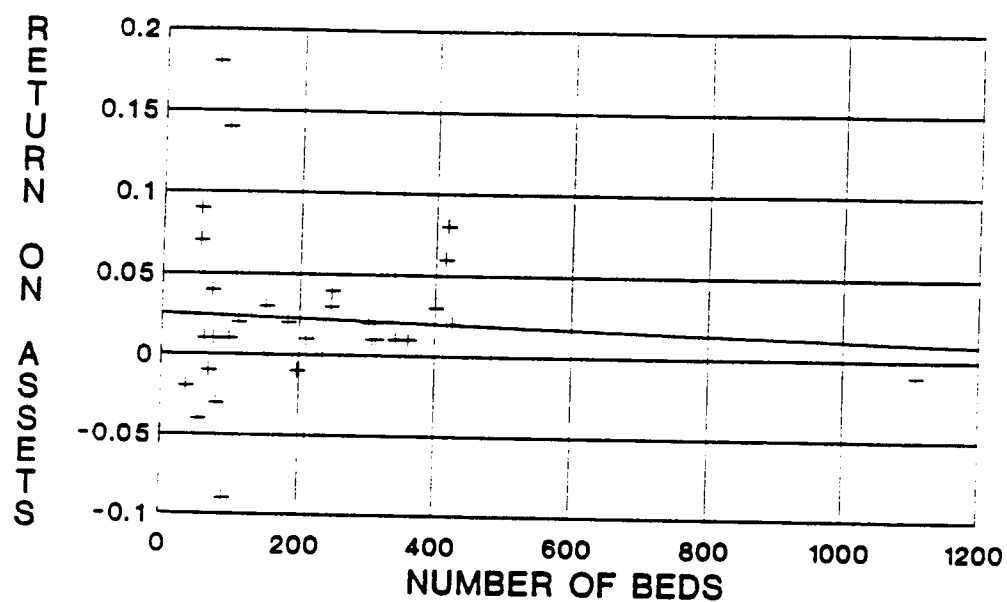
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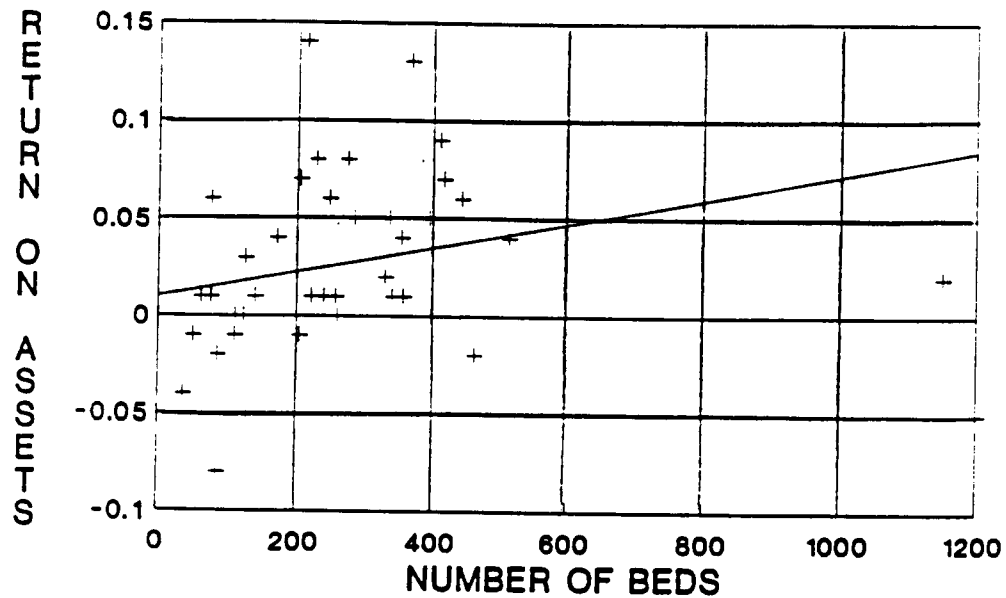
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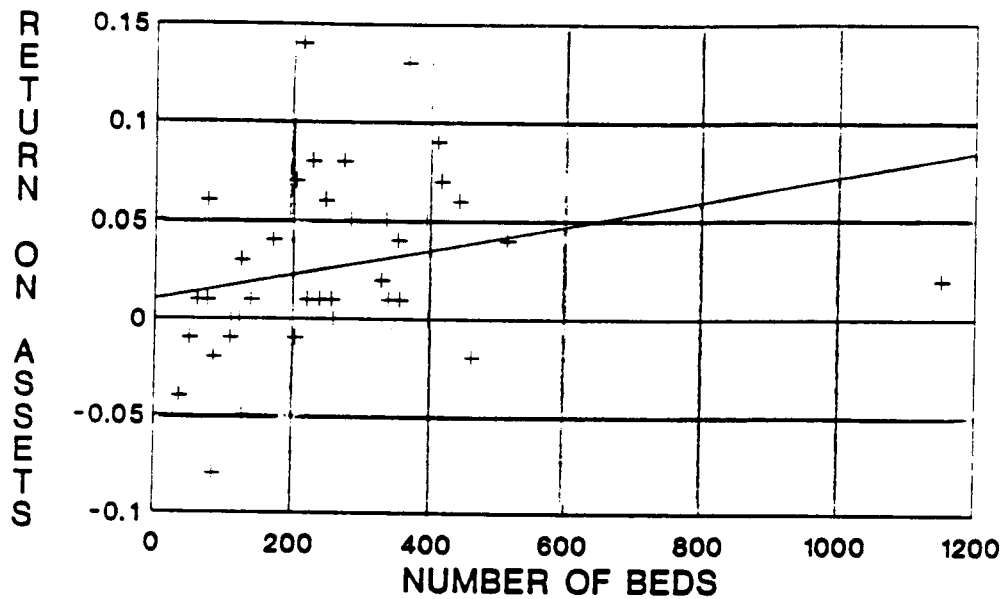
TRENDS IN RETURN ON ASSETS BY NUMBER OF BEDS FOR PERIOD 1



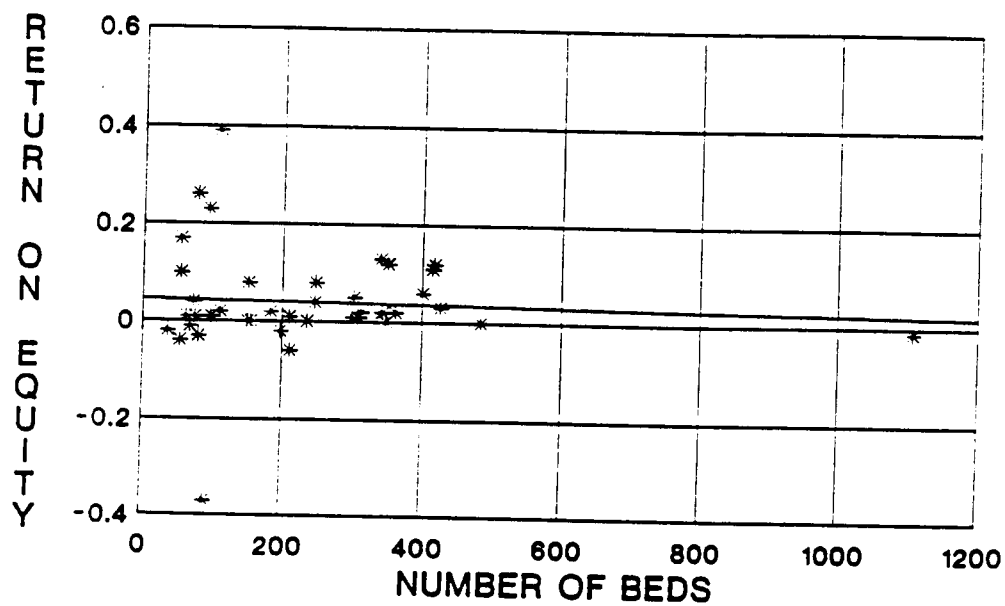
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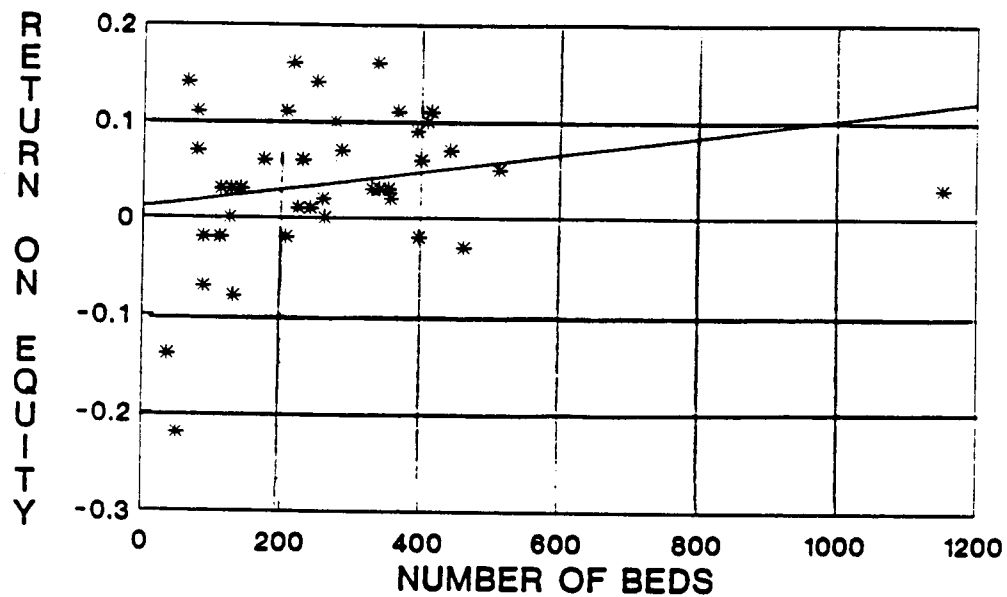
