Decisions of Capital Structure in the Presence of Agency and Collusive Monopsony

A Study of the U.S. Acute Care Hospital Market

Gerald L. Wallace Jr., BS, MBA

University of Edinburgh
College of Humanities and Social Science
The Business School

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Declaration of Gerald L. Wallace, Jr.

Upon submission of this thesis for a degree of Ph.D. in Finance to

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I, **Gerald Leon Wallace, Jr.,** declare that the thesis composed in effort of this degree is my own work and has been composed myself. Any and all work associated with construction of the thesis was provided by me with the exception of those efforts outlined in the acknowledgements.

The work submitted in this thesis has not been submitted for any other degree or professional qualification.

Gerald Leon Wallace, Jr.
Candidate for PhD Finance

Abstract

The United States acute care hospital (ACH) market provides a unique environment in which to examine questions about market structure and performance. The ACHs operate in a mature market of health services that is highly regulated and has one dominant primary consumer of services. The uncharacteristic industry structure offers the opportunity to analyze pervasive agency relationships and capital structure issues in a new setting. In addition, the policies of the U.S. Government have created an environment in which tacit collusion is likely to flourish, which leads to market buyer power (monopsony, or buyers acting as one monopoly buyer). A key question is the extent to which monopsony and agency affect capital structure decisions. Agency is defined by Ross (1973, p.134) as a relationship formed between a principle and their agents, "when one, designated as the agent, acts for, on behalf of, or as representative for the other, designated the principal, in a particular domain of decision problems." This thesis extends the agency framework provided by Jensen and Meckling (1976), along with the econometric understanding of monopsony in healthcare via tacit collusion, as suggested by Pauly (1998) and Sevilla (2005), and the research constraints of monopsony under an all-or-nothing contract, as outlined by Taylor (2003).

Using data on ACHs from the period of 1995 to 2007 for approximately 5,000 ACHs, which was derived from the Medicare Cost Report and medical payments for a sub-population of 1,500, this research examines the determinants of capital structure in a distorted market. Building upon this initial analysis, the research seeks to examine the effects of market distortions upon free cash flow, and ultimately, capital structure. Two theories of distortion are presented that would affect free cash flow: The first is that of the agency cost of free cash flow and signaling, and the second is a theory of monopsony via tacit collusion between buyers.

A model of the agency relationship between ACHs and the U.S. Government is proposed, promoting agency cost (signaling and the agency cost of free cash flows) as a causal relation with free cash flows and capital structure (Jensen & Meckling 1976; Jensen 1986). Empirical models of agency are constructed, examining the dependence on government business and the relation to the leverage (signaling) and free cash flows (agency cost of free cash flows) for ACHs. In addition, a

complementary theory of capital structure determinant via market power (monopsony) is formulated, suggesting that monopsony conditions within the ACH market affect free cash flows and capital structure. The analysis provides a framework for understanding the environments in which ACHs operate and the strength of bargaining within the market. The research concludes with a review of the determinants of capital structure in light of the inefficiencies and distortions of the industry and the relationships observed.

Dedication

I dedicate this thesis to my late father, Dr. Gerald L. Wallace, Sr., who provided me with such love and inspiration as a child. I truly appreciate him, and will love and miss him always.

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Abbreviations

ACH-	Acute Care Hospital
MCR-	Medicare Cost Report
CMS-	Centers for Medicare and Medicaid Services
DOJ-	U.S. Department of Justice
FCF-	Free Cash Flows
KPF-	Kaiser Permanente Foundation
HMO-	Health Maintenance Organization
GDP-	Gross Domestic Product
HHI-	Herfindahl Hirschman Index
NISP-	Net Income from Service to Patients
LI-	Lerner's Index
PPO-	Preferred Provider Organization
PSRO-	Professional Standards Review Organization
MCO-	Managed Care Organization
DRG-	Diagnosis Related Grouper
HCRIS-	Healthcare Provider Cost Reporting Information System
CPI-	Consumer Price Index
PCP-	Primary Care Physician
NEIO-	New Empirical Industrial Organization
NPV-	Net Present Value
AHA-	American Hospital Association
AMA-	American Medical Association
CCMC-	Committee on the Cost of Medical Care
GHA-	Group Health Association
AMA-	American Medical Association
CHIP-	Children's Healthcare Insurance Program
HIPPA-	Health Insurance Portability & Accountability Act
PPS-	Prospective Payment System
MS SQL-	Microsoft SQL Database
GAAP-	General Acceptable Accounting Principles
ROA-	Return on Assets
ROE-	Return on Equity
AR-	Accounts Receivable
DSO-	Days Sales Outstanding
DCOH-	Days Cash on Hand
FATR-	Fixed Asset Turnover
JACHO-	Joint Commission on Accreditation of Hospitals
ANOVA-	Analysis of Variance
FA-	Fixed Assets
OCF-	Operation Cash Flows
CAPEX-	Capital Expenditures
GMLOS-	Geometric Length of Stay
LnTA-	Natural Log of Total Assets
GMM-	Generalized Method of Moments
SMSA-	Standard Metropolitan Statistical Area
RBRVS-	Resource Based Relative Value Scale
PCP-	Primary Care Physicians
MSA-	Metropolitan Statistical Area
ATC-	Average Total Cost
AVC-	Average Variable Cost
AC-	Average Cost

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Introduction

Many commentators suspect market inefficiencies in U.S. healthcare, but such inefficiencies are not well understood. This thesis aims to provide empirical evidence of the presence of market distortions within the healthcare market. Two theoretical frameworks are used: agency theory and collusive monopsony, as both are postulated to exist in U.S. Healthcare (Buchanan 1988; Folland et al 1997; McGuire et al 1988). In doing so, it examines their effects upon the capital structure decisions of acute care hospitals (ACHs).

ACHs in the U.S. are commercial enterprises, and therefore need to cover their cost of capital, yet health insurance companies and government healthcare programs, such as Medicare and Medicaid, seek to restrain the cost of healthcare, and hence ACHs' revenues and the value of their outputs. However, ACHs purchase resources in a competitive market for goods and services; therefore, ACHs must incur market prices on their inputs. This dichotomy of controlled reimbursement and market-based costs has an effect upon free cash flows of ACHs and subsequently, their capital structures.

The purpose of this research is to use data on ACHs to determine whether both agency and monopsony are present and to identify how this may affect the capital structure of ACHs. The question of how the market structure of healthcare affects capital structure might be addressed in relation to only one theory, Agency theory--and consequently agency costs--reflect an organizational dilemma of incentives and the principal's actions to coerce the agent to act in the best interests of the principal. While the conflict between principal and agent may be of a contractual nature, these lead to real costs and consequences for firms. As determined in the literature on corporate finance, these agency costs help to explain agent decisions of capital structure. One the other hand, relying on agency theory alone would be to exclude certain aspects of observable behavior within US healthcare. Monopsony theory provides an alternative approach to examining at the situation that exists between ACHs and payors. In doing so, it takes into account the behavior of market participants from a supply and demand perspective and, in particular, where the pursuit of excess rents is a priority for participant's actions. The combined results from applying both theories provide strong results to explain how decisions of capital structure are affected by the structure of the U.S. ACH market.

1.1 Research in Literature

This research builds on the previous works of Ross (1973) who argued that "Examples of agency are universal. Essentially all contractual arrangements…contain important elements of agency"(p. 134). In their paper, Becker and Koch (2006) suggest the presence of agency cost in U.S. ACH market. Likewise, it extends the Jensen and Meckling (1976) analysis of agency cost inherent in contracts between corporations that lack the ability to form a complete contract akin to Milgrom and Robert (1992). Specifically, Jensen's (1986) idea of the agency cost of free cash flows and the use of signalling is, in this case, applied to the principal-agent relationship between the U.S. Government and ACHs. Consideration for the presence of a principal-agent relationship in healthcare is given in line with Ryan (1994), McLean (1989) and Dranove and White (1989) and which is further supported by the research of Peterson et al (2006), Jack (2005), Eldridge and Palmer (2009), Schneider and Mathios(2006) and Conrad and Perry (2009). The present study considers pricing schemes by payors in order control agency problems inherent in the principal-agent relationship similar to Peterson et al (2006) and Melnick et al (1989), a position, which is further supported via the research of Conrad and Perry (2009), and Eldridge and Palmer (2009). Studying the effects of how the restrictions of free cash flows affect financing constraints, is similar to the work of Calem and Rizzo (1995), who suggested that financing contraints are a function of agency cost in debt markets. However, this research takes this premise further, considering the presence of agency cost of free cash flows as an underlying cause of the reduction in liquidity within the healthcare market and consequently its effects upon decisions of capital structure . The analysis broadens the perspective of agency research in this area using a much larger sample size than prior studies. In addition, the influence of hospital size is considered, so that the agency and monopsony effects upon hospitals by size is better understood

Wedig et al. (1988) found that no differences in capital structure of ACHs could be attributed to ownership structure. By using data for individual hospital units, rather than business entities, a defining feature of this research is that it is able to ignore ownership structure (that is, whether the hospital operates as a 'for profit' or 'non-profit' entity) when considering how the healthcare market affects capital structure. This is helpful as it allows the research to analyze the entire market of ACHs without consequences due to differences of ownership type effecting research outcomes.

The research extends Pauly's (1998) study of traditional monopsony in healthcare by examining input prices for health services. However, in doing so, this research expands beyond the traditional economics definition of monopsony and considers collusive monopsony under the all-or-nothing supply curve as described by Taylor (2003). This is an improvement over Pauly (1988), as traditional monopsony does not necessarily characterize the contractual framework found within the U.S. healthcare market, where there is a dominant payer but also private healthcare paid for by insurance companies. In addition, the research examines the possibility that ACHs have market power and ruling out efficiency-improving situations of monopoly busting of the ACHs by payors. This element of the research uses methodologies similar to those of Feldman and Wholey (2001), who analyzed the prices paid within U.S. healthcare, examining the market of Health Maintenance Organizations (HMO's) and ACHs. They specifically considered the presence of traditional monopsony and the possible efficiency-improving breakup of monopoly power. They concluded that no monopsony is evident, and considered price changes to be a function of the monopoly breakup of ACHs' market power.

However, traditional monopsony does not describe accurately the market or the contractual nature of the payor and ACHs. The outcome of this research shows that perhaps there exists an efficient alloctation of resources but an unfair allocation of economic rents between buyer and seller. Specifically, this research not only considers monopsony presence but also the unfair allocation of economic rents on the capital structure of ACHs. The research extends Sevilla's (2005) use of monopsony under the all-or-nothing supply curve to ACH health services, analyzing payors' effects on ACHs, but while Sevilla (2005) looks at the variance of prices paid to charges, this study examines prices via the Lerner's Index to show monopsony presence with the healthcare market of ACHs. In addition, this research makes use of the Herfindahl Hirschman Index (HHI), similar to Seth (2006), in order to analyze for a concentration of payors, combining it with collusion via the New Empirical Industrial Organization (NEIO) model to seek evidence of collusive monopsony and payor market power.

1.2 Advantages of The Research

The advantage of studying ACHs from a research standpoint is that they are private corporations, and therefore must manage their capital structures to ensure financial health. Understanding how ACHs' capital structures are affected by the distortions created by the healthcare structure in the U.S. is an important addition to industry, financial, and economic knowledge, as the U.S. healthcare market is a highly regulated market. It accounted for approximately 15% of the U.S. GDP in 2004, and is expected to become 19.6% of the GDP, or $4.5 trillion, by 2019 (Center for Medicare and Medicaid Services, September 2010). By focusing on a single industry or market means the analysis avoids the problems of their being structural differences between industries (Calem and Rizzo, 1995).

The ACH market is made up of for-profit, non-profit, and teaching hospitals. In 2005, excluding hospitals of the Veterans Administration (which are government-owned), there were about 947,000 beds in a total of 5,756 hospitals, with 37,000,000 admissions, and a total expense of $570 billion (Jonas 2007). As the data used in this research is at the hospital level, the research is able to examine an entire industry with a homogenous product for evidence of agency and monopsony and their effect on capital structure of ACHs. Using the population is a further advantage for examining these theories, as prior research of Wedig et al (1988) suggests differences in ownership structure (for-profit, non-for-profit or teaching hospitals) can be ignored as they have no effect on the capital structure of ACHs.

From 1995-2007, the government consumed, on average, 65 percent of acute healthcare services measured in patient days via government healthcare insurance programs, such as Medicare and Medicaid. This study of agency and monopsony dynamics in the U.S. healthcare market will help policy makers and academics to better understand the markets in which large public consumption through a single major buyer of an output affects the producers' capital structure. How current regulation and market behavior of the buyer may affect the capital structure of the upstream producers (in this case hospitals) when the consequences of agency costs and market power are analyzed is important, as inefficiency in any market is detrimental to consumers.

The structure of the research allows for focus on the informational asymmetry inherent in U.S. healthcare, where forming a complete contract is difficult due to the inability to monitor, which allows for a large degree of agent opportunism. Prior evidence of asymmetric information indicates that it is appropriate to apply agency theory and, equally, monopsony theory, thus taking into account four out of the five recommendations by Eisenhart (1989) for agency research (McLean 1994, Melnick et al 1989, Ryan 1994, Dranove and White 1987, 1989, Bronsteen et al 2007, Mooney and Ryan 1993, Lee and Zenios 2007, Conrad and Perry 2009, Eldridge and Palmer 2008, Peterson et al 2006, Schneider and Mathios 2005, Chalkley and Khalil 2005). Using these theories and the unique features of the market and data used in this thesis, which will be discuss later, provides a set of models for determining the presence of agency effects and the market power of payors. This joint approach provides a more comprehensive understanding of decisions of capital structure in the presence of agency and monopsony within U.S. healthcare.

1.3 Description of The Data

This research makes use of public information about ACHs' financial records, as well as some private, previously unexplored data, and uses linear and panel data regression methodologies in order to provide new insights into the distortions and their effects on ACHs' capital structures. Data utilized within this study consist of hospital financial data from the Center for Medicare and Medicaid Service's (CMS) Medicare Cost Report (MCR) on, and private medical claims/remit data obtained from an industry third-party claims processor (hereafter, claims data) that previously was unused for research. The MCR data cover approximately 5,600 ACHs for the years of 1995-2007, thus allowing a study of agency using the entire ACH population, which accepts government funds. The claims data consist of 12.7 million claims covering approximately 1,500 ACHs from 2000-2007 which are used to create the Lerner's Index and the Herfindahl Hirschman Index that are used to analyze for the presence of monopsony. This combination of the MCR and the claims data allows the research to simultaneously consider the market power of both payor and ACH, within the same market and time period.

Data was available for the breakdown of results by year and hospital size; however ownership structure information was ignored due to data limitations and the suggestions provided by previous research that it was not necessary in light of the subject matter of this research.

1.4 Agency Theory

One question that the research investigates is how the purchasers of healthcare (insurers) seek to control, via pricing of healthcare services, the inefficiencies and consequently the additional costs generated by ACHs' overinvestment, a form of agency costs, as this may lead to investing in negative net present value (NPV) projects—and consequently how these controls affect the capital structure of ACHs. The ACHs have stable cash flows, but little opportunity for growth, which increases their likelihood of overinvesting (Parrino & Weisbach 1999). Overinvesting by ACHs leads to increased costs, as ACHs pass on additional cost to consumers. The government is a major consumer of health services and wishes to reduce costs; therefore, it seeks to control ACH behaviour, thereby limiting overinvestment and other agency costs.

In the absence of control mechanisms, agency theory indicates that where the principal (the government) and the agent's (the ACH) interests diverge, and where the agent can take unobservable or difficult to observe actions in his own self-interest, the agent will do so. A key element that governs contractual relationships subject to agency problems is how the principal can reduce these agency costs. One such element is the use of debt to reduce agency costs. Jensen (1986) suggests that debt reduces agency cost by the addition of external monitors in the form of lenders. The lenders insure that firms are run efficiently, as future dollars are promised to repay the debt, thus limiting the ability of managers to squander the firm's resources in ways that fail to add value. This limits the free cash flow at the agent's disposal, thereby limiting the ability to overinvest and increasing the performance requirements of future investments. Value for the principal is created for firms with high agency costs, especially when debt reduces the likelihood of overinvestment (Harvey et al. 2003).

Traditionally, firm success depends on the investment of free cash flow (FCF), and/or borrowed funds on positive NPV projects that add value to the firm. In either case, FCF or borrowed funds, a return on the investment must be generated, or else a firm's financial success may be compromised. In the case of the healthcare market, achieving the objective of obtaining a positive return on investment is complicated by the existence of moral hazard created by health insurance that insulates the insured from the price consequences of consuming healthcare services. Therefore, the insured considers other variables of the healthcare product other than price to help determine consumption. Price and quality are often the two major variables considered in the consumption of any product purchased. When price is removed, quality becomes the major driver, thus, the effect of the moral hazard of health insurance. As a result of the moral hazard of health insurance, ACHs must compete on quality or perceived quality (Newhouse 1981; Nahata et al. 2005). A project that increases the perception of quality is considered by the ACH as an acceptable venture if it attracts additional patients; however, projects that increase perceptions of quality are not always positive NPV investments. This construct of competition on quality within the market has led to excessive capital spending by competing hospitals, which some have called a "medical care arms race" (Glied 2003, p. 127). As excessive capital spending in negative NPV projects or overinvestment adds to the cost of providing healthcare, and ultimately is covered by the government through an increase in the costs of healthcare, the government seeks mechanisms to limit this behavior within the ACH market. Primarily, this is accomplished via the reimbursement rate for health services.

By reducing the reimbursement for health services, the government is able to restrict free cash flows of ACHs, thereby limiting their ability to overinvest. This is typical principal behavior within agency theory. Typically, this is described as the agency cost of free cash flow. As such, the agency cost of free cash flow is hypothesized to exist, as the government does not provide healthcare services directly for those lives it covers via government insurance. Instead, the government contracts with hospitals to provide healthcare services for government-covered lives via Medicare, Medicaid, and other government programs. This is a problem, as asymmetry of information is high, which interferes with the ability of the government and the ACHs to form a complete contract. Under this scenario, the only communication left to align incentives between the government and ACHs is price.

The government has a desire to limit healthcare costs and thus inefficiencies within the ACH market. In this case, an inefficiency is seen as an overinvestment problem derived from excess cash flows and a distorted market with competition reliant upon perceived quality. Projects that increase quality can be viewed as loss leaders for hospitals where the projects themselves do not have proper payback, as they are ultimately underutilized, but do attract additional patients overall. The problem from a government perspective is that the facility that patients seek is irrelevant, as the government is responsible only for payment. Under this scenario, when the government is consuming the majority of health services, the government is paying for the additional cost of the heavy competition by hospitals, as some hospital services added to attract patients are underutilized or are allocative inefficient. Ultimately, the expenditure of capital dollars by ACHs is passed on to the consumer through additional costs. Government cost reductions/savings are created by hospitals as a reduction of investment in negative NPV projects, meaning that dollars are not wasted on services with high capital cost, but those with low utilization. By limiting the free cash flows of ACHs, the government reduces the likelihood of bearing the additional cost of healthcare due to overinvestment.

1.5 Testing for Agency Cost

One of the primary research questions is, do agency costs exist? The presence of agency effects is tested via signaling and the agency cost of free cash flows and their effects on decisions of capital structure.

Two models are proposed to seek evidence of agency cost. Signaling is proposed to exist within the ACH market, in which the signaling mechanism is the willingness to take on debt and be monitored by third-party lenders. In this case, the government seeks to reduce monitoring costs that arise as a result of the agency problem. It does this by encouraging debt. Those ACHs that obtain a higher proportion of their revenues from government-purchased healthcare services signal efficiency by having greater amounts of debt in their capital structure. Due to asymmetric information between the ACHs and the government, debt providers can act as third-party monitors. They have a fiduciary interest in the welfare of the ACH, and so they monitor management's efficient use of capital. The debt provider understands that inefficient use of capital ultimately jeopardizes a firm's financial health and the ability to be repaid. This idea follows Jensen's (1986) premise that external debt reduces monitoring costs by reducing free cash flows and bringing in lenders to act as third-party monitors. "…conditions of asymmetric information create incentives for the relatively uninformed parties to draw inferences from the choices made by the better-informed parties. The informed parties, if they recognized that their actions are being interpreted as signals, may attempt to manipulate the signals to convey a particularly favorable message. Financial decisions can serve as just this kind of signal" Milgrom and Roberts (1992).A second model of agency cost is proposed: the agency cost of free cash flow. As previously discussed, the federal government does not provide healthcare services itself for citizens who are covered by Medicare and Medicaid; rather, it contracts with hospitals. It is hypothesized that the government, seeking to lower the cost of healthcare services, lowers reimbursement to ACHs. By reducing reimbursement, the government reduces free cash flows, thereby restricting excess cash flows under ACH management's control and limiting access to debt markets (Calem & Rizzo 1995). Both place limitations upon the capital structure of ACHs. This action has the consequence of reducing the overinvestment problem, thereby lowering cost of healthcare for the government.

1.6 Collusive Monopsony

An Additional question the research investigates is how collusive monopsony or a lack thereof affects decisions of capital structure. Collusive monopsony is proposed to complement the agency models. The monopsony models are based upon the premise that a collusive monopsony exists within the U.S healthcare market. Monopsony is a condition similar to monopoly; in essence, it is the mirror image, or isomer, of a monopoly. Whereas in a monopoly, there is a concentration and market power in the supply market, a monopsony represents the concentration and market power of the buyer. In both cases, there is only the opportunity to transact with the monopolist or monopsonist. In this case, a collusive monopsony between government and private insurers is suggested, similar to Pauly (1998) and Seth (2006), wherein the buyer market colludes to act as a single consumer of the inputs of health services from ACHs. Monopsonists drive down market prices of inputs below the competitive norm, pushing suppliers off their average cost curve and onto their marginal cost curve. The monopsonist reaps excess market rents. In the case of healthcare, private insurers take these excess market rents as additional profits for shareholders, while public insurers such as Medicare and Medicaid view these as a reduction in the overall healthcare cost.

Collusive monopsony conditions exist because the payment data and market behavior of the largest insurers, Medicare and Medicaid, are public information. Private insurers utilize this public data to change their market behavior and their reimbursement of health services. The behavior of this mechanism is very similar to price leader behavior in a market, in which although there may be no formal relationship of suppliers in a market, a market leader, who typically has the dominant share of the market, determines the prices. While the insurers may not communicate formally with government, and vice versa, pricing, or in this case reimbursement, is driven by the market leader: government. This acts to limit the reimbursement of ACHs, and consequently controls the behavior of ACHs, as it reduces the ACHs' free cash flows, thereby restricting access to debt markets, and thus placing restrictions on choice of capital structures. This leaves ACHs more dependent on internal funds for investment, which changes the performance requirement for future investment, as it increases opportunity costs. This reduces the likelihood of overinvestment.

1.7 Testing for Collusive Monopsony

The other primary research question is: does collusive monopsony exist and if so what affect does it have upon decisions of capital structure? In researching this question, two models are proposed to test for the presence of collusive monopsony. The first model suggests that payers have market power, which affects free cash flows. To test this premise, an HHI was created for payors in each ACH market. This provides a measurement of concentration of the payor market faced by each ACH. Then, values of the HHI were compared against values of the HHI that were deemed acceptable by the U.S. Department of Justice. Concentration via the HHI was regressed against free cash flows of the respective ACH. The positive correlation of the HHI and free cash flows of ACHs provided evidence of collusion within the market. Markets with high concentration are more likely to have collusion than markets with lower concentration (Cabral 2000). Combining measures of concentration, evidence of collusion, and an assumption of demand elasticity, this research was able to provide evidence of the market power of payors via the NEIO. The NEIO is an equation that provides an understanding of the relationship between the three characteristics (concentration, collusion, and demand elasticity) mentioned previously with the Lerner's Index measurement of market power. This provides a methodology to estimate the market power of the payor.

The second model acts to determine the market power of hospitals by creating a modified Lerner's Index, using average cost rather than marginal costs for each hospital, and regressing this upon the free cash flows and Net Income from Services to Patient (NISP) of the ACHs. The relationship of the Lerner's Index and free cash flows enables the research to examine whether the market power of ACHs affects the capital structure of ACHs via free cash flows. In addition, the relationship of the market power of ACHs and NISP allows the research to examine if ACHs are price takers. By examining both buyer (payor) and seller (ACH) market power the research is able to provide clear evidence of collusive monopsony and to examine its affects upon free cash flows and thus its impact upon decisions of capital structures.

1.8 Research Findings

The research provided evidence that agency and collusive monopsony are creating distortions in the ACH market. Agency cost and collusive monopsony are shown to have a negative impact upon ACHs' real free cash flows. Additionally, the presence of collusive monopsony is shown to have two to three times the negative effects on future free cash flows than the agency cost of free cash flows. This limitation in free cash flow, according to Calem and Rizzo (1995), acts as a restriction in access to debt markets, as less future free cash flows are available to be promised to lenders. This reduction in access to debt markets causes hospitals with lower free cash flows to be more dependent on internal cash flows for capital investment. This dependency on internal cash flows raises the opportunity cost of investments, which may cause managers to have higher hurdle rates. This change or restriction of investment reduces the likelihood of overinvestment by hospitals. The reduction in overinvestment by ACHs is seen as savings for public and private payors in the cost of healthcare. Savings to government taking the form of less tax dollars spent on healthcare, which is a savings for the overall public and likewise savings for private payors, can be distributed to shareholders and or it's insured in the form of lower premiums.

These findings are important as there has beenfew studies on agency costs in US healthcare when analyzed in the context of its relevance to capitals structure.

1.9 Contributions

The research examines an area which for mainstream financial economists is often seen as difficult to research due to data issues and requiring specialized knowledge of the of U.S. healthcare market. This is characterized by "professionalism, licensure, non-profit organizations, third-party payment structure, heavy government regulation"(Robinson 2001, p. 131). The research applies methodologies common to finance research and microeconomics that are only rarely used to examine U.S. healthcare, due to the barriers presented by the specialized knowledge necessary to conduct research in this area. The relatively small number of empirical studies that exist are based on small datasets and test limited theories. A key feature of this research is that it combines established methodologies with an interesting research topic through using a dataset that had not previously been utilized within a study (the MCR with 65,689 cases and 12M healthcare claims). This means the research presented in this thesis is able to provide a new perspective with which to expand our understanding of decisions of capital structure in the presence of contractual agency effects within the ACH market. Furthermore, in addressing these questions, by focusing on a single specific industry with similar characteristics of participants, the research avoids problems due to structural differences between industries akin to Calem and Rizzo (1995).

The study of contractual agency as proposed in this research is based upon the principal-agent relationship akin to Jensen and Meckling (1976), but expands the understanding of the agency relationship in line with Milgrom and Roberts (1992). In addition, it expands on the recommendations made by Eisenhardt (1989) for agency research, by adding the complementary theoretical perspective of collusive monopsony.

At a practical level, empirical evidence of behaviour under agency cost is important because it allows for an understanding of the construct of the principal agent relationship and the behaviours and consequences it might generate. It provides a basis on which one might judge future transactions under similar frameworks and conditions to help in our understanding of the potential negative distortional effects and the complications agency cost might generate within a transaction or market.

A key area of this research is that it investigates and offers a better understanding of the behaviour the principal and the agent under conditions that are different from traditional principal-agent relationships, where there is direct communication between the principal and agent, other than just the price. In addition the research gives consideration to agent behaviour and the agent's need to compete on quality with little to no concern for price (Newhouse, 1981; Wang, 1999; Glied, 2003; Nahata, 2005). The findings present a clear expansion in the understanding of the effects of agency cost within the US healthcare system and how decisions of capital structures are affected by these costs, thus providing an empirical basis upon which to base future relationships.

The findings on the effects of monopsony in the U.S add detail and validity to the agency results. Furthermore, to date, there has been little study on ACHs and the presence of the monopsony construct (the all-or-nothing contract) akin to Taylor (2003) and the effects monopsony has on their decisions of capital structure and none that combine both agency and monopsony theory to provide a more expansive understanding of determinants of capital structure. By examining monopsony the study builds on the previous works of Sevilla (2005), Taylor (2003) and Pauly (1998). The research also provides a novel approach to examining for the presence of monopsony by analysing both sides of the market, buyer (payors) and sellers (ACHs). This allows for self-supporting position of monopsony to be attained, which is a methodology not seen in any of the previous research analysed in the process of writing this thesis.

Given the U.S. Healthcare market significance as a proportion of U.S. GDP, inefficiencies which are present, large or small, form an important area of study. Even small inefficiencies represent significant dollar amounts when the effects of such inefficiencies are measured. Based upon the insights of this research, having an understanding how policy decisions and the structure of the market affect the U.S. healthcare market is important to those who originate regulation and control the markets in which these inefficiencies exist, or try to manage the market process. The insights mean that policymakers are better equipped to form appropriate conclusions and sounder regulation and decisions. This is important as recent legislation via the "Affordable Care Act" has been passed by Congress and signed into law by President Obama in 2010, which will effectively transform a large part of the regulatory, monitoring and market framework discussed in this thesis. As the Department of Health and Human Services moves to implement the legislation, it will be important to understand how changes in the way the US healthcare market operates being considered might impact ACHs decisions of capital structure and therefore the capability and financial soundness of ACHs themselves. The financial strength of ACHs has potential consequences for the quality of healthcare services delivered, which is one of the primary objectives of the legislation beyond equal access to all. Insights from the findings of this thesis and therefore have immediate relevance to social policy in the United States.

1.10 Thesis Structure

In order to understand the environment in which ACHs operate, a history and discussion of the market structure is provided in the next chapter. The structure of this thesis is as follows: Chapter Two provides a historical overview of the U.S. healthcare market. This enables the reader to understand the current structure of the market and the factors that led to the current market distortions that are examined in the subsequent chapters. Chapter Three is an overview of the financial condition of ACHs during the period of this longitudinal study. The chapter provides the basis for understanding the financial state of ACHs, and acts to provide aggregate financial characteristics to the ACHs. The financial ratios described in this chapter also are used in Chapters Four and Six. Chapter Four is an in-depth study of the U.S. healthcare market within an agency framework. This is tested in two ways: via agency costs of free cash flows, and signaling. Chapter Five discusses the monopsony construct, its existence from a legal perspective, and an examination of previous monopsony research. Chapter Six examines the empirical evidence of monopsony and consequent effects upon capital structure via the panel data regression analysis mentioned previously. Chapter Seven concludes the research and provides an aggregate discussion of both agency and monopsony within U.S. healthcare and its effects upon ACHs' capital structures.

2. History and Structure of the Acute Care Hospital Market

2.1 History

In order to understand the research undertaken in this thesis, it is important to be conscious of the history of the U.S. healthcare market, its evolution, and its components. This chapter provides background information on the U.S. healthcare system and explains the underlying developments in the structure of the ACH market. The purpose of this chapter is provide background for the reader unfamiliar with U.S. healthcare. The chapter is not meant to indicate that this history has a direct effect on the empirical chapters of this thesis other than to describe how the healthcare market has developed and operates. This chapter largely draws on the works of four authors: Matcha (2003), Radich (2008), Mamdani (2001), and Jonas et al. (2007).

The U.S. has been shaped by many forces, including a strong belief in limited government, individual freedom, and exercise of power by private interests, in addition to crises in the healthcare system, political agendas, pragmatism, and technology (Inglehart 1992). Duane Matcha (2003, p.4), in his book, *Health Care Systems of the Developed World*, describes a healthcare system as, "any combination of components identified by a society that facilitates the provision of health and health care for its members." Almost from its inception, healthcare in the U.S has been influenced by various market distortions that have impacted its financial structure and its present organization.

The first hospital and medical school in the U.S. was located at Henricropolis in the state of Virginia (1612); the next was in Philadelphia, Pennsylvania in 1732. As the U.S. developed, so did its healthcare infrastructure. There were approximately 178 hospitals in the U.S. by 1873 (Jonas 2007). The U.S. Government's first involvement in healthcare began with the Relief of Sick and Disabled Seamen Act of 1798, under which the seamen were taxed to cover the cost of their medical care (Matcha 2003). With the War of Independence and throughout the nineteenth century, the health of the average American remained poor.

By the beginning of the twentieth century, U.S. healthcare had emerged as a commodity, a product available to the majority of citizens. Everyone could have healthcare as long as they could pay for the service. This resulted in care primarily for the wealthy. Changes in Western Europe in the 1920s, specifically the formation of socialized medical programs, influenced the U.S. Within the U.S., interests moved toward similar programs for U.S. citizens. At the time, there were four basic cost concerns: individual loss of income, individual medical costs, indirect cost of illness to society, and the social cost of medical care (Radich 2008). However, both hospitals and physicians feared government control of healthcare because of concerns that the government would interfere in the doctor-patient relationship. In order to rebuff advancement in socialized medical programs, and to increase economic revenue stability, a group of physicians formed Blue Shield, insurance to pay for physician care, and Blue Cross, insurance to cover hospital costs. Blue Shield was formed in 1929 at Baylor University Hospital in Houston, Texas where the schoolteachers were contracted to be covered. The insurance premium, when paid, included 21 days of hospital care (Radich 2008).

The Great Depression brought additional problems to the U.S. for hospitals, and with them, additional economic instability. To combat this economic instability, many hospitals and physicians looked to insurance as a possible solution. The era's economic instability gave rise to private and public insurance in the U.S. In 1933, the American Hospital Association (AHA) approved insurance as a legitimate solution to the economic instability affecting many hospitals across the nation (Radich 2008). Plans approved by the AHA had to be non-profit and promote public welfare. This gave rise to demands for greater control and coverage by the U.S. Government. One such organization that emerged was the Committee on the Costs of Medical Care (CCMC), which argued that the use of group insurance or government taxation could help defray the cost of medical care. Adversaries of the CCMC fought to maintain the status quo, preferring limited government involvement (Radich 2008).

In 1937, the Kaiser Foundation grew out of the Kaiser Construction Company (Radich 2008). At the time, the Kaiser Construction Company was building the Grand Coulee Dam in Washington. In order to increase workforce productivity and reduce medical costs, Kaiser Construction contracted with a local physician to treat its workforce. All employees were covered under the plan. In that same year, the Group Health Association (GHA) was formed by the Federal Home Loan Bank. The goal was to reduce the number of mortgage defaults occurring from excessive medical costs (Radich 2008).

The first GHA plan was the health insurance plan in New York City. The GHA also developed similar plans with regard to the coverage of patients. From these plans rose two opposing forces: the medical community that was concerned with obtaining fees for services, and the plan sponsor, whose focus was on controlling the costs. While fee-for-service had been the mainstay of the medical profession, insurance plans now moved to hiring physicians and hospitals directly, or using a capitated rate to reimburse. In an effort to control the spread of insurance, the American Medical Association (AMA) only approved certain plans. The GHA was not approved by the AMA, as it viewed the GHA as unethical and unlicensed (Radich 2008). The AMA led efforts to control the spread of these "unethical" insurers, but later was indicted on charges of violating the Sherman Antitrust Act for use of its tactics to suppress the GHA (Radich 2008).

In further efforts to control insurance, 26 states passed laws that prohibited or limited formation of consumer-organized medical plans. The medical service plans were physician-centric in these states and had to be approved by the state medical society, formed by doctors, and/or a majority of directors had to be doctors (Radich 2008). Another limitation of group practice plans was that most states required free choice of a patient's hospital/doctor.

After World War II, America encountered a labor shortage. This shortage of labor brought about additional competition for the limited workers who were available. Employer-provided health insurance was used to attract and retain personnel. Unions, whose power increased as a result of the Wagner Act and collective bargaining, demanded additional health insurance coverage (Radich 2008). An agreement was reached between the government, labor unions, and industry. Health benefits paid to employees by their employers would be tax-free. This increased the demand overall for health insurance, and the sector grew vigorously. The Hill Burton Act was passed in 1946. This act, along with its amendment in 1975, required hospitals that accepted federal funds to provide care for all, including and most importantly the poor (Mamdani 2001).

President Truman proposed a national health insurance program in the late 1940s. The program was opposed and defeated by the AMA. However, the seed of the idea of a national health insurance had been planted. According to Radich (2008), over 60 percent of the population had hospital insurance, 50 percent of the population had insurance for surgical procedures, and 25 percent had insurance for in-hospital services. Employers covered 35 percent of the net cost of health insurance for employees, and just over 20 percent for employees' dependents.

The fifties and sixties mainly saw competition between plans such as Blue Cross and commercial indemnity companies. Blue Cross guaranteed full payment of healthcare bills, and commercial indemnity companies paid the majority, but it left the insured with some out-of-pocket expenses. In addition, commercial indemnity companies provided employers with cost-sharing provisions (Radich 2008). In 1965, Medicare and Medicaid were passed into law (Services 2009). This saw government (federal, state, and local) take on 46 % of the total healthcare expenditure (Mamdani 2001). During this time, medical expenses were not challenged for payment, as long as they were considered reasonable, and due to unchecked spending, this led to large increases in healthcare expenditure.

Both physicians and hospitals had lobbied hard against the Great Society program of Lyndon Johnson, which brought Medicaid and Medicare into being; however, both entities gained economically by its passing. It was during this period that hospital growth in beds and services was extensive. Healthcare as a portion of the GDP grew from 7.1% in 1970, to 13.9% in 1999 (Mamdani 2001). While outpacing other nations' spending on healthcare, the U.S. lagged behind most other industrialized nations in terms of both the life expectancy and infant mortality rate (Mamdani 2001). As such, more demand was placed on the government to address the humanist aspect of care for all, setting the political tone that exists today.

The idea of cost containment evolved with the development of the Health Maintenance Organization (HMO) by the Kaiser Permanente Foundation (KPF). The KPF is a later form of the Kaiser Foundation, which was founded in 1937. The KPF showed that while HMOs originally were designed to improve the quality of care, they also were effective at reducing costs (Mamdani 2001). The HMO achieved this through the reduction of care or improper utilization of both hospitals and physicians services. Health maintenance was a major focus, and reduced cost through preventative medicine such as vaccines and screenings for cancer. The HMO, unlike insurers, directly provided the healthcare to their clients. This differed from insurers, who just were responsible for paying for the cost of healthcare services provided by the physician or hospital. The HMO proved to be so effective that President Nixon approved a bill (1973 federal HMO Act) promoting the widespread growth of HMOs. This bill provided grants and loans for the startup of new and the expansion of existing HMOs. It also allowed federally qualified HMOs to form in states that restricted the developments of HMOs (Radich 2008).

The HMOs currently are defined by the National Center for Health Statistics as:

"a health care system that assumes or shares both the financial risks and the delivery risks associated with providing comprehensive medical service to a voluntarily enrolled population in a particular geographic area, usually in return for a fixed, prepaid fee (NCHS 2007). Pure HMO enrollees use only the prepaid capitated health services of the HMO panel of medical care providers. Open-ended HMO enrollees use the prepaid HMO health services, but in addition may receive medical care from providers who are not part of the HMO panel. There is usually a substantial deductible, copayment, or coinsurance associated with the use of non-panel providers" (NCHS 2007).

Economist Harold Luft (1981) described five criteria that represent minimal requirements for an organization to be an HMO: 1) contractual responsibility of the organization to provide medical services; 2) defined enrollment; 3) voluntary enrollment; 4) fixed payment to healthcare providers on behalf of the insured; and 5) the organization bears the risk of covering its enrollees. In addition to the creation of HMOs, the 1970s also saw the development of the Preferred Provider Organization (PPO). A PPO differs from an HMO in that they allow their participants to use out-of-panel physicians for a higher fee.

President Reagan followed in 1983 with the Budget Reconciliation Act, which provided immunity from medical malpractice lawsuits for HMOs (Mamdani 2001). The U.S. Government also pushed efforts to closely monitor the need for hospitalization, the length of stay (total time in the hospital), and outpatient surgical procedures. The Regional Professional Standards Review Organizations (PSROs) sought to establish standards for admission, as well as a focus on utilization. Committees were required to monitor physician usage of laboratory and radiological services and other medical resources. The PSRO also established conditions for hospitalization, and they established a firm set of guidelines that physicians were required to follow for a patient's admission. If the requirements for admission were not followed, the payment was denied. The establishment of these standards was a factor for change in the healthcare market. The market for outpatient services was enlarged to provide more services on an outpatient basis, as these were less costly, rather than by hospitalization.

Due to the increasing cost of insurance premiums, HMOs became the favored model for providing employees with healthcare coverage at a low cost. The HMO structure spread widely and helped to reduce the growth of healthcare costs within the U.S. The Surgeon General under President Ronald Reagan, Dr. C. Everett Koop (1996, p. 69), noted at the time,

> “The biggest surprise in the past two years has been the rapid growth of a system known as managed care. Millions of Americans have been shifted into health maintenance organizations, dramatically restructuring the financing and delivery of health care. The original impetus for managed care came from physicians who wanted the freedom to treat their patients without being worried about whether they could pay for each visit, test, or procedure. In the early HMOs, cost containment was an unexpected benefit, not a primary purpose…But now the rapidly proliferating HMOs—most of them investor-owned and for profit—seem to be interested firstly in managing cost and only secondarily maintaining health.”

While the U.S. had reduced the growth in healthcare costs to a manageable level, the U.S. still focused on healthcare for humanitarian reasons. Socialized medicine, or universal coverage, was still of major concern. President Clinton, upon taking office in 1992, presented a comprehensive plan to bring about universal coverage. While this entire plan did not make it into law, two subprograms from this initiative did: the Children’s Healthcare Insurance Program (CHIP), which expanded coverage to provide healthcare for children who were not covered under Medicaid, and the Health Insurance Portability and Accountability Act (HIPAA), which controlled the use and protection of patient information (Matcha 2003).

Eventually, HMOs modernized to become Managed Care Organizations (MCOs). Austrin (1999, p.1118), defines an MCO as, “…a system that uses financial incentives and management controls to direct patients to providers who are responsible for giving appropriate, cost effective care. Managed care systems are intended to control the cost of healthcare by emphasizing prevention, early intervention and outpatient care." The MCOs are forms of PPOs, which were described earlier in this chapter.

The MCOs are different from the classical model of an employer paying premiums to an insurer that covers only 80% of cost, leaving the patient to cover the rest. The MCOs control cost by limiting the demand side of the equation, controlling and limiting moral hazard within the sector created by insurance. Under MCOs, patients may only use MCO physicians or hospitals, or those that have been contracted via the MCO to provide services. Patient demand is reduced by the use of a gatekeeper system. The gatekeeper interviews each patient and determines if the patient is ill enough to be in need of hospital or physician. Most procedures require second opinions, and all hospitalizations require pre-certification before being approved. This basically uses a system of incentives and penalties that encourage certain behaviors of physicians, which effectively regulates the utilization of ancillary services and consultations. Managed care has become an integral part of the healthcare delivery equation.

According to the U.S. Bureau of Census (1999), the number of HMOs/MCOs has increased from 235 in 1980, to 651 in 1998. Enrollment figures in HMOs grew as well, from 9.1 million in 1980, to 65 million in 1998 (Matcha 2003). Prior to managed care, physicians held the power and control. However, MCOs altered this, especially in the 1990s. Pricing control successfully had moved from the hands of ACHs and physicians to MCOs. "The physicians, of whom there were 793,263 active in 2001, by tradition and by license have been the most powerful, dominant group. In the mid 1990's, however, a major change in the locus of control over medical practice did take place, as a significant portion of it moved to the managed care companies" (Jonas 2007, p. 10). Keeping coverage costs low has allowed employers to cover additional lives with less cost. The government also has used managed care to control costs. It has used MCOs to manage the Medicare and Medicaid plans in many states, with lower overall costs as a result. Managed care had an effect on the cost of healthcare provided in the 1990s through an increase in utilization, which allowed for the stabilization of premiums to the insured (Matcha 2003).

2.2 Current Political Climate

Managed care's ability to control costs gives rise to additional pressure placed on the government. This political imperative to control costs also has contributed to the political climate that has evolved into government's drive to achieve healthcare as a social agenda. The U.S. Government has been under pressure by some to expand its role in healthcare. Some argue that healthcare is part of the social/community market, and therein community and social values are more important than private profit (Matcha 2003). Others argue that individuals are responsible for their own welfare, and should be responsible for purchasing and controlling consumption of their own healthcare. There are an estimated 43 million people who are uninsured in the U.S., with millions more having what many believe is inadequate insurance (Jonas et al. 2007). This provides a discourse for argument, as some contend that a capitalistic, competitive market is not designed to take care of those who are inadequately insured, or who have no insurance at all. Nevertheless, the legislation that is passed tries to solve issues of access, costs and quality all by creating market constructs or frameworks in order for the market to solve the problem.

The U.S. Government's regulation of healthcare institutions and the structure of the healthcare system have been a reactive process primarily. Changes usually are made to the system after serious encounters when low quality providers come to light, or when serious financial problems develop. For instance, it was recently suggested by Dr. Donald Berwick, the previous head of the Centers of Medicare and Medicaid Services, that approximately 20 to 30 percent of government health expenditures were wasted due to overtreatment of patients, failure to coordinate care and the administrative complexities of the healthcare system, high regulation and outright fraud (Khan, 2011). The industry is plagued by high health costs and ever higher insurance premiums (White, 2004). These rapid increases in costs, insurance and the number of uninsured, suggests that managed care organizations (MCOs) once thought to be the market solution to the rise in healthcare costs is no longer working properly. There is thought that the failure of MCOs is driven by consumer markets, which act to undermine MCOs, and there is some question if MCOs can work to address the effects of over spending on technology (overinvestment) and quality of care in light of the presence of consumerism. Consumerism is defined as consumers valuing choice in its own right to choose, as many are uncomfortable with shifting decision to payers. This rise in consumerism has led to effectively patients' bill of rights legislation in some states. This has led many of the MCOs to become less restrictive with patients. Reduction in control over the patient base by payors would seem to benefit ACHs negotiating with payors. This has also been complicated by mergers of ACHs to make large chains of ACH's or conglomerates, both on a for-profit and non-for-profit basis. This has led some to believe that perhaps the market power for ACHs is back on the rise (White 2004). Another trend closely related has been payors changing their benefit design to increase consumer cost sharing. This exposes the patient to more of the cost of healthcare services. In addition, MCOs have tried to develop systems to truly manage the higher risk higher costs patients.

Jonas (2007) suggests that many of these problems are caused by the decentralized nature of healthcare, which is primarily administrated by a private structure with little planning. An example could be the use of MCOs to manage costs. However, an opposing viewpoint could be that decentralization does not mean little or no planning, but rather that planning is market driven. With either viewpoint expressed, the market for the provision of healthcare in the U.S. is complex.

These returns to tried solutions of the past have angered many politicians, patients and practitioners. It should be noted that, while not affecting this research, the economic environment for healthcare is being changed significantly. As of March 23, 2010, the Obama Administration has pushed through the new Affordable Care Act. The Act was structured to provide additional rights and protections to consumers effectively putting the patient back in control of their own healthcare—not the insurance company. The individual states are required to setup consumer assistance programs to help with complaints and appeals regarding health coverage and to inform the patients of their rights and responsibilities. These programs were setup up in order to inform consumers of theirs rights to appeal insurance actions such as appeals for denial of payment for healthcare services by insurers. In addition, these programs educate the population on preventative care and how some patients could receive preventative care at no cost. A patient's bill of rights was included in The Act to outline to consumer protections, such as those to children with pre-existing conditions could no longer be denied insurance coverage. The plan also addresses doctor choice and outlining new rules for ER access and what payors are forced to cover when a patient goes out of the panel of physicians and hospitals contracted with the insurer. The theory would be that the insurer would be required to cover more costs. This is further addressed in that insurance cancellations are limited, such as those with a pre-existing condition. The Affordable Care Act is meant to provide a greater variety of alternative providers to the individual private insurance market, expanding coverage for young adults to be covered on their parents plan until the age of 26.

One of the major items to come out of the legislation is the creation of affordable insurance exchanges to be setup in each state. The idea is that an individual would be able to compare like plans, so therefore apple to apples comparisons, and thus use pricing to determine the best insurer to choose.