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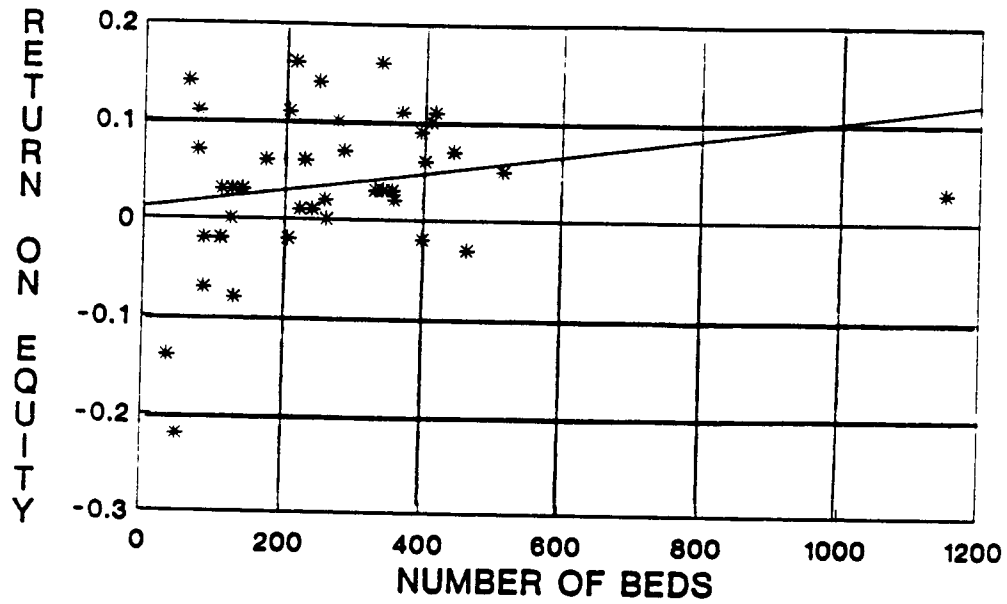
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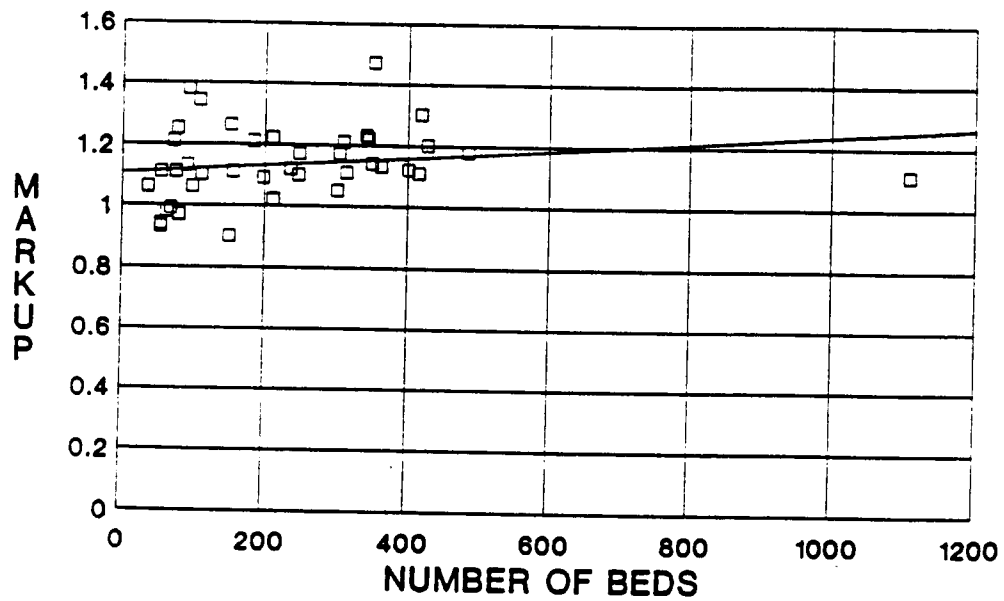
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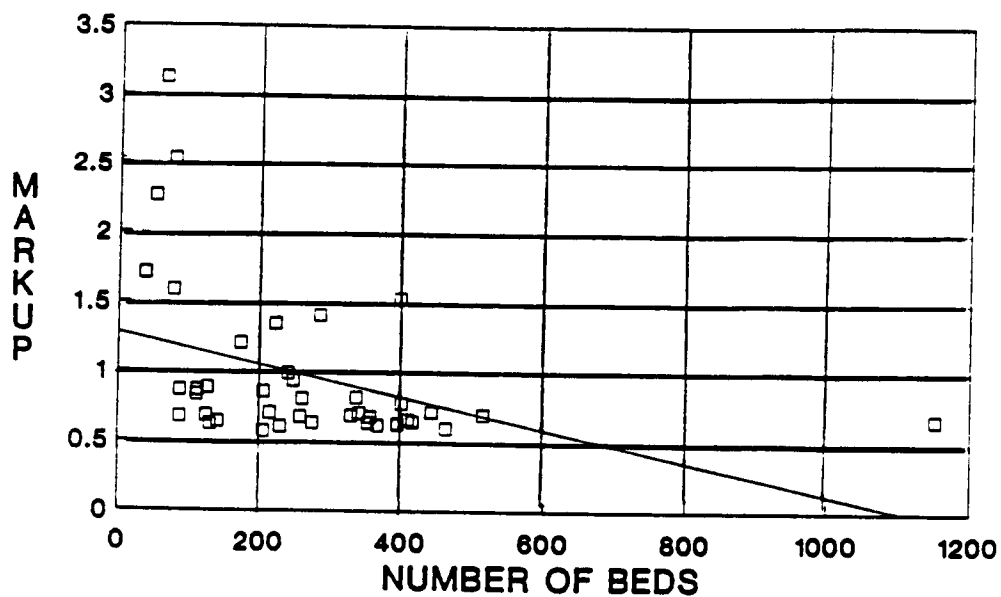
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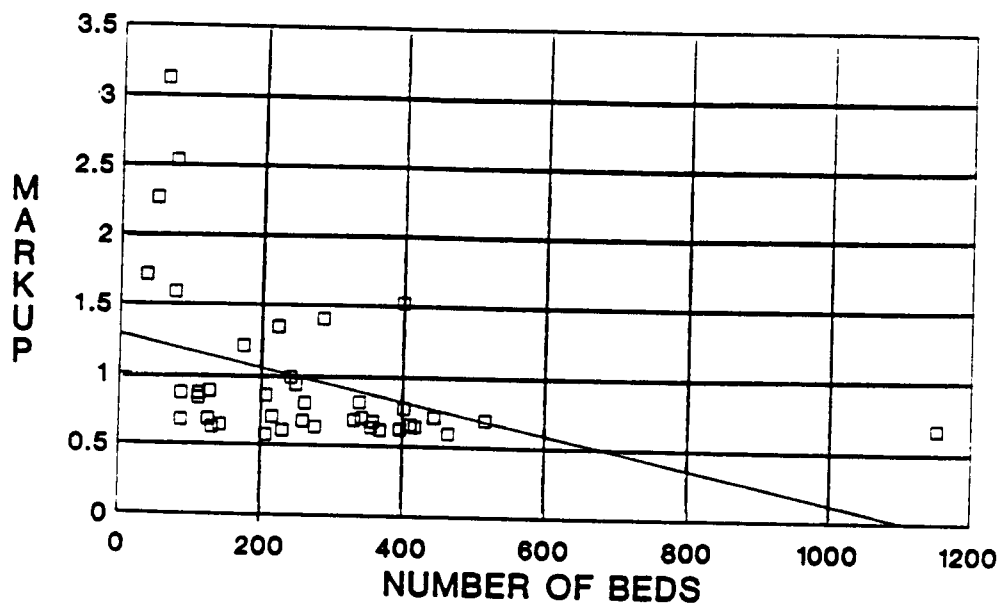