As suggested, earlier the U.S. government often seeks to solve problems in U.S. healthcare by creating frameworks for market-based solutions. MCOs provide a good example of previous efforts to create such market framework. The affordable care act take this premise further by creating a new type of non-for profit, consumer run health insurer call a Consumer Operated and Oriented Plan or (CO-OP).

Premium costs which have been climbing for many years prior to The Act, are now under pressure as The Act provides new methods to hold insurance companies accountable and keep premium costs down to the end patient. The idea was to make sure consumers were getting the most for their insurance dollar. The new healthcare law takes this a step further by limiting insurers' ability to use profits for certain expenses, thus forcing insurers to focus on using premiums to provide and improve quality of care for the insured. This premise of limiting insurer's business control is taken further by limiting and removing lifetime and annual limits that were sometimes placed on health insurance plans, with a requirement to end the practice by 2014. The Act also protects the consumer from unreasonable insurance premium rate increases, with a justification required at an increase of ten percent or more.

Government insurance concerning people age 65 or older was expanded with greater drug coverage and more cost-free preventative care services. The Act extended new tax credits for small business and non-profits to provide insurance for their employees.

The Affordable Care Act has been a very politically sensitive agenda with very determined organizations either for or against. The Act was place into law in one of the most contentious pieces of legislation passed in the U.S. in recent history. The Affordable Care Act has been challenged from a number of angles the largest seems to be its constitutionality revolving around its individual mandate. The individual mandate would require all citizens of the U.S. to purchase health insurance. Lawsuits have been filed in federal court and it is expected to make it to The Supreme Court in the U.S. sometime in summer of 2012, before the law goes into effect. This is an unusual scenario, as The Supreme Court will not hear a case regarding a piece of legislation until it is fully implemented into law.

If this legislation withstands challenge in the judicial branch, it will radically change reimbursement methodologies and the healthcare insurance market. The act promises to cover all citizens with some form of healthcare insurance, whether private or public. The long-term effects of such legislation are unknown at the time of this research. However, the current legislation and changes that are being made to healthcare law in the U.S. are significant. It is therefore important to understand how the current market system functions and to better understand any distortional effects created in the market by the current market setup. Thus, the importance of this study. While more individuals may be covered by insurance under the new legislation, some of the conditions and theories discussed in this research still exist. This new legislation may magnify agency or monopsony effects within the healthcare market; therefore, it is important to understand how these distortions affect ACHs as goals set out in the legislation may be undermined.

To understand these distortional effects of agency and monopsony a better understanding for the delivery and financing of healthcare is coordinated. It is under this premise that we seek to provide the necessary information regarding the mechanics of healthcare in the U.S.

2.3 Mechanics of Healthcare: Financing and Delivery

Healthcare remains an expensive commodity, and while many point to various reasons for this, it is the need to cover more with less money that motivates the government to interject themselves into this market. Approximately one-third of the U.S. healthcare dollar is spent on inpatient hospital care, making hospital care the single most expensive component of the health care system. As health care costs rise and the population ages, policy makers are concerned with the growing burden of hospital-based medical care and expenses to government, consumers, and insurers. (Agency for the Healthcare Research and Quality, 2007)

There are three types of owners of hospitals, or rather, ownership classifications: 1) private, not-for-profit; 2) private, for-profit; and 3) government owned and operated. Most of the hospitals at the time of this research are private, 96%, and 89% of the hospitals are community hospitals. Of all hospitals, 60% are non-profit, 22% are state/local, and 18% are private, for-profit. U.S. healthcare spending for 2004 was $1.85 trillion dollars, approximately 15.6% of the GDP, with predictions that it could increase to 19.6% of the GDP, or $4.5 trillion by 2019 (Center for Medicare and Medicaid Services, September 2010).

Healthcare spending and the inflation of healthcare costs have been a major problem in the U.S., usually increasing at a rate of two to three times that of the general inflation factor (Jonas et al. 2007). The only time this trend in healthcare spending and inflation was curbed was in the mid-1990s, when managed care gained traction in curbing rising healthcare costs. It was not the reduction in actual prices associated with healthcare services that were reduced, but rather, the utilization of services. Managed care was acting as a gatekeeper to healthcare services, curbing the effects of the moral hazard of health insurance. According to Jonas et al. (2007), in 2005, U.S. personal health care accounted for 84% of total health expenditures, approximating $1.99 trillion. This statistic shows that as a percentage, personal healthcare has dropped only barely from 1980, when personal health accounted for 85% of the total health expenditures (Jonas et al. 2007).

2.3.1 Payers & Payments

There are three mechanisms for payment of healthcare institutions in the U.S. healthcare system: 1) government (46% of total expenditures in 2003); 2) insurance/ managed care (36% of total healthcare expenditures in 2003); and 3) individual/personal (14% of total healthcare expenditures in 2003) (Jonas et al. 2007). These funds are paid to hospitals, physicians, pharmaceuticals, nursing homes, dentists, etc., with hospitals receiving approximately 33% of the funds in 2002 (Jonas et al. 2007). Patients, third-party payers, and even the providers themselves contribute these dollars. If the patient contributes the dollars, they are considered out-of-pocket expenses. The insurance portion is from the patient's insurance company or managed care organization.

Providers contribute through the donation of services or forgiving patient debts on services rendered. Insurance or third-party payers technically are classified into two groups: private and public. The private group is a combination of insurance/managed care organizations and out-of-pocket expenses. The public group is federal, state, and local agencies that act as third-party payers or deliver the health care directly. Examples of public insurers are Medicare and Medicaid, which do not provide the services themselves, but reimburse health care organizations acting on their behalf.

2.3.2 Public Health

Medicare and Medicaid, along with various other governmental programs, are public forms of insurance, as mentioned previously in this chapter. The programs cover those citizens who are over the age of 65 in Medicare or meet poverty levels to qualify in Medicaid. These are the social nets of the U.S. healthcare system. Both are operated by the CMS.

2.3.3 Medicare

Medicare, which began in 1965, has been adapted and expanded over the years. Coverage was expanded in 1973 to cover permanently disabled workers and their dependents who were eligible for old age, survivor, and disability insurance under social security (Jonas et al. 2007). There are four parts to Medicare: Part A, hospital insurance; Part B, physician and professional health services insurance; Part C, Medicare Plus (MCO enrollment); and Part D, prescription drug coverage. In 2005, government entities covered 57% of hospital care dollars, with expenditures of $331.4 billion in personal health services (Jonas et al. 2007). Under Medicare, hospitals are reimbursed on an episode-of-care basis under a fiscal structure named the Diagnosis-Related Group (DRG). Medicare has predefined classifications in which patients are placed based upon their illnesses and conditions; those classifications are the DRG. Managed care became involved in Medicare in the early 1990s as that form of private insurance became integral to the market. Within a decade, they had removed themselves from that part of the market, claiming that Medicare reimbursement was too low (Jonas et al. 2007).

2.3.4 Medicaid

Medicaid was created by Congress in 1965 to provide health coverage for the poor in the U.S. Unlike Medicare, an individual must apply for coverage and meet certain income requirements. Medicaid is administered at the state level, so coverage varies from state to state. In 2003, Medicaid covered approximately 55 million people, and was worth 17% of all personal healthcare spending (Jonas 2007).

2.3.5 The U.S. Healthcare Market

Within the U.S. healthcare market, the industry participants have declared that the sector is overregulated. Jonas et.al. (2007, p. 107) wrote, "In the view of these and other stakeholders, the healthcare sector in the United States is already the most regulated of all economic sectors." The U.S. health system is a unique market; if one examines how the market is not only extremely regulated when it comes to payments, but also in all of the market's other qualities, he will find that the system further sets itself apart from that of a normal competitive market system. For example, Kenneth Arrow cites in his 1963 article, "Uncertainty and the Welfare Economics of Medical Care," that uncertainty, asymmetries of information, and the non-market ability of risk inherent in medicine are additional factors that set this market apart from others.

2.3.6 Private Health

Private health insurance usually is acquired through one's employer; however, it is possible to purchase coverage outside of one's employment. Generally, private health insurance more expensive when purchased outside of employment. Approximately 69% of Americans had health insurance in 2005, which was down from 70% in 1990 (Jonas et al. 2007). What is significant about this is the stability of covered lives within the U.S. healthcare market. Private insurance covered 35% of the national healthcare expenditures in 2005. Adding in private out-of-pocket expenses increased the figure to 55% (Jonas et al. 2007).

2.3.7 Payments/Reimbursement

Predominantly in the U.S., bills for medical services (claims) are sent electronically by providers to payors. The electronic bill then is sent to a clearinghouse so that it may be routed to the appropriate payor. The payor then either processes the bill, rejects it for various reasons, or puts it on hold, pending additional information from the hospital. For bills that are considered "good" or correct, payments typically are received by providers in 15 to 60 days, dependent upon the payor. If there are errors with the bill, which is entirely up to the payor to determine, payment can be received by the provider as many as 60 to 120 days later. While the U.S. prides itself on a very efficient capitalistic market, the health care system is not considered an efficient system. It is held that our healthcare system requires tremendous amounts of eligibility determination, benefit checking, coinsurance/deductible calculation/ billing/collection, pre-utilization authorization, and utilization review, all of which add to the inefficiency of the system (Himmelstein & Woolhandler 2001).

2.3.8 Cost/Cost Plus

Reimbursement of providers in the U.S. health system can take place in one or a combination of six ways: cost or cost plus, per diem, fee-for-service, fixed price, capitation, and value. Of these, per diem, fee-for-service, and capitation probably are used the most widely. Cost plus reimbursement is one in which the provider tabulates and maintains his costs incurred while providing services to a patient. Cost plus is based broadly on the assumption that opposing parties can agree on an objective estimation of costs. When the patient is discharged from the hospital, the hospital submits the bill and then is reimbursed for those charges for services rendered, plus a percentage over cost, which accounts for the provider's profits. Under most, if not all contracts, there are items that are non-reimbursable expenses. Most organizations must use the profit gain on the delivery of the services to cover costs that were not reimbursed. Cost plus used to be the primary reimbursement method for most providers. The primary problem with this method of payment is that it penalizes providers for cutting costs, as trimming cost reduces the overall payment for services rendered.

2.3.9 Per Diem

The per diem is calculated based on the diagnosis of the patient and the length of stay determined by the particular illness/procedure. The length of stay determines the maximum allowable days for a particular diagnosis, and thus, a maximum reimbursement. Medicaid and Medicare use a DRG as the primary method of determining the appropriate length of stay. Per diems are very common payment methods for hospitals. Under this payment method, hospitals are motivated to reduce overhead; however, a reduction in overhead does not translate necessarily into efficiency.

2.3.10 Fee for service

Fee for service is the oldest form of reimbursement method for the payment of health services. Most physicians, dentists, and small private providers still prefer this method of reimbursement. Under this scenario, the provider will bear all risks of inefficiency for service. Most services are rendered under a price-for-service list, so that payment may be known in advance. According to some critics, this method of reimbursement has been one of the major causes of problems in healthcare. “In the past, this piecework system was a major cause of many of the observed problems in health care delivery system. Although the patient’s risk that he or she overpays for a service is reduced, such systems do not reward the providers for better quality service” (Jonas 2007, p.148).

2.3.11 Fixed Price

Under fixed price, the payment system and its operation as a market is closer to that of a commodity market, in that the quantity of service is known, as is the price for that quantity of service. While many view the fee-for-service model as one that benefits the provider, the fixed price is more patient or buyer-centric. The best example of such a payment regimen is that of Medicare and the changes to Medicare that were made in the 1980s, which moved towards this payment methodology. “The prospective payment system (PPS) was adopted for Medicare by the federal government in 1983 for Medicare Part A benefits (i.e., payments to hospitals) as a way to control costs. It can be seen as forcing productization on the hospitals—at least with respect to the patients covered by Medicare" (Jonas 2007). Hospitals receive a flat rate for the patient, no matter what the services or volume of services that have been administered. This system is such that it promotes the efficiency of delivery of healthcare, but it does nothing for quality. A moral hazard can be found under this reimbursement regimen, as providers are incentivized to find healthier patients to be treated. This type of reverse adverse selection would be beneficial to HMOs and MCOs, which run the Medicare/Medicaid plans in each state.

2.3.12 Capitation

Capitation is the payment schedule of paying the provider a fixed payment per patient for an agreed upon set of services that are rendered by the provider. No matter how many services actually are delivered to the patient, the payment per patient remains the same, regardless. Under capitation, providers are incentivized to choose patients that are likely to use the least amount of services. Again, HMOs and MCOs are the most likely to take advantage of this scenario.

2.3.13 Value

Value-based payments normally are not the case in health care, although they do happen. Value-based compensation is when a provider is paid according to the value of the treatment rendered. This system values the lives of wealthier people more than the poor, as wealthier individuals would have greater value in monetary terms than the poor.

2.4 U.S. Healthcare Regulation a Functional Discussion

The U.S Healthcare market is unique combining a high level of government regulations with a reliance on market systems to allocate resources effectively. As discussed previously, healthcare within the U.S. is characterized by a dynamic environment with shared equity concerns and problems with uncertainty. This is complicated by rapid technological changes and sharp increases in healthcare costs. There are four types of uncertainty: first is uncertainty of when healthcare services are needed, second, what types of services are required when they are needed and third, how much healthcare services are needed? Fourth, most of all is that outcomes of healthcare services are uncertain.

In order to overcome some of these uncertainties the market created health insurance in one form or another. The presence of insurance brought about its own problems as it raised cost and efficiency issues as it insulates the consumer from price (moral hazard of insurance) and often distorts demand. This creates another problem as most insurers do not provide the services themselves and therefore rely on agents to dispense services. In this case, physicians and hospitals acting as agents solve the uncertainty. This dependency on agents ultimately gives rise to problems of agency such as abuse, fraud and inefficiency as agents' acts in their own self interests. "Reliance on agent has, however raised issues of agency abuse- acts or omissions by providers for the own benefit at the expense of their patients" (White 2004) p.139. "…these agency problems have created a demand for regulatory oversight through such means as professional licensure and government quality assurance efforts which have posed challenges of their own"(White 2004) p.139.

Equitable distribution of healthcare services has long been a problem with a society unwilling to rely on price alone to determine distribution. This single issue has relied on public interests intervening and the creation of large systems of redistribution. These redistributive systems have led to difficult choices regarding access, quality and cost by public policy makers. This has led to difficulties in wanting to treat everyone equitably especially in light of no public will for universal health coverage.

These efforts have been complicated by the sporadic and dynamic growth of U.S. healthcare. As we have seen earlier in this chapter there has been a long history of rapid healthcare expansion dating back to the turn of the 20th century. This expansion combined with increases with newer technologies has added to the magnitude of increases in healthcare costs has led to severe increases in health expenditures.

These characteristics of uncertainty of the healthcare market have provided a central focus for policy makers, with the primary goal of how to address with rules and regulation. Thus, government regulation has played an important role in shaping U.S. healthcare and consequently has there is a need to understand this regulation as its structure provides the background environment for this study.

The government had on-going efforts during the time of this study to control healthcare focusing on equitable access, reducing cost caused by agency problems and dynamic growth. Equitable access has been addressed via creation of government programs such as Medicare and Medicaid which act as an insurer for those who cannot afford healthcare and regulations such as EMTALA (Emergency Medical Treatment and Leave Act). While Medicare, Medicaid and other government programs are not regulation themselves there are regulations that must be complied with in order to participate as a provider rendering care to patients which are covered under these programs. Likewise, EMTALA drives access to healthcare for all in cases of emergency.

There are no regulations controlling price of healthcare services per se, however Medicare and Medicaid control price via pricing schedule listed by DRG (Diagnosis Related Grouper). Quality assurance is driven via CMS guidelines for services; however these types of quality measures were not in practice during the time of this study. Other than the CMS guidelines for quality assurance, government programs control for quality by requiring each ACH to become JACHO (Joint Commission)[1] certified. JACHO sets standards for the quality of healthcare delivery in the U.S. and is considered as self-regulating body recognized by Medicare and Medicaid. The JACHO standards are quite stringent on ACHs to obtain the certification, however a fundamental flaw with these accreditations is that there is no guarantee that the facility will in fact deliver quality care beyond the date of certification. So in fact there is little monitoring of quality of health services delivered, especially during the period of this study as quality measures had yet to be put into place.

What seems like very few regulations from an overview standpoint is actually quite numerous for providers that wish to provide services to government covered

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[1] An independent, not-for-profit organization, The Joint Commission accredits and certifies more than 19,000 health care organizations and programs in the United States. Joint Commission accreditation and certification is recognized nationwide as a symbol of quality that reflects an organization’s commitment to meeting certain performance standards (Joint Commission.Org).

patients must meet numerous requirements. Most of the government regulations have been trying to create frameworks for limiting moral hazard of insurance and pricing controls by forming regulations that allows private market participants to solve these problems. Two examples of these are HMOs and MCOs both of which have been discussed earlier.

The regulation presented previously allows the reader to understand the basics of how price, quality and equitable access are addressed by regulation. These regulations, which set prices paid for government healthcare services are the subject of this research as they have consequences on ACH free cash flows and likewise affect decisions of capital structure. An understanding of the capability of the government to monitor the services rendered helps the reader to comprehend the difficulties in making sure that contracts between providers and government funded insurance programs are monitored effectively. This provides an outline on the inability of government payors to form a complete contract with providers (ACHs). Chapter 4 discusses this dilemma in detail along with how the government uses incentives and possibly pricing pressures to control for these problems and their effect on free cash flows and likewise decisions of capital structure. These regulations have no outlined effect on the research or any of the tests conducted.

2.5 Acute Care Hospitals: an Environment for Analysis

The market morphologies that healthcare have been through has created a unique environment to study theoretical concepts of finance and economics. The market for health services in particular ACH services are a homogenous they are all health services, yet the market is distinct geographically for each hospital, so that ACHs only compete with nearby ACHs. This provides the opportunity to analyse finance and industrial organization theory, where the empirical research can avoid problems with cross industry data that is likely to distort the outcomes. Therefore findings from this research are likely to be more accurate in explanating both theoretical concepts at least in describing theoretical costs within the US healthcare market.

ACHs are organizations that must maintain financial health. Whether for-profit or non-for-profit ACHs borrow monies and have similar capital structures (Wedig et al 1988). ACHs must be able to repay principal and interest on all debt and therefore must be considerate of its burden and the ability of its revenue stream to support borrowings. The ability to disregard the ownership structure within this market allows the research to broaden the sample to the entire population so that all ACHs may be taken into account with regard to influences on decisions of capital structure.

Payors are restricted by state lines which lead to payor dynamics which are relevant to each state. Therefore competition of payors takes place within each state, with differing market penetration within the state based upon employer or city composition. This means that ACHs face varying degrees of competition amongst payors. Taking into account a homogeneous product in a single vertical market allows the research to analyse for the presence of monopsony across an entire market of ACHs. This is only possible because of the claim level detail in the medical claims available for study, which when combined with the public Medicare Cost Report allows the research to consider competition at the local geographic area of the particular ACH.

ACHs compete with one another based upon quality or perceived quality (Glied 2003). This leaves ACHs within closer proximity to spend more on capital expenditures which enhance competitiveness. However, likely differences in quality between ACHs remains possible, as some ACHs overinvest more than others (Nahata2005).

ACHs have contractual arrangements are such that allow for market power to come to bear as payors have the ability to utilize the time and duration of the contract to negotiate aggressively. Not to mention that contracts are negotiated on an all or nothing basis akin to Taylor (2003). In this case payors both public and private try to account for their lack of ability to monitor services rendered to patients. In this case payors are incentivized to control for lack of monitoring via pricing for ACH services. Influencing prices via contracts allows for the opportunity to wield market power.

These attributes of the ACH and its market place provide a unique environment in which to do research. The greatest benefit of the research is that in many of the empirical sections are utilizing the entire population of ACHs that accept government funds. ACHs in the U.S. provide excellent opportunity for this research to provide insight into agency cost and monopsony cost not only to the academic community but also to policy makers for one of the single largest segments of U.S. GDP.

2.6 Conclusion

The historical changes in U.S. healthcare outlined within this chapter provide a unique environment in which the research takes place. Historically, we can see that pressures have been placed on the U.S. government to resolve issues of equitable access, costs and quality of healthcare services, whether provided for patients via government or private insurers. From a cultural perspective there is evidence in history that citizens are uncomfortable with the idea of control over the individual and therefore universal coverage during the timeframe of this study was not attainable; however, tax advantages for private insurance was welcomed. Additionally, they wanted to be in control of their own healthcare hence the rejection of HMOs and MCOs in favor of traditional indemnity insurance, which allowed the patient to choose, no matter how uninformed the patient might be. However, U.S. citizens continued to want to gain control over costs in healthcare.

We can see that legislators tried to solve these problems by using market forces and structures to solve these dilemmas. The Creation of HMOs and MCOs are a good example of this type of legislation. However, these unique solutions, using market structures to resolve these types of problems, created issues of their own. Namely, the inability of government insurers to form a complete contract due to the inability to monitor services delivered to patients, as monitoring quality was only accomplished through single or multi year accreditation by JACHO.

This environment of historical changes in regulation and the economic market place, which existed, provides a unique opportunity to look at agency problems between the principal and its agents. Likewise, conditions of monopsony—which is a market condition—can be analyzed, as the government often allowed or created market forces or structures to handle most problems, ultimately believing that the market was a better determinant of these types of resolutions than government bureaucratic agencies and or regulations. This is a unique market for the study of agency theory and monopsony theory, one in which costs of both may exist simultaneously.

The historical permutations of the U.S. healthcare market have created a highly-regulated environment with multiple means for payment for services from a wide range of payers, ranging from the federal government to private insurers. This environment creates complex conditions in which ACHs must navigate to be financially healthy. The existing healthcare system forces the ACHs to take into account market conditions when deciding matters of capital structure. It is these capital structure decisions and the agency and monopsony conditions created by the healthcare market that are the focus of the remainder of this thesis.

3. Liquidity and Capital Structure Trends

3.1 Introduction

With the purpose of gaining a better understanding of the changes present in the market during the years 1995 to 2007, this chapter examines the financial condition of ACHs. This is done by examining the financial ratios over the period of this study using ratios for profitability, leverage, cash position, liquidity and efficiency. The methodological approach of this chapter is to analyze the mean values of the financial ratios for all the ACHs studied. The data covers the entire population so that the mean ratios between time periods and size of ACHs can be analyzed directly without statistical tests for differences. This would not be the case with inferential statistical techniques, but the use of inferential methodologies is not the aim of this chapter. This is to contextualize the empirical results discussed in Chapters four and six.

The examination of the trends and ratios discussed here provide the necessary background of the ratios that are used later as well as providing insights of the trends in ACHs' liquidity and capital structure. These are used in the empirical chapters as key variables in explaining both the effects of agency and monopsony costs. On theoretical grounds, these costs are premised to affect either or both the liquidity or the free cash flow of ACHs and consequently decisions of capital structure. In addition, as theory suggests, agency and monopsony costs influence free cash flows and hence profitability and liquidity. Consequently, these also will be analyzed. However, a key aim of the research is to not only observe the influence of both agency and monopsony on free cash flow but to extend this to an understanding of how these ultimately influence capital structure. Hence, this requires a consideration of the leverage of ACHs as this will be used in several of the later empirical analyses. As part of this examination, this chapter will also look at the cash position, as it may help to determine the financial health of the ACH as well as provide possible control variables later on. Efficiency ratios are included to analyze the effectiveness of ACHs in utilizing its assets in operations. Efficient use of assets is important, as previous research suggests that ACHs overinvest and therefore underutilize assets in place. The existence of overinvestment is important as it supports the premise of reducing agency costs via pricing of healthcare services by the federal government.

A small financial history of the ACH market is provided, along with possible influences on the financial conditions of ACHs at the time. The remainder of the chapter is broken into several components: data, and its format, uses, and construction of ratios, and the financial trending of ACHs and its implications.

The information described in this chapter is the data used in the empirical analyses that form the major analytic elements of this thesis. Given this, it is important to understand the characteristics of this data and how financial ratios are subsequently created or extracted from this data. Therefore, each ratio is explained in some detail with additional discussion given in the Appendix.[2]

The trends in financial ratios are relevant as patterns across the classifications of ratios can show movements in ACH financial health within the population during the period of this study.

A proper understanding of the history of U.S. healthcare during the period of this research is a necessary precondition to contextualizing the results presented later. Hence, Section 3.2 is designed to supplement the background given in Chapter 2 with greater detail of the underlying financial condition of ACHs during the period under analysis. Furthermore, this chapter provides an understanding of the ratios used subsequently in the empirical analyses and how the data is manipulated based on the methods used by previous researchers. Likewise, a basis for the creation of the ratios and organization of the data base upon previous research is necessary as many of the decisions regarding data manipulation and or ratio creation was supported by previous research.

3.2 Background (History and Literature)

In 1995, the healthcare market in the U.S. was dominated by managed care. The 1996 survey of employers by KPMG Peat Marwick found that 73% of individuals covered through their employers were enrolled in some form of a managed care plan, and approximately 31% were enrolled in an HMO (Ginsburg

[2] Appendix sections are3.5.1 for profitability ratios, 3.5.2 leverage ratios, 3.5.3 cash position ratios and 3.5.4 liquidity ratios.

2005). Prior to 1990, HMOs had per capita costs that were 10 to 15% less than traditional insurance plans (Glied 2000). Most of this was accomplished through supply-side cost sharing, controlling utilization, and limiting the provider network to providers who were willing to meet stringent cost parameters. Supply-side cost sharing is a similar tactic to one used by Medicare, in which a provider receives a fixed fee for a procedure or case. Medicare has reimbursed since 1983 using a flat fee that is determined by the DRG. According to Soulam and Gaumer (1991), introduction of the DRG as a cost-saving mechanism resulted in reduced payments to hospitals by 20%, based on larger employers who had multiple HMO providers that varied by geographic region.

Insurers were expanding into new markets via acquisition and new programs via Medicare. The effectiveness of these regimes of authorization requirements and use of capitation in the early 1990s had a great effect on curbing cost. This led to the reduction in concerns over what some had called a “medical arms race,” which was helping to drive up medical cost (Gaynor 1999, p.157). The ACHs were concerned with coping with managed care and the reduction in reimbursement associated with its predominance in the market. Managed care was proving effective in reducing healthcare cost increases year after year. In an effort to achieve greater economies of scale and greater negotiating power with managed care, hospitals were consolidating.

During the mid-nineties, President Clinton was pushing for greater development of managed care and integrated delivery. The market changed as consumers and physicians turned against managed care. Patients sought greater choice within plans, which forced managed care companies to expand the providers in their network and to negotiate with ACHs on their rates. While the ACHs had an improved bargaining position, managed care, traditional insurers, and government healthcare programs still were bargaining from a position of strength with providers. The ACHs adapted strategies to control the costs and services used (Glied 2003). Managed care continued to grow as a percentage of the insured healthcare population, growing from 41 % (102 million) in 1993, to 76 % (172 million) in 1997 (Health Insurance Associaton of America 2002).

The late 1990s to early 2000s is considered a time of mixed direction for healthcare, as ACHs were gaining ground due to the demise of managed care. Managed care groups were being forced to expand their network providers, and the leverage provided by ACH mergers previously in the decade meant that ACHs had greater negotiating power with managed care providers. This was offset by the Balanced Budget Act of 1997, which cut prices for Medicare expenditures by $112 billion dollars for the next four years (Medicare Payment Advisory Commission (MEDPAC 2000).

Historically, the healthcare market was in flux, as the next phase of consumer-driven healthcare had not begun. Managed care as a solution to lowering healthcare costs was abandoned; traditional insurance became prominent again. This had an effect on ACHs' reimbursements, because larger traditional plans such as Blue Cross Blue Shield (BCBS) were able to negotiate lower rates based upon the size of their market share (Ginsburg 2005). Many traditional insurers merged across various markets, and many changed from non-profit to for-profit status.

The years of 2003 to 2006 saw an increase in consumer-directed delivery, with patient financial incentives and support for customers to choose the appropriate provider. Pricing for medical services was still under heavy pressure from payors. Through a combination of aggressive price searching used by HMOs and PPOs, and Medicare's use of its dominant position to negotiate better-than-market prices, utilization was reduced and ACHs' profit margins were shrinking. Ultimately, shrinking profit margins contributed to slower diffusion of technologies in the sector and to a more extensive use of existing capacity (Glied 2003). Medicare was gaining prominence due to the growth of the elderly of the Baby Boomer generation. Medicare influenced Medicaid and the commercial insurers' reimbursements of ACHs (Ginsburg 2005).

3.3 Data

3.3.1 Description of data

The data used in this study was provided by the CMS, and will be referred to most often as the MCR. The cost report contains provider information such as facility characteristics, utilization data, cost and charges by cost center (in total and for Medicare), Medicare settlement data, and financial statement data. The CMS maintains the cost report data in the Healthcare Provider Cost Reporting Information System (HCRIS).

All ACHs that accept Medicare or Medicaid are required to file annually within each fiscal year with the respective Medicare financial intermediary for their geographic area. The MCR's purpose is to provide information to the CMS to calculate reimbursement or Medicare/Medicaid payments to ACHs and other healthcare providers. Most of the filings are completed in an electronic format.

The database used in this study covers the years of 1995 to 2007. It is comprised of 65,689 records over the 13 years, with an average of hospital cases of 5,474 per year. All null and duplicate value cases were removed prior to this record count. In some cases, financial records were not filed on an annual basis, with some ACHs filing more than one time per annual year. For purposes of this research, these cases were removed as well. All financial records that reflected 363 days or more were deemed acceptable for the study. Because the filing of financial data did not cover 363 days, 5,235 cases were excluded from the population.

3.3.2 Advantages of the Data

The MCR is a valid database of financial information on approximately 5,474 individual hospitals per year at the operating unit or hospital level. The population in the database represents all operating ACHs within the U.S. who accept government reimbursement from Medicare and Medicaid. The data includes an income statement, balance sheet, and a change in net assets via Schedule G. Data is provided in an MS SQL format, which simplified the study's planning and execution. It is the most comprehensive data set on the financial condition of hospitals within the U.S. The MCR contains the highest-level (filtered and aggregated) hospital financial information. The MCR provides information at the hospital departmental level regarding cost and cost analysis. All data is provided in a single format for each hospital

This data provides a useful base for observing influences upon the financial condition of ACHs over time. For this research, it excludes concerns over cross-industry influences. The exclusion allows the research to rule out differences in financial condition due to the underlying business model generating returns. While other sources of data remain available from commercial vendors, these other databases account for a subsample of the ACH market within the U.S., and data was not reported on a regular basis; in other words, data was there for one year, but not the next. Alternatives could be the data in the aggregate form of the hospital system, rather than at the individual hospital level.

The database is comprised of a population N = 55,582 cases, with 545 variables per case. The population distribution can be seen by year in Figure 3.1, below. All years contain just fewer than 5,000 cases, with 1995 and 2007 having a reduced case count of approximately 25% of the normal case volume per year. While the frequency case count for those years is a statistically viable sample, it will not be as reliable as the years 1996 through 2006, which contain larger populations for those years. It is unknown why 1995 contains fewer cases in the database provided by the CMS; however, the reduction in the number of cases in 2007 is due to the lack of availability of the additional cases from the CMS at the time that this research was conducted. This is mainly because the hospitals had not filed their cost reports at the time that the database for that year was created/updated and made available. The database is released more than once a year, so one may receive data for hospitals whose fiscal year end date had occurred before the MCR was released for a partial year, for example, the first six months of 2007 or the first quarter of 2007.

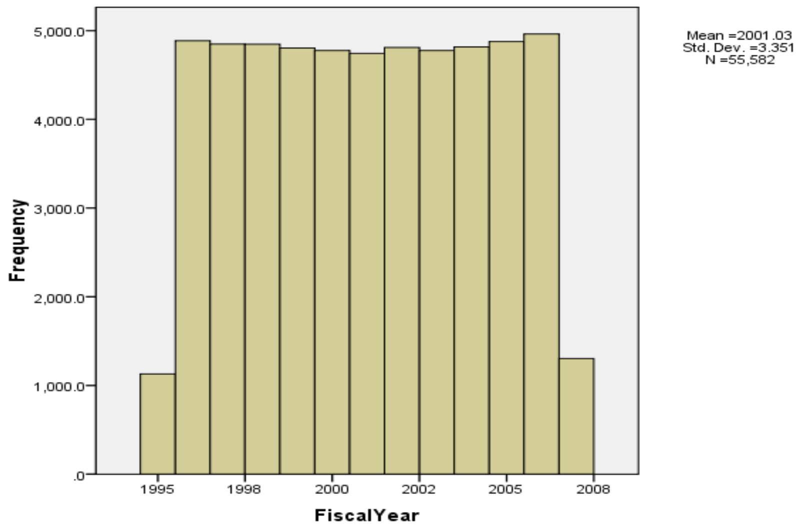

Figure 3.1: Histogram N Cases by Fiscal Year.

Thirteen years of data are present in the database 1995-2007.   The years 1995 and 2007 represent roughly 25% of the sample size present each year for the years 1996-2006. Each of the years from 1996-2006 contains just under 5,000 ACHs reporting for each year. Except for 1995 and 2007, the sample size in all other years remains stable.

While many variables will be analyzed in this research, the size of the hospital will be an important variable, as capacity certainly has an effect on the financial capabilities of the ACH.   In Figure 3.2, the distribution of cases in the population N is segmented into five categories of hospital size. The categories created take into account various ACH size ranges and adjust for operating similarities. Each category or class has different operating concerns and revenue generating units. This is not to say that all hospitals within a category or class are the same, but rather that they have similar operations and similar operating concerns. All have a large frequency in the population, except for Category 5, which is a very small sub-population. This may have a tendency to skew the results calculated for this category, and will be scrutinized in the research conducted with this category.

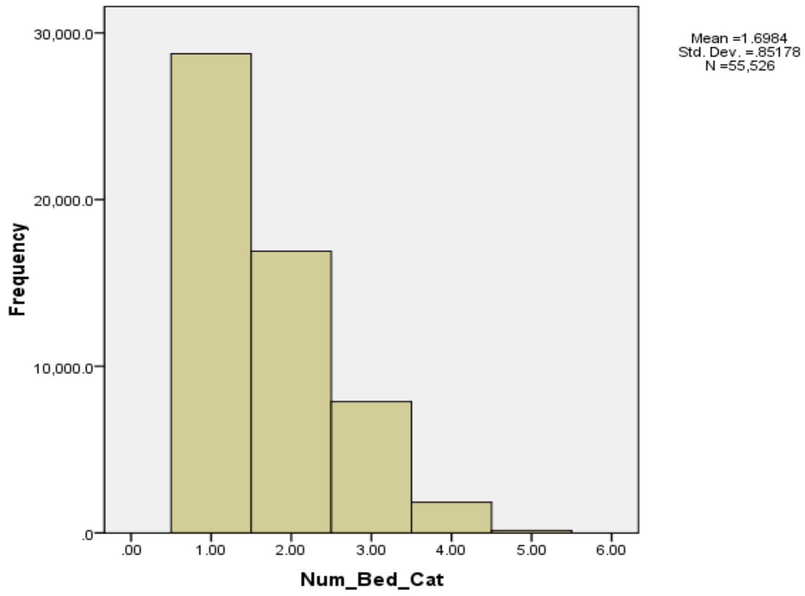

Figure 3.2: Population Outline by Hospital Size.

Frequency of cases is analyzed for the entire period of the study 1995-2007. Category size can be seen in Table 3.1. Category 1, representing hospitals from 0 to 100 beds, contains the largest sample, with just under 30k cases of ACHs participating. Category 2, which represents hospitals with a bed size from 100 to 250 beds, provides the second largest frequency of cases, with just under 20k cases of ACHs. Category 3 represents hospitals with 250-500 beds, and has just under 10k cases in the sample. Category 4 represents hospitals with a bed size of 500 to 1,000, and has approximately 2,000 cases in the sample. Category 5, representing hospitals with a bed size over 1,000 provides the smallest number of cases within the sample, with under 1,000 cases.

The categories of hospital size defined by bed size for this research are as follows:

Table 1: ACH Category by Bed Size:

Integer values represent the number of beds in each ACH. The number of beds was identified with the variable “num_beds” from the MCR.

Category	1	2	3	4	5
Size	0>X<=100	100>X<=250	250>X<=500	500>X<=1000	X>1000
NOTE: (X) denotes bed size					

3.3.3 Disadvantages of Data

The MCR has been criticized as unreliable, unaudited, lacking in detail, and vaguely defined (Kane 2001). The greatest criticism is the lack of rigorous third-party auditing of the information provided in the MCR. Most hospital-audited financial statements are designed to provide information regarding an income statement, a balance sheet, a statement of cash flows, changes in net assets, and to give footnotes detailing the underlying nuances of transactions listed in the previous statements. The MCR is lacking in comparison. Schedule G of the MCR does not provide a statement of cash flows or footnotes. Largay and Stickney (1980), Sloan (1996) and Kane and Magnus (2001) all suggest that the absence of cash flow statements is a major deficiency. This makes an analysis of cash flows difficult, and requires greater diligence in creating ratios that accurately reflect cash positions.

There are additional research questions that may be difficult to answer given the information from within the MCR. Any questions regarding short-term operating accountability or long-term financial stewardship of the firm are difficult to analyze (Kane 2001). Kane (2001) provided a summary of key limitations with the MCRs financial accounting elements: 1) major differences in the reported profits; 2) inadequate balance sheet and income statement detail; and 3) inaccuracies related to estimation of cash sources and uses. Cleverly (1992), Cleverly and Harvey (1990, 1992), and Bazzoli and Cleverly (1994) all call for greater, more complete financial disclosure by hospitals than currently is supplied in the MCR. In addition, the data does not distinguish between for-profit and non-for-profit, rural and urban hospitals. While some effort is made in the current research to use standard industry characterizations, for example in regards to rural and urban, a true delineation is not possible. Therefore, comments within the research can only use the logic of these characterizations. For instance, it is widely known that small hospitals are located in areas with smaller populations and those urban areas or areas of smaller populations are more likely to be rural in character. Likewise, larger hospitals are located in areas with larger populations that are more likely located in large cities. A similar situation presents itself for the for-profit and non-for-profit categories. While teaching hospitals can be identified in the data and that it is known that most if not all teaching hospitals are public non-for-profit, it remains a problem to be able to identify other non-for-profit ACHs which may be in the data. For example, county run hospitals.

Therefore, it is not possible to break down variables and findings based on these characteristics.

3.3.4 Data Preparation

While the CMS and other health researchers prepare the MCR for use, the database itself is not entirely without error when the data is released. Errors and omissions occur and must be cleansed or removed in order for research to be conducted properly. An original N= 65,689 cases were available in the distributed version of MCR by the CMS. After a quality test was performed on the data, it was found that the MCR contained duplicate records. A match was performed, using the fiscal year beginning date, fiscal year end date, hospital name, zip code, and state. Approximately 92 cases were removed as a result of this process.

A cleanup of the hospital state and zip code was necessary. All zip codes were verified via a third-party database of zip codes from the U.S. Postal Service. The state was adjusted when it was different by observing previous years' reporting to determine the actual state. This normally was verified by zip code. Hospitals not identified via this methodology were researched individually on the Internet through their websites, and the address was confirmed. No cases were removed as a result of state or zip code errors.

The U.S. covers more than just the 50 U.S. states under Medicare and Medicaid; U.S. territories also are included. This research was limited to the 48 contiguous states, plus Alaska and Hawaii; therefore, any cases that occurred outside the 50 states were excluded from this research. These would include the U.S. territories of Guam, the Virgin Islands, and Puerto Rico.

Hospitals report to the CMS throughout the year as their fiscal year end date is reached; however, sub-year reporting was found in the MCR when reporting for less than 363 days occurred. In this body of research, 363 days was used to reference a full year’s data as opposed to 365 days, as the largest portion of cases within the database reported a year to be 363 days or more. More than 363 days were allowed, but a year was set as the minimum time frame allowed to be reported. Any calculations that used days as the measurement were adjusted accordingly. Because they reported less than 363 days, 5,235 cases were removed.

The mean for each variable, whether the mean was by itself or broken down by year or size, were created with all of the cases for that particular year and size. Not all of the hospitals were present throughout the longitudinal study. They may have reported for a few years, stopped reporting, and started to report again later in the study. No hospitals were excluded for this reason. The reasons for the lack of reporting were unknown at the time that this research was conducted.

While the MCR provided basic balance sheets and income statement variables, not all variables used in the creation of ratios used in this study were present in the original database in its initial form, and some had to be created. Most ratio formulas took the underlying variables directly from the MCR. If the variable was not available, it was created by way of the other variables present. Evidence of this will be visible in the definition of each ratio using data variable names. Null values were prevalent for some variables within the MCR database. Where appropriate, a zero value was used to replace the null or missing value. This was done so that ratios could be calculated, and this included multiple variables that might not have been reported as zero, but rather were left blank in the reporting. An example of this is temporary investments. Many ACHs did not report a value for this field, which ultimately is reflected in the MCR database as a null or missing value. Changing this field to a zero did not change any ratios calculated with this field. This allowed many cases that would have been excluded from the sample of the ratios because of missing data to be included, thus increasing the sample size for the ratio.

All data provided in the MCR was input manually into the system at some point. Errors in inputs led to the recording of extreme values for various variables. These values were not removed from the population, but rather dealt with as extremes and outliers when creating the subsamples for each ratio. Evidence of this will be provided in the discussion on each ratio, where relevant.

Hospital type was considered in creation of the population to be studied. While the MCR included many types of health facilities, general short-term, general long-term, cancer, psychiatric, rehabilitation, religious non-medical, childrens, and alchohol and drug, amongst others, only those that met characteristics of ACHs were included. The variable of hospital type was limited to values of 1, 2, and 7. Hospitals types are as follows: 1) General Short-Term; 2) General Long-Term; and 7) Children's Hospital. Removal of all other hospital types left a population of N =

55,582 cases. There were some records within the MCR data (38) that contained null values in all variables, so they were removed permanently from the data.

3.4 Methodology

3.4.1 Introduction

The methodologies employed within this chapter provide a general view into the data. All statistical calculations were done at a 95% confidence interval. The population of each ratio was analyzed via box plot and stem and leaf to identify extremes and outliers. Definitions of outlier and extremes are those defined by J.W. Tukey (1977) to be three inter-quartile ranges below the twenty-fifth percentile or above the seventy-fifth percentile. Outliers were removed from each population as necessary to provide as close to a normalized distribution as possible.

Once a sample was created by removing outliers and extremes, a histogram of the distribution of each was created. The removal of outliers improves the stability of the variance of each year's distribution and allows for a relatively homogeneous statistic. This method improves the comparability of variables over time (Frecka 1983; Rees 1990)

The removal of outliers along with additional box plot and traditional statistical descriptives were used to verify that a sample had been normalized. In all samples, a mean and mode for that sample must be considered an acceptable value for that particular ratio, with a small standard deviation and acceptable range. Both skewness and kurtosis were used to verify that the character of the distribution is acceptable, with limited skewness and limited kurtosis signifying normalization. Each ratio's statistical descriptives are presented pre- and post-removal of outliers and can be seen in Table 3.2, below. For each ratio, the sample is normalized. Additional details of the process are available in the appendix beginning with section 3.5.1.

Table 3.2: Sample Descriptive for Each Ratio, Pre- and Post-Removal of Outliers.

Removal of the outliers is denoted by (-x) after the variable name using Tukey's (1977) definition of outliers. (n) represents the sample size pre- and post- removal of outliers. Deviation of mean and the median due to the presence of outliers can be seen in many variables prior to the removal of outliers.

Chapter 3

Descriptives of Variables

Variable	n	Mean	Median	Std. Deviation	Range	Skewness	Kurtosis	Outliers
RoE	54619	41.98	0.0747	74064	21643214	56.875	19.801	x<= -0.26 & x>= 0.42
RoE -X	44629	0.0743	0.0713	0.11895	0.68	0.125	0.624	
RoA	54047	37566.92	0.03	5088640	8.81E+08	-121.52	16973.44	x<= -0.150 & x>= 0.220
RoA - X	45634	0.0334	0.03	0.06655	0.35	-0.057	0.249	
FAT	53179	1022.01	4.49	189654	44280143	170.26	32447.82	X<= -3.6 & X>= 13.7
FAT - X	47943	4.8	4.16	2.65	17.26	1.06	0.764	
Current Ratio	53761	3.24	2.03	87.75	19898.78	83.43	13976.81	x<= -1.4 & x>= 5.8
Current Ratio -X	49524	2.14	1.95	1.217	7.18	0.639	0.292	
Quick Ratio	50043	2.78	1.9	70.47	19642.78	69.163	18666.36	X<= -1.3 & X>= 5.4
Quick Ratio - X	45991	2	1.82	1.13	6.68	0.65	0.298	
DCOH	55564	108.81	36.768	5737.647	1356149	235.197	55399.032	x<= -160 & x>= 275
DCOH -X	52050	57.7826	31.296	68.525	434.61	1.18	0.668	
Cash Ratio	53946	3.87	2.27	107.866	23005.77	92.93	13875.72	x<= -2.1 & x>= 7.1
Cash Ratio - X	50168	2.47	2.164	1.533	9.2	0.725	0.229	
Oper Margin	54019	-0.0546	-0.01	0.87927	182.67	16.029	6679.606	x<= -0.26 & x>=0.23
Oper Margin -X	48615	-0.0136	-0.1	0.09045	0.47	-0.112	0.146	
Net Margin	54078	0.0148	0.01742	0.183182	33.872	-99.124	14886.324	X<= -0.80 X>=0.118
Net Margin - X	49699	0.01919	0.01799	0.036954	0.198	0.041	0.089	
Debt Ratio	53904	300.075	0.45	69431.498	16120298	232.172	53903.798	X<=-0.39& X>=1.34
Debt Ratio - X	49996	0.4778	0.44	0.29558	1.71	0.5	0.084	
Debt /Equity	47850	2497.917	0.7	3.12959	66817193	204.22	43436.85	X<= -1.5 & X >= 3.2
Debt /Equity - X	42651	0.778	0.61	0.71562	4.55	1.024	1.03	
DSO	53931	126.199	92.64	2143.57	496654	217.61	49005.71	x<= -27 & x>=222
DSO - X	51138	96.813	89.88	41.905	245.87	0.655	0.097	

In all cases, the primary ratio is utilized. No square root transformations were necessary, as a square root transformation is only marginally effective in correcting the distortions in accounting ratios, which usually appear to be skewed ,exhibiting non normal characteristics and kurtosis Rees (1990) Each mean ratio was compared with two variables to see behavior, and the first and foremost was the fiscal year in which the cost report had been reported. This showed any longitudinal time trends that might have been present. Trends in this chapter were considered just for their own merits, and any independent variables that might have influenced these trends were not considered.

Other than time, size is the other variable that the individual ratios were compared against in order to understand how ratios varied by ACH size. The number of beds within a facility determined its size. The number of beds was signified by the variable “num_beds” within the MCR (Medicare Cost Report) data itself (The breakdown of these size categories is described in Section 3.4.2.). These interactions were analyzed using tables and simple statistical descriptives of the comparison.

3.4.2 Ratios to Be Used in the Analysis

Using the research of Chen and Shimerda (1981) as a basis for choosing the financial ratios to be studied, 12 ratios were chosen. While this study does not attempt to separate financially-distressed firms from non-distressed firms, ratios that gave clarity to condition and were more sensitive to indicating the distress of ACHs were chosen. Ratios have been shown to be predictive of firm distress: “financially-distressed firms can be separated from the non-failed firms in the year before the declaration of bankruptcy at an accuracy rate of better than 90% by examining financial ratios” (Altman 1968, in Chen & Shimerda 1981, p. 51).

Chen and Shimerda (1981), suggested that all of the financial ratios can be assigned to one of the seven basic financial factors: return on investment, financial leverage, capital turnover, cash position, liquidity (short-term), inventory turnover, and receivables turnover. While some overlapping in ratios does occur as a result of data peculiarities, ratios within this study address these seven basic financial factors. A list of recommended financial ratios, descriptions, and equations for each can be seen in Table 3.3.

Table 3.3: The Seven Basic Financial Factors and Recommended Ratios, by Chen and Shimerda (1981), along with description and equation for each.