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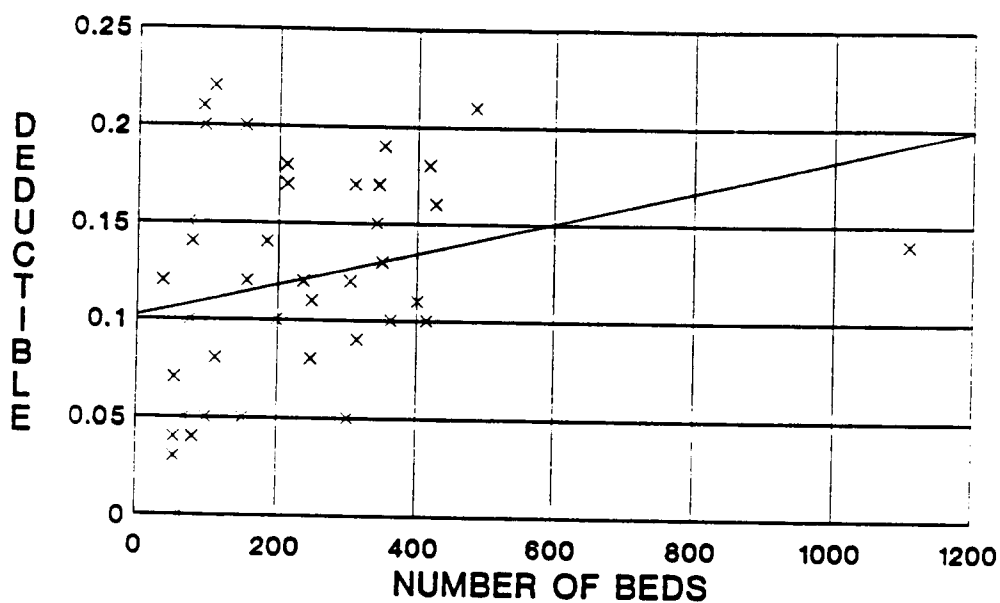
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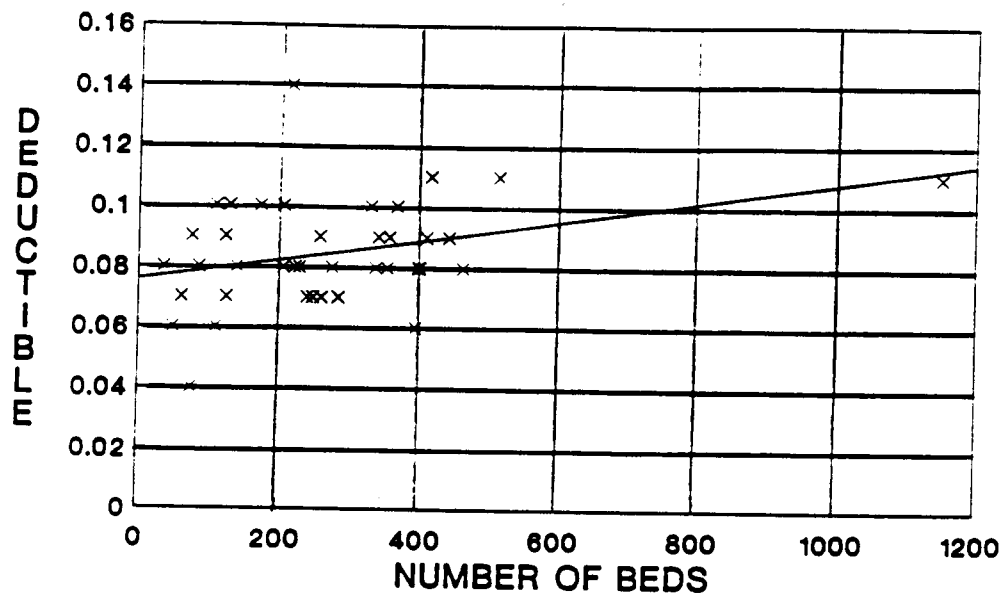
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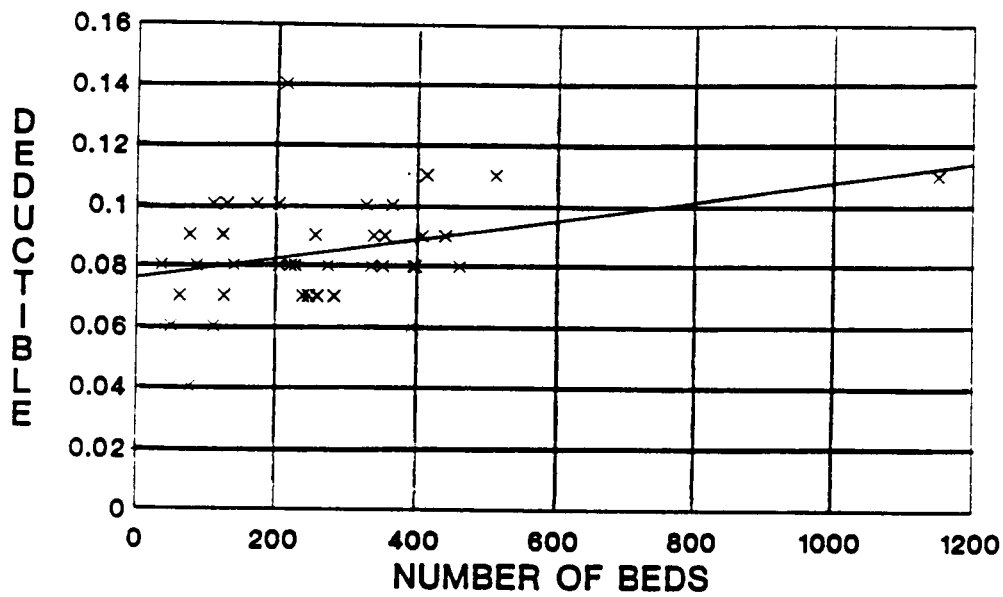
TRENDS IN DEDUCTIBLE BY NUMBER OF BEDS FOR PERIOD 1



TREND IN DEDUCTIBLE BY NUMBER OF BEDS FOR PERIOD 2



TREND IN DEDUCTIBLE BY NUMBER OF BEDS FOR PERIOD 3



VITA

Lorraine Bem, originally of central Maryland, received her early education in the public schools of Maryland. After completion of her first bachelor's degree in home economics, she pursued volunteer activities such as a family planning aide at a health department, a story teller in a pediatric emergency room and a pre-surgical puppeteer. She returned to college and obtained degrees in nursing and school health education. In 1986, she enrolled at the University of Tennessee in Knoxville to work on a doctorate in education. The topic of her dissertation is health care finance. She received her Doctorate in Education in December 1989.

The author is a member of numerous professional organizations including the American College of Healthcare Executives, the American Association of Healthcare Administration, the American Hospital Association, the American Public Health Association, the American School Health Association, the Association for the Care of Children's Health, Eta Sigma Gamma, and Pi Lambda Theta.