Ratio Type	Description	Equation
Profitability	Return on Investment	net income/total assets
Risk	Leverage ratio	long-term debt/equity
Efficiency	Receivable turnover	sales/ quick assets
	capital turnover	sales/ total assets
	Inventory Turnover	sales/ current assets
Liquidity	Cash position	cash / total assets
	Liquidity ratio	current assets / total assets

According to previous studies, these ratios have the highest loading score for each of the seven financial factors. However, exactly which ratio should represent a factor is still up for debate, as suggested by Chen and Shimerda (1981, p. 53): "An acceptable theoretical foundation for the election of ratios for decision making has yet to be found, and the scattered heterogeneous empirical evidence in the published studies does not identify a complete set of useful ratios." Chen and Shimerda (1981) suggested that the financial ratios that capture most of the information for the financial factor they represent should be chosen, so that a group of ratios will contain more unique information.

To develop a predictive model of hospital closure using financial accounting ratios, Wertheim and Lynn (1993) brought the selection of ratios in line with healthcare in the U.S. and ACHs in their study. Their study compared 71 U.S. hospitals using data taken from the two years preceding closure against data taken from 71 operating hospitals with the same demographics between 1987 and 1995, and it used Logit analysis. Univariate and multivariate tests were used to examine the relationship between 21 financial ratios. They drew from the previous predictive models of the LaJolla Management Corporation for the Bureau of Health Finance (1981), the Farmers Home Administration checklist of financial ratios for assessing rural hospitals (1983), Cleverly and Nilsen's (1980) analysis of 14 closed hospitals in New York, NY, Kwon et al.'s (1988) analysis of financial and operational characteristics of Catholic hospitals, and Cleverly's (1985) financial flexibility index, or FFI. Wertheim and Lynn (1993) found, using the Lachenbruch Procedure, that 17 of the 21 ratios were significant indicators of hospital closure in the year prior to closure, while only eight of the 21 were found to be significant in predicting hospital closure in year two. The predictive ability of a ratio decreasing two years prior to closure was found to be in line with prior research on the subject. "Rose and Giroux (1984) indicate that as a firm approaches failure, financial factors leading to that closure become more pronounced" (Wertheim & Lynn 1993, p.539).

Wertheim and Lynn (1993) narrowed down the set of seven financial factors to four factors: 1) ratios representing leverage; 2) liquidity; 3) capital efficiency; and 4) asset availability. These ratios ultimately can provide significant information that is useful in the prediction of hospital closures. Ratios for asset availability, capital efficiency, and leverage were greater at predicting ACH closures than liquidity in a multivariate model (Wertheim & Lynn, 1993). Total liabilities/total assets, total revenues/total expenses, and total assets/bed days available were found to be significant in predicting hospital closure. Their findings also concluded that leverage increased as capital efficiency and asset availability decreased prior to hospital closure.

Zeller et al. (1996) put forth seven financial characteristics that emerged from their taxonomy of hospital financial ratios. They are: 1) profitability; 2) fixed asset efficiency; 3) capital structure; 4) fixed asset age; 5) working capital efficiency; 6) liquidity, and 7) debt coverage. "The ratios classified by the same financial factor are highly correlated, and selection of one ratio to represent a factor can account for the most information provided by all ratios of that factor" (Chen 1981, p. 59). An ACH's location, rural or urban, and its mission, teaching or non-teaching, should not affect the framework for financial ratio analysis (Zeller et al. 1996). Ratios included in this study and comparisons to other studies mentioned previously are shown in Table 3.4.

Table 3.4: Ratios Used to Determine Hospital Failure by Previous Researchers, divided by authors' ratio preference:
All ratios used within this research are listed under "This Research." Multiple variables are listed under "This Research," instead of just one, because the MCR is not audited; therefore, similar ratios may provide different results due to the uniqueness of reporting within the MCR.

Academic Studies	**Chen, et...al. (1981)** Non Healthcare Study	**Zeller, et...al. (1996)** Non-for Profit Hospital	**Wertheim and Lynn (1993)** All hospital (closure) One Year Prior	**This Research**
Financial Characteristics				**Ratios**
statistically significant in predicting distress in firms.	Profitability	Profitability		ROE, ROA, Net Margin, Operating Margin
	Financial Leverage	Capital Structure	Leverage	Debt Ratio, Debt/Equity Ratio
	Capital Turnover	Working Capital Efficeincy	Capital Efficiency	
	Cash Position			Days Cash on Hand, Cash Ratio
	Liquidity (short-term)	Liquidity	Liquidity	Current and Quick Ratio
	Inventory Turnover			
	Receivables Turnover			DSO
		Fixed Asset Efficiency		FATR
		Debt Coverage		
		Fixed Asset Age		
			Resource Availability	

Table 3.5: Ratios for This Research with Description and Equations.

Several ratios were chosen for each ratio type. The multiple ratios are meant to provide a broad base of financial characteristics, as all information is taken from the CMS cost report. Therefore, if a single ratio is distorted, multple ratios for the same ratio type would provide a more broad base for comparison. Equations for each ratio are included. Equity is defined as net assets for non-for-profit ACHs

Ratio Type	Description	Equation
Profitability	Return on Equity	Net Income/ Equity
	Return on Assets	Net Income/Total Assets
	Net Income Margin	Net Income/ Sales
	Operating Income Margin	Operating Income/ Net Sales
Leverage	Debt Ratio	Total Debt/ Total Assets
	Debt to Equity ratio	Long-Term Debt/Equity
Cash Position	Days Cash on Hand	COH/ (operating expenses/365)
	Cash Ratio	(Cash+Temp Investments+AR)/Current Liabilities
Liquidity	Current Ratio	Current Assets / Current Liabilities
	Quick Ratio	CurrentAssets-Inventories/Current Liabilites
Efficiency	Days Sales Outstanding	(Gross Receivables/Net Sales) x 365
	Fixed Assest Turnover	Sales/Fixed Assets

3.5 Results

The results presented here are key to understanding the later analyses of the effects of agency and monopsony on decisions of capital structure of ACHs. There are some key considerations to be made prior to reviewing the results of the ratio analysis.

The first is that ACHs can be found in two main types of ownership structure: for-profit and non-for-profit. Non-for-profit entities are considered the same as non-governmental organizations or civil society organizations elsewhere in the world. While there is no variable in the database to identify ownership structure, there may be some concern that these ownership types may lead to different capital structures because non-for-profits do not receive the same tax shield generated by debt as for-profit entities. That said previous research of Wedig et al (1988) on ACH capital structure, suggests that the capital structures of ACHs are not affected by type of ownership and that non-for-profit ACHs show no difference in capital structure compared to for-profit ACHs. “Holding constant the ownership-payment interaction, tax shield, and other variables correlated with ownership, we find no differences in capital structure by ownership. This result persists in spite of the fact that the specific motives for holding debt are quite different across ownership" (Wedig et al 1988, p.37). This prior finding consequently supports our approach, which is to consider leverage ratios across ACHs sizes and years without regard to ownership type.

The second and also a key concern is that an ACH's location, rural or urban, and its mission, teaching or non-teaching, may affect the framework for financial ratio analysis. Research by Zeller et al. (1996) suggests that the composition of financial ratios are not affected by these characteristics. This means that we are able to compare and contrast the financial health of ACHs without regard to such features.

Third is that there may be some concern that certain ownership types of ACHs may not recognize equity on the balance sheet in the same way. For-profit hospitals issue shares to shareholders in the ACH, thus allowing for a measure of equity and hence the creation of financial ratios mearsuring performance in comparison to the equity investment. On the other hand, non-for-profit ACHs are generally owned by the community or educational system which in turn is state or community owned. Consequently there are potential difficulties in identifying a similar equity investment category. However Conrad (1984) points out that non-for-profits can be measured for equity performance as they still generate a return of equity capital due to competition in the final product market for ACH services as well as in the capital markets. Non-for-profits often keep retained earnings, fund balances or more recently net assets, which are functionally equivalent to the equity investrment cateogry and allow a definition of equity in financial ratios such as return on equity, and so on. Researchers such as Long and Silver (1976), Long (1976) and Day (2008), argue for the use of corporate finance principles in the non-for-profit healthcare sector by suggesting that the same economic principles for investment decision making and financial performance measurent apply between for-profit and non-for-profit hospitals. Conrad (1984) furthers this approach in the light of his use of return on equity taking the view that return on equity is an appropriate measure for non-for-profit financial performance. Based on the above findings, in this research the equity for non-for-profits is therefore defined as total assets minus total liabilities—rather than net assets. This will is discussed later on in this chapter when examining the financial performance of ACHs based on a ratio that includes equity in the denominator, That prior researchers have found no differences concerning location and ownership type are important to this research as it reduces concerns that the observed relationships that are found later on are driven by such characteristics. This means the research can focus on the industry as a whole taking into account the entire population of ACHs provided in the MCR during the timeframe of this study.

3.5.1 Profitability

The profitability of ACHs is included as a variable as prior researchers have used it also and it is a component of free cash flows, which will be discussed later on. However, problems with free cash flows should be indicative within the profitability ratio. As profitability and free cash flow are linked, it is important to understand changes in profitability over timeframe as free cash flow is a key variable to be discussed later in empirical chapters where it used to provide evidence of agency and monopsony. Fluctuations in profitability affect the ability of the ACH to obtain debt, decisions of which are a main concern of this research.

ACH profitability is measured via four ratios: return on equity (ROE), return on assets (ROA), net income margin (NIM), and operating income margin (OIM). Equations for each profitability ratio are given in Table 3.4.[3]

Before discussing the profitability ratios, a proper understanding of net income and operating income is needed as the MCR differs on the definition of operating income from US GAAP, while net income does not. Operating income normally is described as the amount of profit realized from a business's operations gross income after taking out operating expenses, such as cost of goods sold (COGS), wages and depreciation. This is often described as (EBIT) or earnings before interests and taxes. The MCR differs in its definition of Operating Income in that the MCR refers to operating income as the Net Income from Services to Patients (NISP). Therefore, in this case the MCR definition does not start with gross income, but rather only

[3] A detailed breakdown showing how each profitability ratio is created can be found in the appendix within Section 3.5.1 together with a discussion of the underlying variables descriptive statistics.

includes revenues generated at the ACH from services to patients. This definition of Operating Income excludes Other Income obtained from sources such as Schedule G3 of the MCR. Other Income includes contributions, donations, income from investments, revenues from television and phone rental, purchase discounts, rebates or refunds, parking revenues, revenues from laundry, meals, rent, sales of medical or surgical supplies, sale of drugs, medical record sales, tuition, and revenues from vending. However, Net Income includes both the revenues defined as Operating Income and revenues, which are defined as Other Income via the MCR. This difference in the definition between net income and operating income is important as will be shown further in section 3.5.1.

The data shows that ACHs have been affected financially over time. All profitability ratios had their highest values in 1995 or 1996, and their lowest values in 1999, with the exception of the net income margin, which had its lowest value in 2002. Evidence of this can be followed in Table 3.5. All the measures of profitability trend downward, as shown in Figure 3.4**.** While the trough of each profitability ratio may vary, the worst performing periods correlate to the years 1998-2002, with the exception of the operating margin, which had its worst performance beginning in 1996 as opposed to 1998. As shown in Table 3.5, net income margin, which had its highest value in 1995 at 3.03%, is halved by the year 1999 at 1.5%, with a further one-tenth of a percent decrease by 2002. By 1999, all ratios decreased significantly. The return on equity (RoE) was down 39%, while the return on assets (RoA) was down 48%. The Net Income Margin was down 50.5%, and the Operating Margin was down by 289%.

All profitability ratios were positive, with the exception of the Operating Margin, for which the mean is negative. While this may seem to contradict the positive net margin, this is due to the MCR not following Generally Accepted Accounting Principles (GAAP) reporting. The Operating Margin measured only the margin that was derived directly from service to patients. This provided evidence that ACHs on average were not profitable on services delivered to patients, and that they must be profitable on other services delivered. This also helps explain the magnitude in change over time between net income margin which decreased 50.5% while the operating margin decreased 289%. The larger decrease in operating margin can be directly be attributable to margin on patient services. This suggests that payors reimbursement for service to patients was decreasing at a greater rate in comparison to underlying cost to service patients. The change in net income shows that these sharp decreases in operating margin were diluted by the contribution to net margin made by other income sources. These other income sources are classified as Other Revenues by the MCR and were discussed previously.

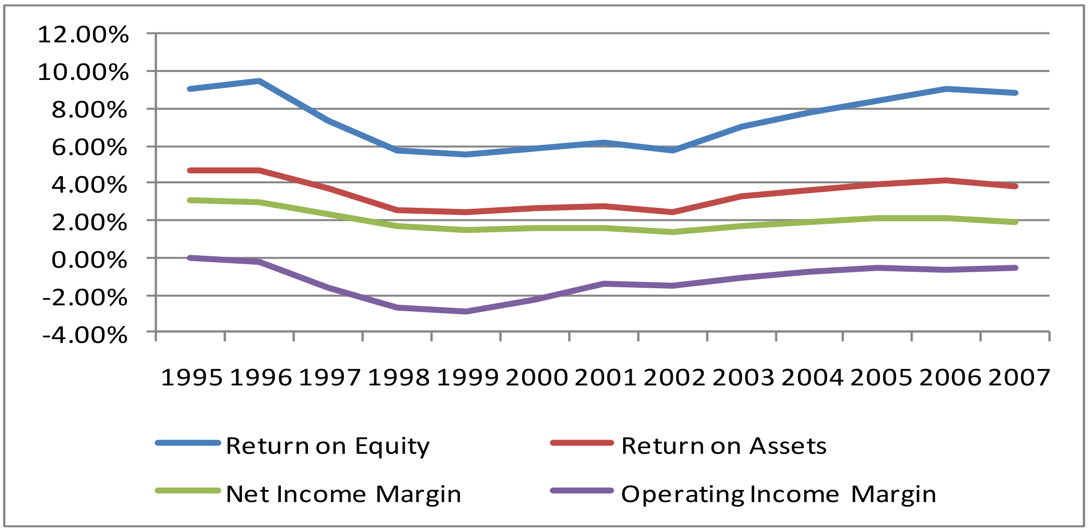

Figure 3.4: Mean Profitability Ratios by Fiscal Year Reported:

The low points in all the profitability ratios occur between 1998-1999. Large increases in managed care in the preceding years provide a possible explaination of decreases in profitability, as managed care reduced reimbursement to ACHs. In additon, the dip in the ratios coincides with the implementation of the balanced budget amendment in 1997, which significantly reduced the CMS expenditures.

Any revenue not specified in any other field also falls into this category. Of these, rent for living quarters, medical/surgical supply sales, and drug sales were categorized most often by GAAP as operational revenue. If these revenues were included in full or in part, then the operating margin would be positive. As these are important revenues for ACHs, the Net Margin was positive, as all such revenues and expenses were reflected in this ratio. While Net Margin during the worst years did approach zero percent, the minimum net margin achieved was approximately 1.4% in 2002, with a max net margin of 3% in 1995 and 1996.

The finding that on average operating margins were negative is a key piece of evidence that ACH cash flows may be under pressure via reimbursement on services to patients and that over the period under analysis ACHs were not able to generate income in comparison to the underlying costs of services rendered. The later tests of agency and monopsony rely on the relationship between costs and their full or partial reimbursement from payors. In the case of agency costs, it is postulated that the government may reduce fees for health services in order to limit overinvestment and other undesirable behavior by ACHs. Likewise, collusive monopsony is suggested to have a negative effect on free cash flows of ACHs by limiting reimbursement for health services. While both theories will be discussed further in chapters four and six, it should be noted that the average negative operating margin ratio provides evidence that there is prima facie evidence for agency and monopsony effects in U.S. healthcare.

These low margins affected both RoA and RoE. As would be expected, both mean RoE and RoA had similar graph characteristics, as can be observed in Figure 3.4. As both had the same numerator, the denominator was the only variable that changed. All profitability ratio performance is illustrated in Table 3.5.

Table 3.5: Mean Ratios by Fiscal Year Reported.

Several ratios are provided for each ratio type by year. Further breakdown of movement within the ratios by year is provided later in this chapter.

Ratio Type	Description	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Profitability	Return on Equity	0.09	0.10	0.07	0.06	0.06	0.06	0.06	0.06	0.07	0.08	0.08	0.09	0.09
	Return on Assets	0.05	0.05	0.04	0.03	0.02	0.03	0.03	0.02	0.03	0.04	0.04	0.04	0.04
	Net Income Margin	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02
	Operating Income Margin	0.00	0.00	-0.02	-0.03	-0.03	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Leverage	Debt Ratio	0.45	0.46	0.47	0.47	0.47	0.48	0.49	0.50	0.49	0.49	0.48	0.48	0.50
	Debt to Equity ratio	0.77	0.78	0.79	0.78	0.78	0.78	0.79	0.79	0.78	0.75	0.78	0.75	0.81
Cash Position	Days Cash on Hand	69.81	64.35	63.06	58.49	56.85	54.96	56.10	55.53	56.36	56.35	56.93	55.85	50.36
	Cash Ratio	2.51	2.43	2.41	2.46	2.46	2.47	2.49	2.48	2.49	2.48	2.49	2.50	2.57
Liquidity	Current Ratio	2.20	2.16	2.14	2.16	2.15	2.15	2.17	2.13	2.12	2.13	2.11	2.12	2.12
	Quick Ratio	2.04	2.02	2.00	2.02	2.01	2.00	2.02	1.99	1.98	2.00	1.98	1.98	1.98
Efficiency	Days Sales Outstanding	96.07	96.17	99.23	104.84	105.93	103.48	97.93	94.05	93.57	90.46	90.00	91.29	91.76
	Fixed Assest Turnover	4.00	4.09	4.13	4.17	4.33	4.55	4.81	5.09	5.31	5.50	5.67	5.65	5.73

It should be noted, the equity definition for non-for-profits are retained earnings and fund balances on the balance sheet. As reflected in the margins, both the mean RoA and RoE had very sharp declines in return initially in the longitudinal study, with stabilization and the worst performance during the same periods, 1998-2002. Both increased for the remainder of the study, with the exception of the mean RoA in the year 2007, which was reduced. At its height, the mean RoE provided a return slightly under 9.5% in 1996, with its worst performance at 5.5% in 1999.

While mean RoE was relatively low in comparison to other industries, it was on average positive over the period.

Though the profitability ratios showed evidence that ACH returns were under pressure at the beginning of this longitudinal study, the downward trend at the beginning of the study stabilized, suggesting that the industry was adapting to the new pressures within the market. This also suggested that the industry was adjusting its business model to succeed in spite of any external pressures within the market is suggested by the positive operating income margin.

Table 3.6: ACH Financial Ratios by ACH Size Category:

RoE with the exception of Category 1 indicates that larger ACHs generate a larger return on equity. RoA larger ACHs generate larger return on assets, which perhaps suggests greater efficiency or economies of scale with larger ACHs. Net Income also confirms that larger ACHs generate larger net incomes, with the exception of Category 5. Category 2 provides the best performance for the operating margin. This suggests that based upon the definition of operating margins, Category 2 ACHs perhaps have better cost management for patient services. Categories 1, 4, and 5 have the worst performing operating margins.

Ratio Type	Category	1	2	3	4	5
Profitability	Return on Equity	0.082	0.079	0.084	0.085	0.088
	Return on Assets	0.030	0.035	0.041	0.040	0.042
	Net Income Margin	0.018	0.020	0.022	0.023	0.019
	Operating Income Margin	-0.022	-0.002	-0.006	-0.021	-0.015
Leverage	Debt Ratio	0.458	0.504	0.487	0.510	0.443
	Debt to Equity ratio	0.716	0.822	0.859	0.946	1.036
Cash Position	Days Cash on Hand	54.550	57.710	67.550	70.530	47.630
	Cash Ratio	2.500	2.470	2.430	2.200	2.240
Liquidity	Current Ratio	2.190	2.100	2.090	2.100	2.040
	Quick Ratio	2.050	1.940	1.970	2.040	2.020
Efficiency	Days Sales Outstanding	96.790	97.630	96.260	92.610	96.090
	Fixed Assest Turnover	4.590	4.960	5.170	5.120	5.030

As shown in Figure 3.5, below, and Table 3.6, above, larger ACHs had a larger RoE. This led to the possible conclusion that larger institutions have greater leveraged returns than smaller facilities. Larger ACHs had a larger RoA, and with the exception of Category 5, larger ACHs had larger Net Income Margins. Category 2 had the lowest Net Income and the highest Operating Margin. This indicates that Category 2 ACHs derived more revenue from service to patients, and less from what the MCR deems other revenues. Overall as shown by the profitability ratios, smaller hospitals are less profitable. This supports the previous research of Morellec and

Smith (1997), which provided evidence that financially weaker ACHs were small rural hospitals.

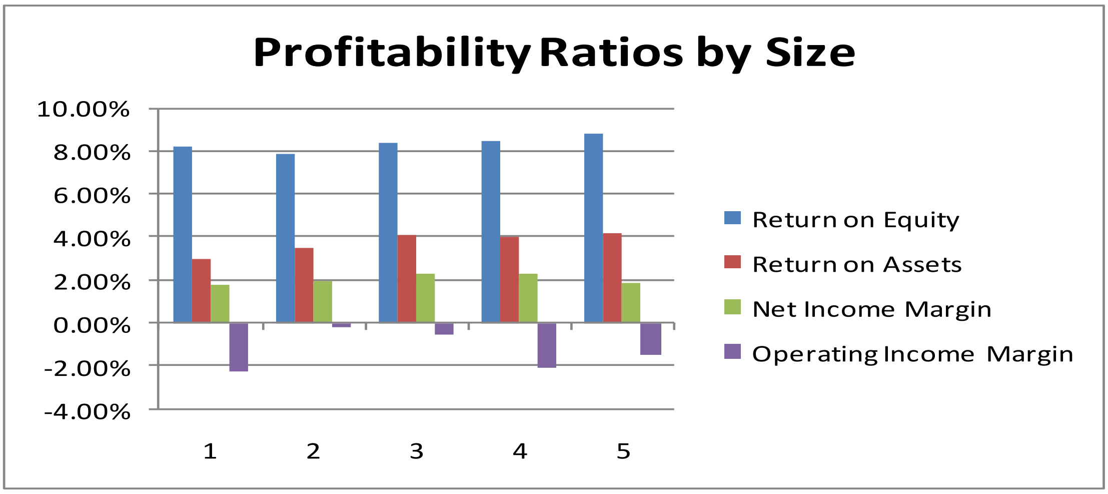

Figure 3.5: Mean Profitability Ratios by Size Return on Equity and Return on Assets:

Both increase performance with size. Net margin increases with size, except in Category 5, which performs similarly to Category 1. Operating income margin decreases with size with the exception of Category 1, which is the worst performing, followed by Category 2, which is the best. Operating margin is negative, as it only incorporates income from service to patients. Net income is positive, because in addition to operating income, net income includes revenues that are derived from service to patients as well as other income. This provides evidence that hospitals have losses from delivering services to patients and must compensate with other income streams in order to create a positive net margin.

3.5.2 Leverage

Leverage is measured via two ratios: the debt ratio and debt to equity ratio. The debt ratio looks at the comparison of total debt to total assets, and the debt to equity ratio compares long-term debt to equity. For this research, equity is defined as net assets for both for-profit and non-for-profit ACHs. Equations for each leverage ratio are available in Table 3.4 on pg.77. Leverage increased over time from a debt ratio perspective from an initial value of 0.45 in 1995, to 0.50 in 2007. The debt to equity ratio increased from 1995 through 2002, and declined through 2006, but remained above 2000 levels. The highest debt ratio occurred in 2002, with a value of 0.4952. The highest debt-to-equity ratio occurred in 1997, with a value of 0.7892. The industry debt ratio never increased above 0.50.

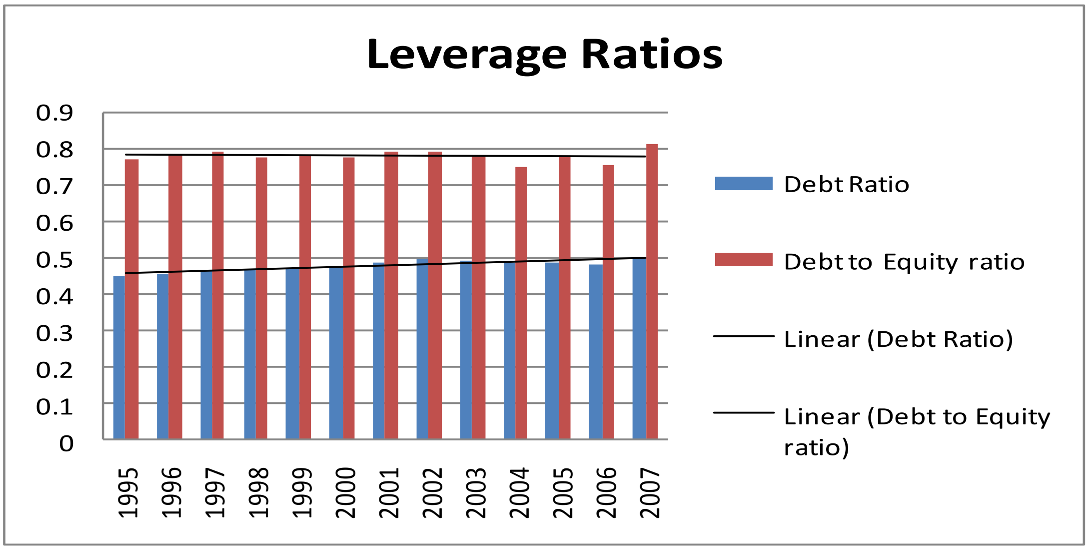

Figure 3.6: Leverage Ratios by Fiscal Year Reported :

The debt ratio increases year on year, which is evident via the blue graph along with the linear trend line. This provides evidence that ACHs are taking on additional debt as time increases. The debt to equity ratio shows variation via the red graph. While the trend line for the debt to equity ratio is flat, changes through the years are most likely due to underlying changes in equity values.

The debt ratio is acceptable; however, it is evident that pressure within the industry concerning profitability and cash coincided with this increase in the debt ratio. Any decreases in the mean debt ratio also coincided with improvements in profitability and liquidity.

Debt to equity was not as clear as the debt ratio. [4]Debt to equity went through several cycles during the term of this study. There was an initial increase in the debt to equity ratio from 1995 through 1997; however, the debt to equity ratio dropped to below 1996 values in 1998, only to increase the next year. The debt to equity increases are explained by the increase in long-term debt. This is not as evident in the debt ratio, as an increase in total liabilities was balanced by the increase in total assets. This makes sense, as ACHs are known to invest heavily in capital assets, and this may be a sign of heavy capital spending associated with overinvestment. Overinvestment is a key driver in the healthcare market for government action as it is viewed as a major underlying cause of high healthcare costs (Glied 2003).

[4] Equity for non-for-profit hospitals is defined as net assets or total assets minus total liabilities.

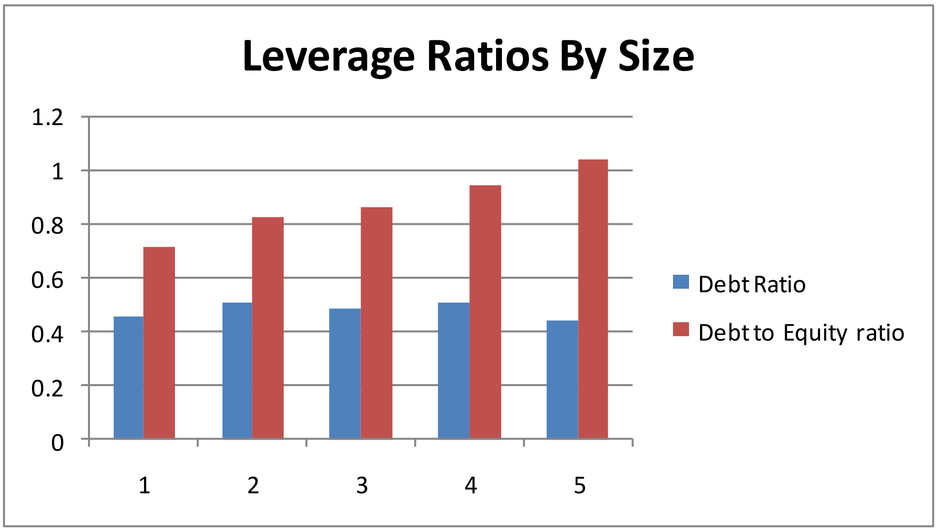

Figure 3.7: Leverage Ratios by ACH Size Category:

It is evident from the illustration that larger ACHs have more debt, whether measured by the debt ratio or the debt to equity ratio. This may suggest that larger hospitals are more dependent on debt to purchase capital items. It also may be indicative of overinvestment, which will be discussed later in this thesis.

In Figure 3.7, we can see that larger ACHs had larger mean debt-to-equity ratios. Category 5 had the largest mean debt-to-equity value. The debt ratio remained relatively flat across all ACH size categories. The highest debt ratio was found for Category 4. Category 1 had the lowest debt and debt-to-equity ratio; this suggests that ACHs in Category 1 provided the lowest leveraged returns and the lowest profitability ratios. In addition, the finding that larger ACHs had larger debt ratios also is indicative that larger ACHs overinvest more. As leverage ratios vary by size substantiates previous research, it suggests that larger ACHs in larger population centers face higher levels of competition, which leads ACHs to invest more in equipment and services that enhance quality or perceptions of quality (Newhouse 1981). Glied (2003) and Nahata (2005) show that quality is the key variable in competition between hospitals. In their model, increased competition leads to excess spending on capital expenditures, which in the absence of greater profitability drives up debt levels. This “medical arms race” is important corollary evidence of excess capital spending which is related to overinvestment and consequently the tests using agency theory, which will be discussed in detail in chapter 4.

3.5.3 Cash Position

The cash position of the ACHs is measured via two ratios: the cash ratio and days cash on hand. The cash ratio looks at short-term assets such as cash, temporary inventory, and accounts receivable (AR) in relation to the current liabilities of the ACH. Days cash on hand compares the cash on hand against daily operating expenses. It provides an analysis of survival time should unexpected shortfall in operation impede the cash flow. Equations for both cash position ratios are available in Table 3.4 on pg.77.

Cash position reflected in the cash ratio and the cash-on-hand ratio begin with a negative trend. The cash ratio showed a steep decline initially, with a quick recovery in 1997, and thereafter an improving cash ratio was found. This can be seen in Figure 3.8. The cash ratio remained relatively high, with the lowest value found in 1997 at 2.41. As shown, the cash ratio improved in 1997, just as the Days Sales Outstanding (DSO), a reflection of AR outstanding, increased.

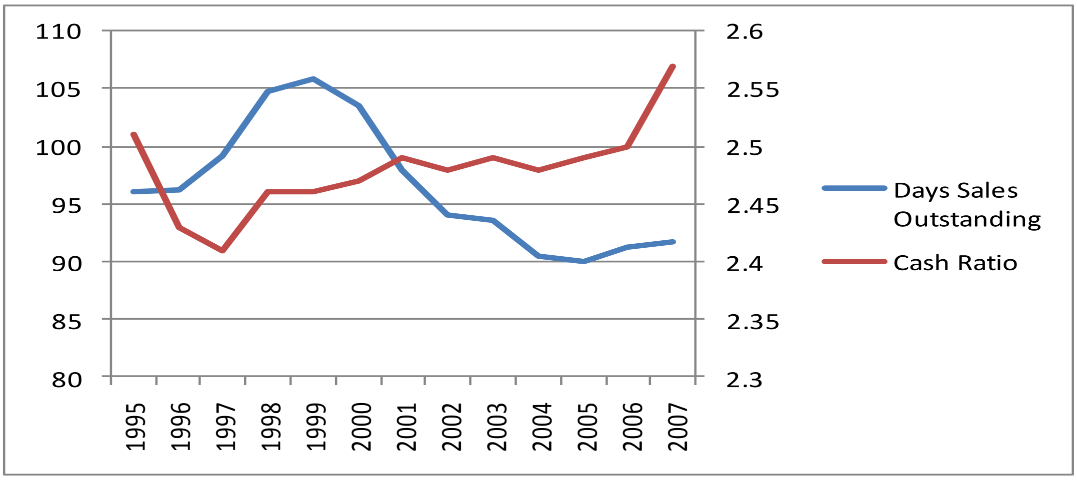

Figure 3.8: Mean DSO and Cash Ratio by Fiscal Year Reported:

Here, we see the typical trade off of the DSO and the Cash Ratio. In this, the Cash Ratio also includes the AR in the formula, so increases in the Cash Ratio often reflect increases in operational cash flows and not a contraction in the AR cycle. The improvement in the cash ratio was not necessarily an improvement in financial condition. From 1995 to 2007, there was a reduction of approximately 20 mean days cash on hand from 70 days to approximately 50 days. The reduced amount of cash on hand to cover liabilities puts ACHs at risk. The DSO also reflected a decline, although it improved after a trough in 1999. The worst performing period was from the years 1999 to 2001, which coincides with a recession in the U.S. economy from November of 2000 to October of 2001. It was during this time frame that the DSO reached over 100 days.

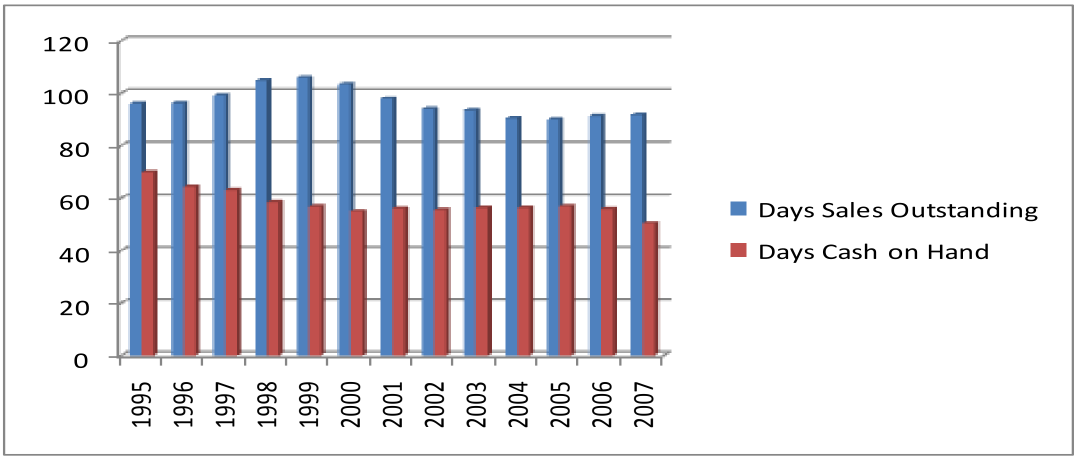

Figure 3.9: DSO and DCOH by Fiscal Year Reported:

This graph provides a better picture of the trade-off in between cash and the AR cycle represented by the DSO. In this case, the DCOH is the actual cash on hand divided by the average daily total expenses for the firm. The decrease in cash on hand accompanies the increase in managed care in the mid-nineties, including the Balanced Budget Act of 1997. Likewise, as ACHs adjusted to the new law and lower reimbursement and managed care power weaned in 2000 or so, cash on hand started to make a recovery, although it was small. The DSO in this case reflects the slow payment of the managed care payor, and as the managed care power weans, the DSO decreases.

This increase in the DSO ultimately led to less cash on hand. While the DSO did improve beyond 1995 levels, it remained high, with values above 90 days. It is evident in Figure 3.9 that the DSO and the days cash on hand (DCOH) worked conversely with one another; as the DSO increased, the DCOH decreased. The DCOH trended downward over the study period, while the cash ratio trended upwards. This divergence between the DCOH and the cash ratio may point to increasing cost over time. If reimbursement schedules did not adjust for inflation and market prices over time, and the expenses of an ACH did, one would expect the cash ratio to increase and the DCOH to decrease, because the denominator of DCOH, which includes expenses, would be increasing over time. This would cause the formula for the DCOH, assuming the cash remained the same, to produce a lower DCOH over time. This divergence in reimbursement and cost may be evidence of agency and monopsony costs in U.S. healthcare, as reimbursement is the key revenue variable that affects ACHs' free cash flows. If payors contribute less over time and or do not increase reimbursement to compensate for rising costs of delivery health services then payors are adversely affecting the financial condition of hospitals. Control over reimbursement can be construed as efforts by payors to control underlying issues of excessive healthcare cost created by both the principal agent relationship in healthcare as well as the dynamics of the healthcare market structure, which cause inefficiencies (Peterson et al 2006; McLean 1989; Lee and Zenios 2007; Chalkley and Khalil 2005; Eldridge and Palmer 2008).

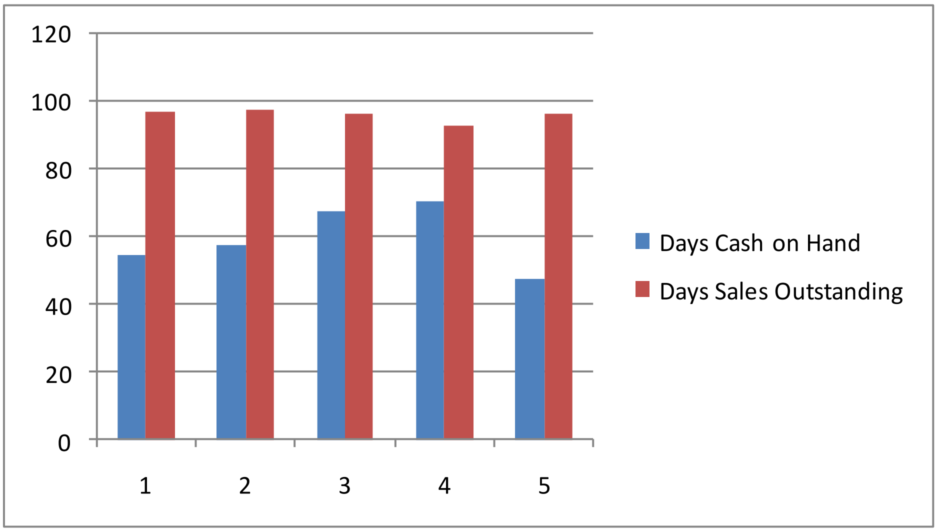

Figure 3.10: The DSO and DCOH by Fiscal Year Reported:

The DSO shows no competitive advantage for size in regards to the ability to collect AR. This is likely indicative of the lack of the market power of hospitals to influence payment patterns and timelines of insurers. The DCOH is highest for Category 4 and lowest for Category 5. With the exception of Category 5, the larger ACHs are able to generate larger amounts of cash in relation to average daily expenses.

Figure 3.10 shows that Category 4 had the largest DCOH, with a value of 70.53 days, and Category 5 the lowest, with a value of 47.63 days. Excluding Category 5, due to sample size, Category 1 provided the lowest DCOH, at 54.55 days. Also excluding Category 5, the larger the ACH, the larger the DCOH. The mean Cash Ratio by size did not provide a clear trend. The largest mean cash ratio was Category 1 at 2.5, with the lowest in Category 4. Excluding Category 5, there is a clear trend of the mean Cash Ratio decreasing by size.

3.5.4 Liquidity

Liquidity is measured via two ratios: the current ratio and the quick ratio. The current ratio analyses current assets in relation to current liabilities of the ACH. The quick ratio provides a similar angle of analysis; however, it removes inventories of the ACH from the comparison provided by the current ratio. Equations for the current and quick ratios are available in Table 3.4. The ACHs' working capital efficiency as measured by the current and quick ratios has declined steadily over the length of the longitudinal study. Both ratios showed similar characteristics in their bar charts when viewed by fiscal year. The ACHs were not that sensitive to inventories, so both the quick and the current ratios remained similar in values.

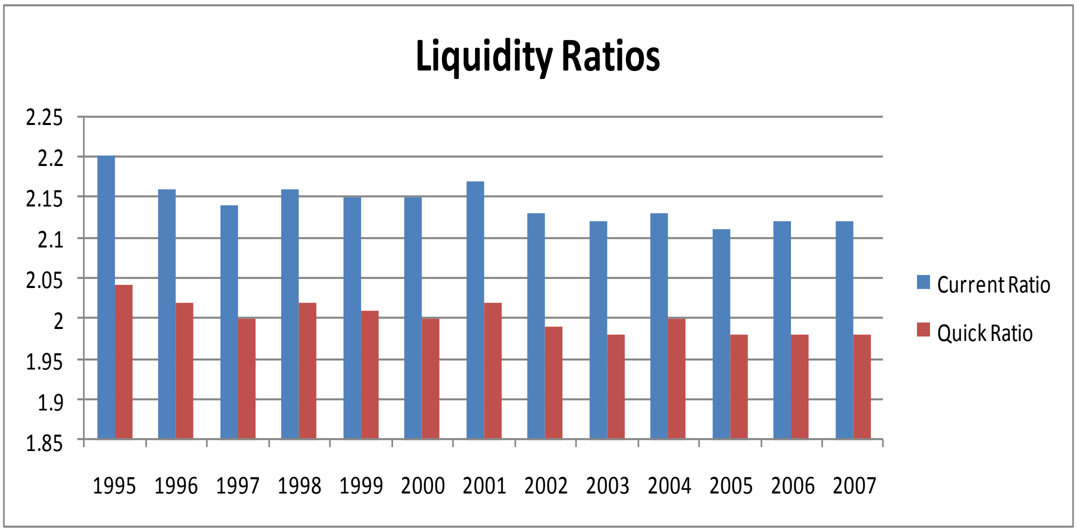

Figure 3.11: Liquidity Ratios by Fiscal Year Reported:

Both the current and quick ratios both show declines over the course of the study. This suggests that cash and other short assets are decreasing in comparison to short-term liabilities. The decrease in both liquidity measures also coincide with the decrease in the DCOH illustrated earlier.

The current ratio dropped from an initial value of 2.20 (it's highest) in 1995, to 2.11 in 2005. This shows that working capital efficiency was reduced within the ACH market. The quick ratio confirmed this trend, as it decreased from an initial value of 2.04 in 1995 to 1.98 in 2003, remaining at this level through 2007. Both mean liquidity ratio values decreased over time. This suggested that the ACHs' liquidity was reduced over the period of the study. This trend is supported further by the decrease in the DCOH, as discussed in Section 3.5.3. Quick ratios remained at comfortable levels. The declining quick ratios from 2005 to 2007 coincide with changes with the U.S. economy that some believe to be the beginning of the credit crunch of 2007.

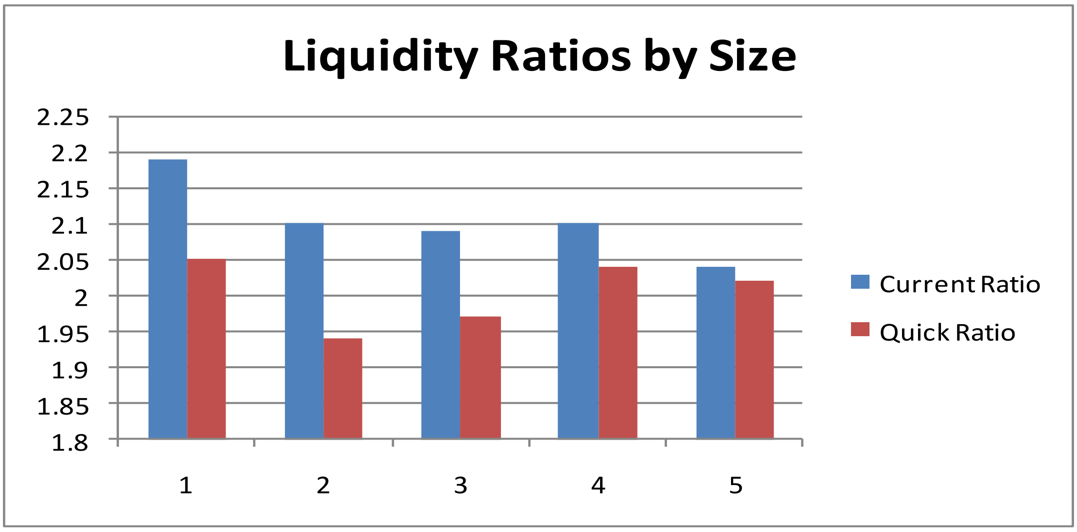

Figure 3.12: Liquidity Ratios by ACH Size.

Smaller hospitals have higher liquidity ratios. The current ratios are decreasing by size, suggesting that larger hospitals have less liquidity. The quick ratio is variable by size. The highest quick ratio is that provided by Category 1 hospitals, and the lowest by Category 2.

Overall liquidity ratios are non-volatile and remain confined for the length of the study, as shown in Figure 3.11. In Figure 3.12, Category 1 had higher liquidity ratios, Category 5 had a lower current ratio, and Category 2 had the lowest quick ratio. Previous research by Calem and Rizzo (1995) supports these findings as they find that small ACHs are more dependent on internal cash flows for capital investment. The liquidity ratios for smaller hospitals are larger and may be evidence that smaller hospitals are compensating for this dependency on internal cash flows for capital investment by holding more cash. This is important as agency and monopsony are postulated to affect reimbursement, which in turn limits free cash flows and thus affects access to debt markets. The result is to leave ACHs more dependent on internal cash flows for investment. Thus, liquidity ratios provide some evidence that ACHs are compensating for the effects of agency and monopsony. While Category 1 may have been the most efficient in liquidity terms, there was no evidence of an advantage to size.

3.5.5 Efficiency

Efficiency is measured via two ratios: Days Sales Outstanding (DSO) and Fixed Asset Turnover (FATR). The DSO measures efficiency in the receivable collections process in terms of days to collect outstanding balances due the ACH.

Fixed asset turnover provides measurement of efficiency of the ACH to utilize its fixed assets to generate gross revenues. Equations for both efficiency ratios are provided in Table 3.4. As discussed in Section 3.2, heavy external and internal pressures were placed upon the ACHs to increase the efficiency and lower the cost of healthcare. A lot of those cost reductions came in the form of reduced payments to ACHs as shown in the cash ratio and the DCOH. The ACHs adjusted or adapted to these changes within their market. In order to increase returns with lower payments, ACHs had to decrease the cost of provisioning these services. One way was to increase the utilization of assets currently in place.

The FATR analyzes efficiency of assets. As this ratio was observed over the length of this study, it was evident that ACHs already were increasing their utilization of assets. This was reflected in the ever-increasing FATR ratio in Figure 3.13. The FATR increased from a 1995 value of 4.0, to a value of 5.73 in 2007. This increase in efficiency is what allowed other aspects of profitability to recover and coincides with similar increases in the profit ratios shown in Figure 3.3. This is one of the ways that the industry reacted to forces within the market from government and commercial payers reducing reimbursement as evidenced by the decrease in operating margin in section 3.5.1. This also provided evidence of ACHs making efforts to minimize allocative inefficient services, or increasing utilization of assets in place, thereby reducing overinvestment. While this may not outweigh or countermand forces that encourage overinvestment, such as competition over quality, it does show that ACHs were responding accordingly. This premise will be discussed further in later chapters.

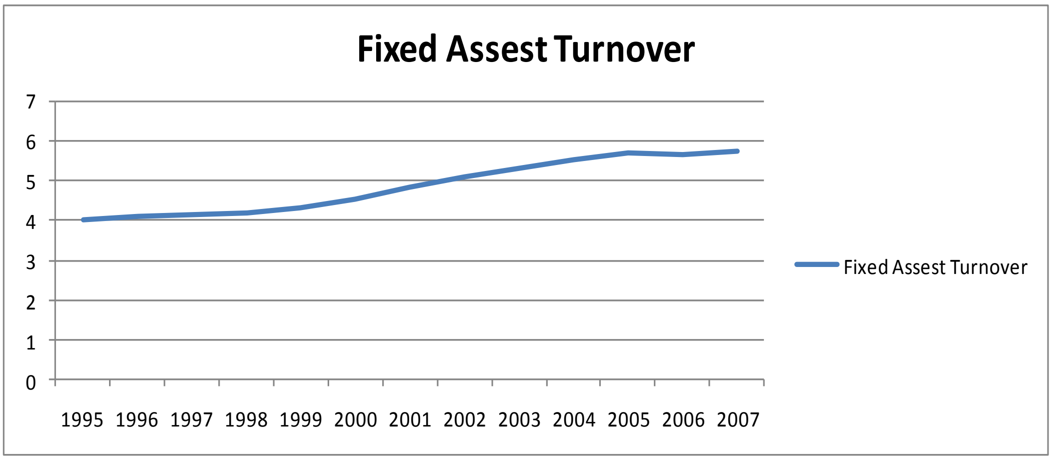

Figure 3.13: Fixed Asset Turnover Ratio by Fiscal Year Reported:

The FATR increased year on year and is evidence of the ACHs improving the utilization of assets in place.

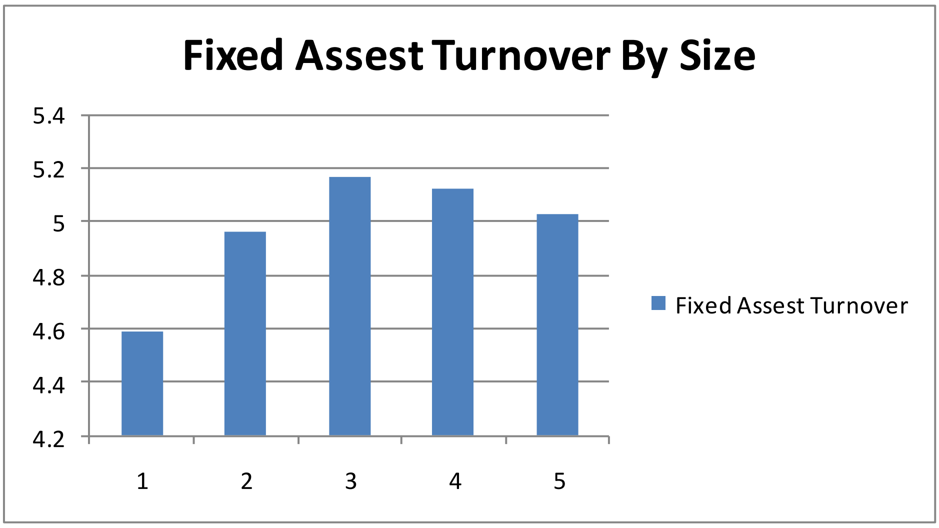

Figure 3.14: Fixed Asset Turnover by ACH Size Category.:

Larger ACHs are more efficient in the use of assets. This is in line with expectations. Categories 3, provides the highest efficiency in the use of assets. Categories 4 and 5 are less efficient in use of assets. This may provide evidence of overinvestment in larger hospitals, which is discussed in Chapters 4 and 6.

Figure 3.14 shows that Category 3 provided the greatest efficiency in terms of use of assets. There is evidence that there is an optimum size to maximize the utilization of assets. Category 1 provided the least efficient use of assets. This is most likely due to smaller ACHs' location in rural areas, where high utilization is not possible, because the demand for healthcare services is lower. Likewise, the larger ACHs are more likely to be situated in urban areas, where there is a high demand for healthcare and the volume of potential patients is larger. On the other hand, greater demand is offset by competitive forces driving capital expenditures in the form of the 'medical arms race' discussed previously. Where these forces balance seems to be in the midsized market where there is enough patient volume to maximize utilization of assets, but which is not offset by competition leading to overinvestment and underutilized assets that are acquired only to enhance quality or perceived quality.

3.6 Conclusion

The primary purpose of this chapter was to examine the nature of the ACHs' financial ratios based on the dataset in the MCR in order to understand the general financial health of ACHs during the timeframe of this study. A second objective was to find evidence in the data of agency and monopsony. The observable consequences include overinvestment via the 'medical arms race', a secular trend of reducing reimbursement by payors in comparison to underlying costs, and lower utilization in areas with greater competition (Glied 2003; Nahata 2005; Peterson et al 2006; Eldridge and Palmer 2008). In addition, what we find is the ACH market experienced financial pressures, as discussed in Section 3.2. These pressures affected profitability, liquidity, working capital, and fixed asset efficiencies, as well as debt levels. While the mean values for the ratios discussed provide an aggregate view of the industry in the longitudinal study, they also provide evidence that previously mentioned historical policies and efforts to control cost in healthcare had an effect.

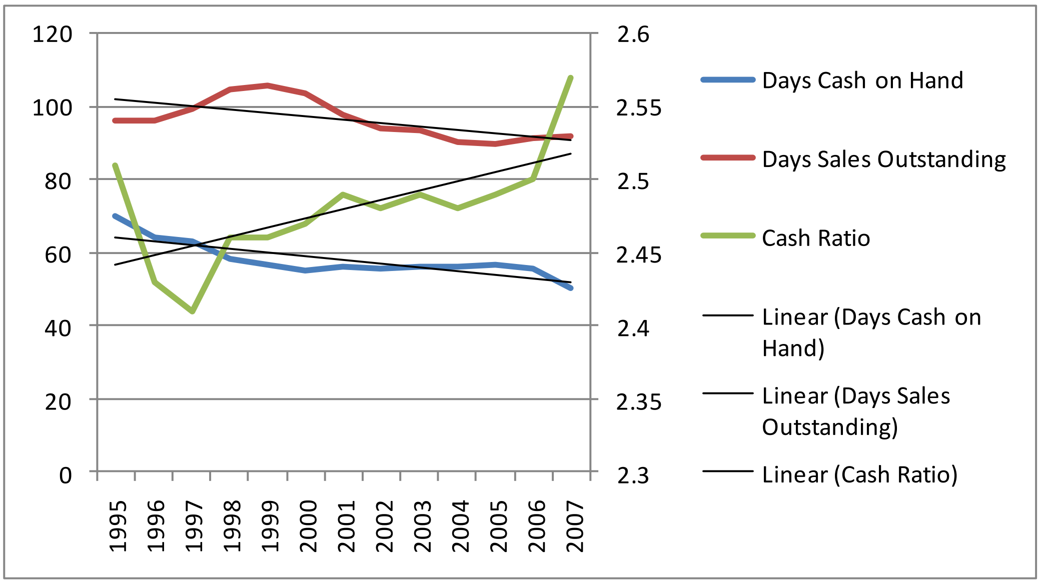

Figure 3.15: Mean DCOH, DSO, and Cash Ratio by Fiscal Year Reported:

The mean cash ratio increased over time, and the mean DSO and DCOH decreased over time. One would expect to see an increase in the cash ratio with a decrease in the DSO. A decrease in the DSO assumes that receivables that are collected sooner within the receivables cycle increases cash. As AR is included in the cash ratio calculation, the decrease in DSO is offset and balanced by cash within the same formula. Therefore, the increase in the cash ratio must be related to increases in cash from operations. The decrease in the DCOH suggests that ACHs have less cash on hand in comparison to a day's operational expenses. If there is a lower DCOH over time, and cash itself increases over time, then operational expenses are increasing at a rate over time greater than the increase in actual cash accounted for in the cash ratio. The contrasting nature of the cash ratio and the DCOH may suggests that ACHs are being squeezed between pricing methodologies to keep reimbursement low, and the ever-increasing market prices of goods and services of the open market.

Figure 3.15 shows evidence of the intrusion of such pressure on ACHs. This graph shows the mean cash ratio, which increased over time, the mean DSO, which decreased over time, and the mean DCOH, which decreased over time. Normally, one would expect to see an increase in the cash ratio with a decrease in the DSO. Figure 3.8 in Section 3.5.3 showed a decrease in the DSO, which assumes that the receivables collected sooner within the receivables cycle increases cash. As AR is included in the cash ratio calculation, the decrease in DSO was offset by and balanced by cash within the same formula. Therefore, the increase in the cash ratio uncovered by this study must be related to increases in cash from operations.

When observing the previous phenomena with the DCOH over the same period, there is evidence of market pricing pressures upon ACHs. The decrease in the DCOH suggests that ACHs have less cash on hand in comparison to a day's operational expenses. Therefore, if there is a lower DCOH over time, and it is known that cash itself increases over time, then the only explanation for the decrease in the day's cash on hand is that operational expenses are increasing at a rate over time greater than the increase in actual cash accounted for in the cash ratio. Therefore, this may suggest that ACHs are being squeezed between pricing strategies by payors to keep reimbursement for healthcare services low, and the ever-increasing market prices of goods and services purchased by ACHs on the open market, as provided by evidence of the contrasting nature of the cash ratio and the DCOH.

If in addition we examine profitability ratios, which all show a decreasing trend over the period studied, we can find additional evidence of the trends seen in the divergence of the DCOH and the cash ratio. This provides additional evidence that ACH reimbursement for services over this period was not covering the costs of the services rendered. This effect is especially noticeable in ACHs' operating margin as this is a good indicator of margin accrued from services to patients. While not conclusive, this may be evidence for agency and monopsony effects as both are postulated to affect free cash flows via reimbursement for health services.

Overinvestment is a key component of the agency argument put forth in this thesis. As Newhouse (1981), Glied (2003) and Nahata (2005) find ACHs may be overinvesting in projects that have low or negative net present values, driven by the need to compete on quality. Supporting this argument, Wang (1999) finds that firms with higher levels of competition overinvest more. We see evidence of this in Section 3.5.2 where larger ACHs have higher debt ratios, which suggests more capital spending by larger hospitals in highly competitive geographic areas. Evidence of overinvestment provides a basis for the presence of agency cost discussed in Chapter 4.

The liquidity ratios discussed in Section 3.5.4 provide additional evidence that smaller ACHs were more liquid in comparison to larger ACHs. In this case, as suggested by Calem and Rizzo (1995), smaller ACHs may be compensating for their reliance on internal funds for capital expenditures. This is shown by the fact that smaller ACHs have higher liquidity ratios than larger ACHs. The Calem and Rizzo (1995) findings are also confirmed by the leverage ratios which show that smaller ACHs carry less debt than larger ACHs, which suggests that perhaps smaller ACHs have difficulty taking on debt—a condition also identified by Calem and Rizzo. The interaction of these two ratios types supports the contention presented in this thesis, which suggests that payors are controlling compensation to ACHs to address underlying informational asymmetry issues that are typical of agency relationships. In this case payors control reimbursements in order to minimize that element of costs that is not essential to the delivery of healthcare.

Given the above, and that overinvestment is the result of the 'medical arms race', this would suggest that efficient utilization of assets in place would be falling over the period under examination. However, throughout the term of the study the fixed asset turnover ratio would indicate the opposite. This ratio suggests that ACHs have improved their utilization of assets in place to generate revenues. This might provide contrary evidence to overinvestment. However, this trend could equally suggest that efforts by payors to reduce overinvestment and to increase utilization through reducing reimbursement have been effective over time causing the mean efficiency use of assets to increase by 1.5 times the utilization at the beginning of the study. Viewed in this light, it may provide additional evidence for the presence of agency and monopsony in the market. Given the constant demand for healthcare, as it has been shown to have a relatively inelastic demand curve, one would not imagine such volatility as what is evidenced in the financial ratios. One could point to competition as perhaps a driver of such volatility of the financial ratios, but hospitals compete on a limited geographic basis. This possibly leaves these changes in overall ACHs to market-wide forces. The combination of the larger market forces of government regulation and commercial payer reimbursement are large enough to have market-wide change as a result. The remainder of this thesis examines this evidence of large market forces by way of regulatory and price control behavior and possible collusion and their effects on the free cash flows of ACHs.

4. Agency

4.1 Introduction

One of the primary research questions seeks evidence of signaling and agency cost of free cash flows in the principal-agent relationship between the government and ACHs. The purpose of this chapter is to provide evidence of agency costs (signaling and agency costs of free cash flows) in the U.S. ACH market via regression analysis and analyze the role that agency plays in the government's reimbursement or fee schedule and how it affects ACH's decisions of capital structure.

Most principal-agent research is presented with goal conflict as the core of the argument, with the assumption that the principal is more risk averse than the agent. For this research, we assume that the agent acts in their own self-interest against the interests of the principal. In this case, the agency relationship is complicated by the presence of a moral hazard within the healthcare market, which is thought to cause overinvestment by ACHs(Newhouse 1981; Glied 2003 and Nahata 2005). Specialization is increasing agency costs in the relationship between the government by way of the CMS and ACHs, as ACHs offer specialized services (Jensen and Meckling 1976).

Eisenhardt (1989) describes agency research and theory as falling into two categories: positivist and principal-agent. Positivists focus on conflicting goals of the principal-agent and the necessary governance mechanisms that will bring into alignment the goals of the agent and principal so that self-interested behavior is minimized. Positivists focus predominantly on the relationship between owners and managers of public corporations. The research by Jensen and Meckling (1976), Fama (1980), and Fama and Jensen (1983), is positivist in approach. Jensen and Meckling (1976) studied ownership structure within corporations. Fama (1980) explored managerial labor markets and examined controls of self-interest behavior with large corporations. Fama and Jensen (1983) analyzed the role of the board of directors as an information system to help stockholders monitor management's behavior.

In contrast to positivism, principal-agent research is more concerned with the general theory of the principal-agent relationship. Generally, the theory is applied in a broader concept, often used to describe any principal-agent relationship in any relationship in which an agency problem can exist. Principal-agent research normally entails specific assumptions of the agency relationship, followed by the logical deduction of the organization of the agency problem, and concluding with empirical proof. Using an easily measured outcome and an assumption that the agent is more risk averse than the principal, a simple model is created to explain the relationship and test for the presence of agency effects. The model measures the cost of the behavior of the agent, the cost of measuring outcomes, and the shifting of risk from the principal to the agent.

The research in this chapter will explore these principal agent relationships, using both categories of agency in order to examine the effects on the capital structure of ACHs. From a positivist perspective, this research analyzes the goal conflict and the aligning incentives/motives between the government (principal) and the ACHs (agent). In addition, the research considers the principal-agent perspective, discussing the agency relationship between the government and ACHs. Agency relationships of this type and similar are well documented in healthcare (McLean 1994, Melnick et al 1989, Ryan 1994, Dranove and White 1987, 1989, Bronsteen et al 2007, Mooney and Ryan 1993, Lee and Zenios 2007, Conrad and Perry 2009, Eldridge and Palmer 2008, Peterson et al 2006, Schneider and Mathios 2005, Chalkley and Khalil 2005).

According to Jensen and Meckling (1976), agency conflict can occur in any organization, which suggests that all organizations: firms, educational organizations, government, mutuals, and any other similar entity, are open to agency conflict. This position regarding agency conflict is shared by Ross (1973) and Milgrom and Roberts (1992). Furthermore, agency can be present in any contractual relationship, rather than just within organizations; in this case, the contractual relationship is between the U.S. Government and ACHs, with whom it contracts for healthcare services.

Agency problems can influence the managerial decisions of capital structure (McLean 1989). In the case of the U.S. Government and ACHs, it is proposed in this research that agency influences ACHs' decisions of capital structure. The agency relationship between the government and ACHs can provide insight into matters of contractual agency problems and their effects upon decisions of capital structure. The research is important, as it helps to expand the understanding of decisions of the capital structure of firms in the presence of contractual agency effects, and specifically within the ACH market. The remainder of this chapter will focus on the description of the ACH market in light of the agency problem, examine how agency exists, test for its presence, and measure its influence on free cash flows, and consequently, capital structures.

Empirical evidence of behavior under agency cost is important, because it allows for an understanding of the construct of the principal-agent relationship in real-life terms. It provides a basis by which to comprehend future relationships and the behaviors and consequences they might generate. In the case of finance, it provides a basis on which one might predict the outcomes of future transactions under similar frameworks and conditions, and to understand any potential negative distortional effects it might generate within the transaction or market.

Given the structure of the principal-agent relationship between the CMS and ACHs, one might take the view that the agency problem within the ACH market is minimal if one is to consider (e.g., Lambert 1983) that both parties have a long-term relationship in place. In this relationship, through time, one might expect that the CMS would be likely to become more informed about the ACHs). This is true to some extent, in that the CMS is able to amass considerable information on the activities of those ACHs that provide services to Medicare and Medicaid patients. However, healthcare services on the whole are not monitored on a direct basis on the delivery of every service, but rather are monitored from a distance via what has been billed and/or what has been reported on or complained about from those covered by the CMS. Direct monitoring of quality exists via third parties, such as the Joint Commission on Accreditation of Hospitals (JACHO), an industry self-regulating body that surveys hospitals according to self-determined standards. The U.S. Government began in 1965 using the JACHO certification as a minimum set of standards for participation in Medicare and Medicaid (Joint Commission 2010). JACHO is used for monitoring, whether for annual or multi-year approval, and therefore the ACH is not measured or monitored on a daily basis. As a result, asymmetric information remains. Because of the process by which CMS monitors quality and delivery, the relationship between the parties is more like a short-term relationship in which the likelihood of the agent's, or ACHs' undertaking, self-interested behavior is greater (Eisenhardt 1989). In addition, there is an inherent divergence in the objectives between CMS and ACHs in terms of maximum revenues, profitability, and minimum costs, amongst others, which contributes to the potential principal-agent problem.

The short-term characteristics of the relationship, created by the monitoring process, are exacerbated by the structure of the ACH market itself. The ACH market within the U.S. is not a competitive market, and it has high barriers to entry created by the special licensing needed to own and operate hospitals. A large asymmetry of information exists, as the consumer is not well informed on the quality or price of services delivered, or the payor (CMS) of the quality or quantity of services delivered(Chalkley and Khalil 2005, Mooney and Ryan 1993, Dranove and White 1989, Ryan 1994). The market is dominated by the government as the largest consumer of goods and services, which regularly influences market performance and behavior (Pauly 1998). By definition, a competitive market is free of collusion and has low barriers to entry for both the buyer and the seller, both the buyer and seller are well informed, and a single buyer or seller cannot influence or affect the market (Milgrom and Roberts 1992). The market characteristics described previously that act to distort the competitive ACH market are thought by some to create an oligopoly market that protects prices and hinders market entry (Wang et al. 1999).

4.1.1 Relevance of the Study to Agency Research

One of the benefits of studying agency under the conditions previously discussed is that this research is able to focus on a specific industry with common characteristics. This allows for the avoidance of problems of structural differences between different industries (Calem 1995). Furthermore, the research is able to ignore variations in an ACH's ownership structure, i.e. for-profit and non-for-profit, as it has been shown to be insignificant in its effects on capital structure of ACHs in the U.S. (Wedig 1988). This is important, as there are several forms of ACH ownership within the market: public, private, and teaching with variation in for-profit and non-for-profit status. In addition, the research is able to consider the agency effects under the conditions of a contractual arrangement. The arrangement is such that the ultimate purchaser of health services, the government, actually is not responsible for decisions of consumption, but rather the facilitators of financial payment, under which they ultimately are responsible for paying for the consumed services of the patient and thus try to induce behavior through payment for services (Peterson et al 2006).

Under this scenario, one is able to consider principal behavior in trying to control a situation in which the principal neither controls where or when something is consumed, nor how much is consumed. This presents a unique problem for the principal to consider. Understanding principal behavior under these conditions is important to agency research, as they are different from the traditional principal-agent relationship, in which there is a direct communication with the agent other than payment for services rendered. In addition, understanding principal behavior's effects on agent decisions of capital structure is important, as a healthy capital structure is pertinent to a successful firm. Agency effects that negatively impact agent decisions of capital structure not only may have consequences for the firm in question, but could impact an entire market, especially if the principal in questions consumes services from the majority of market participants and behaves similarly with all. This study provides a non-traditional view of agency effects on decisions of capital structure, one in which there is a clear separation of choice of consumption via the patient and ultimate purchaser (CMS). There is asymmetric information not only between the principal and the agent, but in this case, between the principal (CMS) and the consumer (patient) (Bronsteen et al 2007).

The environment for the research provides a unique set of conditions under which to consider agent behavior. In this case, the research is able to examine the ACHs' need to compete in a market that encourages competition through quality due to the presence of a moral hazard condition for the patient. A moral hazard within the industry influences consumer choice based upon quality or perceived quality, and not price (Newhouse 1981). Competition via quality presents a circumstance in which the agent has the need to spend heavily on capital expenditures in order to remain competitive (Glied 2003).

There is previous research that suggests evidence of agency's effects on hospitals in the U.S. Becker and Koch (2006) claimed ACHs: 1) appear to be overleveraged; 2) are unprepared for reductions and changes in reimbursement; and 3) lack sufficient reserves. All of these factors can be interpreted as the effects of agency costs on the U.S. ACH market. The overleveraging could be caused by both liquidity issues as well as signaling. The lack of preparation for reimbursement changes and ACHs not maintaining sufficient reserves could be the result of reduced free cash flows.

The factors presented by Becker and Koch (2006) are characteristics that restrain ACHs from being competitive. Under this scenario, competition is dependent on access to capital. Access to capital, unless raised for a firm via equity, is determined by the availability of free cash flows and the stability of future free cash flows to support borrowings. If the access to free cash flow is reduced by agency through actions of the principal, then access to debt markets is limited, and thus leverage and opportunity for growth also is limited (Calem and Rizzo 1995). This research seeks to understand the effects of the principal–agent relationship described previously, and analyze how its behavior affects decisions of capital structure.

4.1.2 Conditions for Agency

An agency relationship is said to exist whenever one individual or firm (the agent) acts on behalf of another (the principal), where self-interest influences the decisions of the agent, and where asymmetric information allows the agent to take unobservable actions in his/her own self-interest, unless incentivized otherwise (Ross 1973; Milgrom & Roberts 1992). Jensen and Meckling (1976, p. 5) described the agency relationship as, "a contract under which one or more persons (the principal) engages another person (the agent) to perform some service on their behalf which involves delegating some decision making authority to the agent." This relationship applies in the case of U.S. Government-provided healthcare services, because the government does not provide healthcare services directly, but rather contracts with ACHs to deliver care to its customers. This arrangement is no different to that which exists in commercial contracts, whereby an agent, whether an individual or an outside firm, is hired to perform a service by which the agent acts on behalf of the principal. As Jensen and Meckling (1976, p. 312) noted: "Contractual relations are the essence of the firm, not only with employees but with suppliers, customers, creditors, and so on. The problem of agency costs and monitoring exists for all of these contracts...."

A key requirement for agency conditions to exist is that there needs to be asymmetric information between the principal and the agent. Asymmetric information is present within the ACH market. The U.S. Government has very little information to determine whether the terms of its contract with hospitals are being met. This is primarily driven by the lack of data on outcomes of delivery of care because there are very few mechanisms for sharing data on outcomes of patient services, this lack of information leads to the inability to monitor by the principal. Compounding this there is no way to ensure that the patient treated was in fact the patient with proper legal coverage by CMS, which creates an opportunity for fraud, in this case not necessarily by the agent. In addition, a payment policy may create perverse incentives to game the system for financial gain as certain procedures may be reimbursed at higher rates, but may be delivered clinically similar and therefore give incentive to bill for the procedure with higher reimbursement (Chalkley and Khalil 2005; McLean 1989; Peterson et al 2006). As Maynard (1991, p. 1277) notes, "There are a number of features of healthcare systems which make monitoring outcomes and policy formulation especially problematic- poor data on outcomes and perverse incentives facing agents…." This lack of information on the part of CMS provides a basis for asymmetric information on the part of the ACHs. In addition, this asymmetric information allows for fraud, both in terms of poor delivery of the final services, but also theft of services by illegal patients and monies by institutions that fraudulently bill for services not delivered. The conditions of asymmetric information in this context create problems with forming a complete contract. Milgrom and Roberts (1992) pointed out two problems that exist with asymmetrical information: The first is that buyers cannot monitor the quality of the output of an agent, such as a product or service, and that given the nature of the incentives involved, the supplier of the good can—and will—substitute poorer quality goods and services. In addition, they might provide little diligence in providing these services. The second problem is that the principal and agent transaction may fail to occur at all, because the principal fears victimization, or perhaps monitoring costs are too high to reduce the likelihood of opportunistic behavior. In this case, the U.S. Government has experienced victimization via fraud. It is well documented within the U.S. healthcare system (Moroney 2003) that fraud and waste exist, and that the U.S. Government is trying to contain the high cost of healthcare, some of which is ultimately caused by asymmetric information and agency cost (Maynard 1991). While it is doubtful that government and ACHs would fail to transact, the presence of fraud and the difficulty in monitoring increase the likelihood of the government seeking additional ways to police and motivate ACH (agent) behavior.

Within the U.S. healthcare market, the economic structure for rents and incentives is clear. The principal in the market is the U.S. Government, and the agents are the ACHs. The principal must have some economic rents to be derived from the relationship, and there must be a need to align incentives for the agent to maximize the principal's rents and ensure against fraud and or waste. The relationship is expressed in Equation 4-1.

Equation 4-1:

$$\pi_g = \int T_m - \sum_{i=1}^{n} (P_j * Q_j)$$

Where:

$\boldsymbol{\pi_g} = Surplus\ economic\ rents\ derived\ via\ savings$
$\boldsymbol{T_m} = Tax\ revenues\ allocated\ for\ the\ purchase\ of\ medical\ services$
$\boldsymbol{P} = Price\ of\ procedures$
$\boldsymbol{Q} = Quantity\ of\ procedures\ purchased$
$\boldsymbol{j} = Medical\ procedure, services\ rendered$
$\boldsymbol{i} = ACH$
$\boldsymbol{n} = Total\ number\ of\ ACHs\ from\ which\ services\ were\ purchased$

The agency argument put forth is one of control of free cash flows and signaling of compliance via external debt. The U.S. Government seeks to reduce the cost (P_{ij}) of providing healthcare in the U.S., limiting $\sum_{i=1}^{n}(P_j * Q_j)$, and thereby increasing π_g. In order to accomplish this, the U.S. Government via the CMS must ensure that ACHs are dis-incentivized to overinvest. The government measures success in preventing overinvestment in the savings on healthcare expenditures as shown in Equation 4-1. "The principal can limit divergences from his interest by establishing appropriate incentives for the agent and by incurring monitoring costs designed to limit the aberrant activities of the agent" (Jensen & Meckling 1976, p. 5).

Because it uses agents to deliver these services and does not perform services directly, the U.S. Government seeks to minimize the free cash flows to hospitals. Minimizing free cash flows reduces access to debt markets, limiting the ability to finance projects; in addition, the reduction in free cash increases opportunity costs, forcing managers to be more cautious with their investments. The overall effect is one of reducing overinvestment by ACHs. The U.S. Government reduces free cash flows in order to maintain a control over the cost of healthcare. It controls cash flows in three ways: 1) through reimbursement; 2) through policy; and 3) by allowing a collusive monopsony to exist within the payors of healthcare, for both government and commercial payors. All of these reduce free cash flows, and thus the likelihood of overinvestment. In this chapter, only reimbursement is considered as a mechanism for controlling free cash flows. Policy and monopsony are discussed further in Chapters 5 and 6.

The reduction in free cash flows via reimbursement is to ensure among other things that positive NPV projects are chosen. The NPV projects in this scenario are ones that are economically efficient and provide a positive return. The selection of NPV projects by ACHs is distorted, as there is a moral hazard within the healthcare market. The moral hazard in this case causes ACHs to compete on the quality or perceived quality of goods, (Glied 2003; Nahata 2005).

4.1.3 Moral Hazard

Milgrom and Roberts (1992, p. 167) described a moral hazard as, "...the form of post-contractual opportunism that arises because the actions that have efficiency consequences are not freely observable and so the person taking them may choose to pursue his or her private interests at others' expense." They felt that a moral hazard could develop in any situation in which individuals are allowed or tempted to choose an inefficient action, because the interest of the individual is not aligned with group interests, and that action cannot be monitored easily. Milgrom and Roberts (1992) suggested there are three conditions that must be present in an environment for a moral hazard to exist:

1. There must be some potential divergence of interests between people.
2. There must be some basis for gainful exchange or other cooperation between the individuals; in other words, there must be a reason for a transaction.
3. There must be difficulties in determining whether in fact the terms of the agreement have been followed and in enforcing those contract terms. These difficulties often arise because monitoring actions or verifying reported information is costly or impossible.

Milgrom and Roberts (1992, p. 167) summarized the outcome in healthcare: "if you are covered under health insurance or belong to a Health Maintenance Organization (HMO), so that you are insured against all or most of the costs of visits to the doctor, you are likely to make greater use of medical services of all kinds..."

The healthcare market in the U.S. is one in which those insured via private insurance or government programs are at risk of overconsumption, or a "moral hazard," due to a lack of monetary risk in consumption. To be more succinct, when payments are made by insurance companies or the government, the patient has no incentive to minimize the consumption of medical services. Sometimes, even ACHs have no incentive to minimize the supply of medical services.

Of course, this makes the demand for healthcare inelastic to price. People will consume if they see a need/want to consume, even though the marginal cost of the service could exceed the marginal benefit. The distortions within this market, via public and private health insurance, shelter the consumers of medical services from many of the financial consequences of their own decisions. The separation between the prices paid by the patient and the actual cost of service leads to a moral hazard. The existence of a moral hazard via health insurance is well documented in U.S. healthcare by Milgrom and Roberts (1992), Pauly (1986), Gaynor (2000), Smet (2002), and Glied (2003), among others.

Newhouse (1981) suggested that improperly structured insurance reduces the amount of price competition in the marketplace, and thus the healthcare provider competes on the basis of quality, as price is not a consideration in the consumption equation utilized by the patient/consumer. This perspective is confirmed later by the research of Wang (1999), Glied (2003), and Nahata (2005**.** "Studies have shown that hospital payment arrangements lead to higher costs and contribute to lower production efficiency by forcing hospitals to invest excessive amounts in technology, provide more patient amenities, and provide excess services to attract physicians and patients" (Wang 1999, p. 85).

The effect of the moral hazard of insurance leads to competition of the ACHs for patients on other market parameters, such as quality. This leads to over-acquisition of capital items, or the creation of programs that increase the perception of quality. This need to compete on quality rather than price leads to an arms race, with ACHs competing with newer/better equipment, technologies, and services. The research of Robinson and Luft (1985) showed that this "arms race" generated 20 percent higher costs in the more competitive markets than in the less competitive markets. This was confirmed by Smet (2002) and Glied (2003). Glied's explanation for higher costs follows:

> "Studies through the 1980's found that when many hospitals compete in the same market, prices in that market is higher- not lower- than in setting with

> fewer competitors. Competing hospitals engaged in a ‘medical care arms race,’ buying more costly equipment than their neighbors. Consumers, who both lack information about the value of this equipment for their condition and who generally do not face full costs at the margin, select the hospital that appears to offer the highest quality service.” (Glied 2003, p. 127)

While the healthcare market has tried to contain the moral hazard via consumer cost sharing, ultimately the moral hazard distorts the market so that ACHs are not required to compete for patients based upon costs. Instead, ACHs are forced to use indirect means to gain consumer confidence, loyalty, and ultimately, more patients. In other words, patients are not considering cost in their decisions to purchase healthcare services; therefore, they have no incentive to choose the cheapest or moderately priced care, but rather choose healthcare services based upon other factors, such as quality or perceived quality (Newhouse 1981; Glied 2003; Nahata 2005). Because of this particular moral hazard, the scope for attracting customers is changed and narrowed. Patients choose healthcare providers based upon service offerings; in other words, based upon who offers the most comprehensive services. This drives hospitals to enhance their images of quality via questionable projects, and includes projects that have a negative NPV.

For the government, ACHs’ negative NPV projects can be projects that when completed are considered underutilized due to low patient volume. This is considered an issue of allocative efficiency. “Allocative efficiency problems arise in hospitals when substantial resources are allocated to treatments of questionable effectiveness, when unnecessary tests are employed, or when hospital clinical services are underutilized due to low patient demand” (Wang 1999, p. 84). Wang et al. (1999) recognized significant increases in excess hospital services from 1989 to 1993 that could not be supported by efficient medical practices. They concluded that this increase in spending within the market could have been caused by ACHs attempting to gain market share. Their data showed excessive use of hospital capital resources in the form of excess hospital services.

In the case of projects that are considered allocative inefficient, the cost for the project must be recouped from the patients as a whole, which means that the government ultimately is going to bear the cost for these types of investments pro-rata. Considering that the U.S. Government consumed 65% of healthcare services during the time frame of this study, one can understand their desire to restrict such investments in order to decrease costs. When one considers that the government ultimately will pay for a large proportion of such negative NPV projects (whether by overinvestment or allocative inefficiency) via increased cost to the government, due to the impossibility of creating a complete contract, the government is forced to utilize indirect means of control. In this case indirect means, such as controlling the amount of reimbursement, which typically are found where the agency relationship exists, (Peterson et al 2006; .Conrad and Perry 2009).

4.1.4 Specialization

Specialization within healthcare further adds to the cost of agency within healthcare. Hospitals provide specialized services within healthcare, which are delivered by employees with focused training, such as doctors and nurses, who take many years to obtain their qualifications. There is licensure for the practice, limiting entry into the field for the physician and the nurse. In addition, the hospital itself has acquired the right to provide healthcare services via licensing, and has acquired specialized assets and technology to be able to deliver competent care to patients. While there may be competition within geographic regions, it would be very difficult to replace the entities providing the healthcare services.

Jensen and Meckling (1976, p. 33) recognized the importance of specialization in the increase of agency costs in their study: "The size of the divergence (the agency costs) will be directly related to the cost of replacing the manager. If his responsibilities require very little knowledge specialized to the firm, if it is easy to evaluate his performance, and if replacement search costs are modest, the divergence from the ideal will be relatively small and vice versa." In other words, because ACHs are such specialized units, it makes monitoring and replacement difficult. The increased nature of specialization acts to increase agency cost with the healthcare market.

4.1.5 Signalling

In contractual situations, agents signal their compliance or proper management of the contractual arrangement. Often in cases with pre-contractual private information, some of the privately informed people would gain if they could make their information known. The difficulty is that there may be no simple, direct means to reveal the private information. This creates incentives to find ways to convey the information. One such strategy is via signaling.

Signaling may exist within the context of the U.S. healthcare market. The U.S government lacks the resources to monitor individual hospitals adequately. Therefore, it lowers its monitoring cost by using external monitors/lenders. Prior research indicates that lenders/banks monitor borrowers. Banks monitor borrowers to ensure that borrowers—in this case, the ACHs—are managing the business prudently and efficiently so that the borrower may return the borrowed capital plus borrowing costs. Often, banks require financial covenants that act as guidelines for the financial performance of the firms. These financial guidelines, along with direct monitoring via audits of the firm, ensure compliance with required firm financial performance.

Debt, according to Jensen (1986, p. 11), "increases efficiency by forcing organizations with large cash flows but few high-return investment projects to disgorge cash to investors. The debt helps prevent such firms from wasting resources on low-return projects." Furthermore, debt reduces the agency cost of free cash flows by reducing the excess cash available to managers, thus reducing the likelihood of overinvestment (Jensen, 1986). In the context of the agency problem between the U.S. Government and ACHs, debt can be seen as a method of signaling efficiency to the U.S. Government. Debt replaces direct monitoring costs for the government with external monitoring via the lenders. The ACHs incur debt, among other reasons, knowing that it signals to the government that they are being monitored on a regular basis to ensure that they are running efficiently and are minimizing their investment in negative NPV projects.

A corollary is that hospitals that provide more services to the government would seek to send greater signaling of efficiency. Hospitals that derive larger proportions of revenue from the government want to ensure that those streams of revenues are not jeopardized, and are thus compelled to signal compliance with the operational wishes of their largest customer. The government is trying to reduce overinvestment or investment in allocative inefficient services. Typically, the government encourages this through lower reimbursement to ACHs. Incentives to align the goals of providers of healthcare services and insurers via payment schemes or reimbursement schedules are well known (Peterson et al 2006; Eldridge and Palmer 2009; Melnick et al 1989; Conrad and Perry 2009; Lee and Zenios 2007). The ACHs know that the government can and does change reimbursement for them. If there is a risk of ACHs losing revenues because of the government's need to reduce overinvestment or allocative inefficient services, then the ACHs likely will want to signal compliance with the government's wishes, thereby ensuring that reimbursement is not cut for their hospital or they are not subjected to planned reimbursement schedules which may lower potential revenues. In effect, the ACHs seek to show compliance so that they are not penalized by way of lower reimbursements. Debt provides the mechanism for signaling compliance.

Therefore, one would expect a direct correlation of debt and hospital revenues derived from providing government services. Hospitals with higher revenues from government payors are at a greater financial risk should government change reimbursement. For this reason, one would expect that as the proportion of government-derived revenues increase, so too would the concern over ACHs' vulnerability to changes in reimbursement. As the ACHs' vulnerability increases, the likelihood should be greater for the ACHs to want to signal efficiency.

We know that in most agency relationships, the principal and the agent will both incur costs to ensure that the principal's interests are protected. Principals will incur monitoring costs, and agents often will incur bonding costs (Jensen & Meckling 1976; Chalkley and Khalil 2005; McLean 1989). In this case, bonding costs are the costs incurred by the agent to guarantee to the principal that the agent will not take decisions or actions that will harm the principal. In this case, the cost of debt can be viewed as bonding costs, costs that the hospitals incur to bond themselves to the principal (the U.S. Government). The debt that the ACH takes on acts as a guarantee that the ACH (the agent) will not take actions in the form of overinvestment and allocative inefficient services that harm the principal, in this case the government.

4.2 Agency Theory

4.2.1 Prior Research

In order to understand the agency relationship described earlier, a better understanding of previous research is necessary. The purpose of this section is to examine previous literature that has context and support for the agency argument put forth within this chapter. The research presented here is meant to inform the reader of previous academic works that have relevance to this study, and to draw parallels between the previous literature and the argument presented within this chapter.

If one examines the ACH market and the agency framework that has been discussed, one can see that what one has is a single principal, the government, which hires many agents on its behalf, ACHs, to provide healthcare for citizens covered by Medicare and Medicaid. From a broad perspective, this framework is similar to the research conducted by Stephen Ross. In his research, Stephen Ross (1973) created a set of utility functions under several relative payoff structures to examine the conflict of Pareto efficiency (assuming perfect information) with the needs to motivate agents within a principal-agent relationship. Ross concluded that payoff structures that solve the principal's problem and lead to Pareto efficiency, in which no further improvement in efficiency can be made, are attainable and actually quite likely to occur within the market. Effectively, Pareto efficiency can be attained by incurring the cost necessary to ensure agent compliance. However, when there are many agents acting on behalf of the principal, the fee may be the only communication between the principal and the agent. In this case, Ross noted that while it may be feasible to monitor the agents in action, it would be too expensive. This is very similar to conditions within the ACH market, where in this case, the government's only mechanism for communication is the reimbursement rate. The government would like to be able to ensure compliance via monitoring costs; however, similar to one of the conclusions reached by Ross, the economic viability of such a system for monitoring is not there, as the cost are too great. Ross (1973) also supports the general principal that agency costs may be present in any agency relationship and that agency relationships may be found in any contractual arrangement where a principal contracts with an agent to act on the principal's behalf.

Jensen and Meckling (1976) brought agency theory to the forefront of finance, as their work combined agency theory, property rights theory, and the theory of finance to provide a theory of ownership of the firm. They defined the concept of agency costs in light of the separation of ownership and control, that is, between the principal and agent, together with the associated costs of the relationship. They created a model of the firm with equity and debt and examined the resulting agency costs. They suggested that the principal could act to monitor the agent to limit the deviation of the agent's dealings from those that are in the best interest of the principal. Additionally, they suggested that it is beneficial for the agent to incur bonding costs in order to guarantee to the principal that the agent will not take actions out of line with principal's interest. In their model, both monitoring and bonding costs were considered agency costs, along with the residual loss.

This research uses the Jensen and Meckling (1976) model of agency costs, and argues that ACHs take on bonding costs, in effect signaling behavior, which limits deviation from the principal's interests. Bonding reduces monitoring costs, and where debt is being used, the reduction in free cash flows limits the options of the agent (ACHs) and therefore minimizes the likely cost of aberrant activity.

Jensen (1986) expanded agency theory, incorporating discussions of the agency costs of free cash flows and corporate finance. Free cash flows were defined by Jensen (1986, p. 323) to be, "cash flows in excess of that required to fund all projects that have positive NPVs when discounted at the relevant cost of capital." He analyzed the conflict between managers and shareholders and the role of reducing free cash flows under managerial discretion in diminishing the conflict between the principal and the agent (management). Jensen (1986) suggested that debt is a signal and a way of reducing the manager's discretion of the use of free cash flows. Jensen covered two important points related to this research on agency costs: 1) the benefits of debt in reducing agency cost of free cash flows; and 2) how debt can substitute for dividends.

These two points of agency are important to this research and should be discussed further. The first is that managers with excess free cash flows can signal to shareholders by declaring a permanent increase in the dividend. However, according to Jensen (1986), this is a weak promise, as dividends could be changed in the future. Secondly, debt can enable managers to bond their promise to the payout of future cash flows; thus, debt can be an effective substitute for dividends. Jensen suggested that debt reduces the agency costs of free cash flows by reducing the resources under management's control, and is thus likely to reduce overinvestment.

Jensen's (1986) theory suggested that firms with large amounts of free cash flows that are allowed to accumulate under the firm management's control are more likely to be wasted on projects/mergers that are of minimal value to the firm and possibly even value destroying. This is an important result, because this research suggests that a similar agency problem exists between the CMS and ACHs in the U.S. The ACHs are similar to the firm with prior large free cash flows. Due to the ACHs' need to compete on quality as well as the characteristics Jensen describes, ACHs are likely to overinvest or invest in allocative inefficient services, as discussed previously. In the case where ACHs overinvest, they are likely to increase the cost to their customers to cover the overinvestment. Government costs will increase, because the CMS consumes the majority of healthcare. However, if the government (principal) is able to reduce the resources under management of the ACH (agent), then the ACH is more apt to operate efficiently and ensure that projects are scrutinized for value creation and allocative efficiency. This effort effectively aligns the goals of the principal and agent.

Kim and Sorensen (1986) analyzed the capital structures of firms in relation to insider ownership of public firms. They extended Jensen and Meckling's (1976) work by looking at firms with multiple shareholders, and testing empirically for the presence of agency costs and how these costs relate to capital structure. They used a sample of 186 companies divided into groups with high inside ownership (above 25%) and low inside ownership (below 5%). The groups then were broken into separate industries so that only like industries were compared. Using analysis of variance (ANOVA) and simple regression, they found that firms with insider ownership had 6% to 7% higher debt to total assets than those of lower inside ownership within the same industry. These findings are relevant to this research, as they indicate that debt levels and agency effects are related in the way that Kim and Sorensen's (1986) theory predicted that firms with high inside ownership have lower agency costs. This is supported by the views of Jensen and Meckling (1976), who suggested that owner/managers have little or no agency costs.

Wedig et al. (1988) also used this agency framework to analyze the capital structure of hospitals in relation to ownership structure. Hospitals in the U.S. are categorized as either non-profit or profit based hospitals, and the majority are non-profit. Wedig et al. suggested that capital structure is an interesting subject in light of the fact that nonprofit hospitals are exempt from tax, yet maintain debt obligations, even though there are no tax advantages from doing so. According to Wedig et al., the bulk of revenues within hospitals are derived from public or private insurers, and this reimbursement mechanism affects the cost of both debt and equity. They examined how capital structure is affected by the reimbursement policies of the major insurers, taking into account differences in ownership structure. In addition, they assessed the debt/asset ratios of hospitals and determined the roles that reimbursement policies, tax policy, and bankruptcy risk play in capital structure. Wedig et al. concluded that hospitals with high reimbursement via cost-based reimbursement have greater debt than hospitals with a lower reimbursement mechanism. They suggested that this would be a problem going forward if reimbursement is reduced. They also concluded that the type of ownership provides for no differences in capital structure, even in light of the differences for holding such debt. This is important to the research as no variable within the data allows for ownership structure.

McLean (1989) examines the application of agency theory to healthcare organizations. He suggests that although agency theory was developed as a theoretical model for use in economics and finance, it is applicable for use by managers of healthcare organizations and policy makers. McLean states "several types of arrangements used to finance healthcare organizations can be understood as ways of dealing with agency problems" (McLean 1989, p.65). He suggests that unequal access to capital amongst providers may be a result of varying degrees of agency costs. McLean (1989) applies his theory of agency in healthcare to hospital based medical care in the U.S. examines the participants within the healthcare market and describing how agency theory fits. He suggests that hospital managers show signs of agency problems when they use their managerial discretion to consume perquisites to a greater extent than allowed by contract, a perfectly plausible event in healthcare, which creates opportunity for abhorrent behaviors due to the lack of monitoring output or the amount of input into health services. Debt according to McLean (1989) helps resolve problems of agency in healthcare in a way described by Jensen and Meckling (1976) by reducing the resources under managements' control as cash flows must be promised in order to acquire debt. McLean suggests that providers of healthcare are temporary agents that have a propensity to over consume perquisites in the form of reduced effort and or higher fees. This is made possible by the monitoring problem within healthcare. McLean (1989) concludes that agency theory is applicable in many cases to healthcare.

McLean's discussion is important to this research as it supports the theoretical application of agency theory to the U.S. healthcare market, specifically addressing the relationship between patient and provider, payor and provider and physician/ provider relationships. He further suggests that agency cost may explain the unequal access to capital by providers.

While no direct agency costs are attributed to the unequal access to capital, the inference that it can have impact on access to capital is important. This research puts forth the premise that agency cost of free cash flows impacts decisions of capital structure by limiting payments to ACHs and thereby limiting the amount of cash flows with which they can promise in order to obtain debt. The outcome of this limitation in the available cash flows to support borrowings, limits the debt capacity for an ACH. The inequality is driven by ACHs, which have differing cash flows to promise, which means that ACHs with better cash flows can obtain more debt, while those with lower cash flows have less. This will be discussed further later on.

Eisenhardt (1989) assessed agency theory and reviewed the empirical literature to determine the strains of agency research that provide testable positions and to evaluate empirical agency theory. She concluded that there are two strains: (1) positivist, examples of which are Berle and Means (1931), Jensen and Meckling (1976), Fama (1980), and Fama and Jensen (1983), which is interested in describing governing mechanisms that minimize or remove agency costs; and (2) principal-agent research, examples of which are Anderson (1985), Eisenhardt (1985, 1988), Eccles (1985), and Conlon and Parks (1988), which is concerned with empirical research of the principal-agent relationship. According to Eisenhardt (1989), principal-agent research provides greater opportunities for empirical testing.

She separated the two strains of research by noting, "Positivist theory identifies various contract alternatives, and principal agent theory indicates which contract is the most efficient under varying levels of outcome uncertainty, risk aversion and information…" (Eisenhardt 1989, p. 60). She concluded with five recommendations for research within the principal-agency model: 1) focus on information systems, risk, and outcome uncertainty; 2) focus on theory relevant situations in which contracting problems are difficult and agent opportunism is high; 3) expand into richer contexts and apply agency to organizational situations where asymmetric information is present; 4) use agency as a complement to other theories;

and 5) look beyond economic literature. The research in this chapter follows many of the guidelines laid out by Eisenhardt (1989) and recognizes the strength in applying agency to real market/contractual situations within the healthcare market.

Stulz (1990) analyzed financing policies, observing how they restrict management's self-interested behaviors in the presence of asymmetric information. He constructed a model of an atomistic shareholder who did not have access to the firm's cash flows, nor insight into management's investment decisions. Stulz assumed that it was too expensive for shareholders to demand dissemination of cash ex-post. He then suggested that managers enjoy increasing perquisites with an increase in investment, even when it involves negative NPV projects, so consequently, managers always will choose to invest rather than pay out cash. Informational asymmetries under these conditions cause problems for firms with too little cash flow to invest in positive NPV projects, as managers lack credibility in convincing the shareholders that they do not have enough cash flow to take advantage of the positive NPV opportunities.

Stulz (1990) concluded that financing policy reduces the agency cost of managerial discretion. Agency cost of managerial discretion has two costs: overinvestment and underinvestment. Stulz found that debt that requires management to pay out funds from cash flows, which exacerbates the underinvestment costs. An increase in underinvestment cost is a reduction in overinvestment costs. Stulz confirmed the premise put forward in this research: Government can drive down overinvestment by ACHs by reducing free cash flows to ACHs.

Calem and Rizzo (1995) analyzed the agency cost of capital markets in U.S. hospitals. They suggested that investment activity is related closely to the liquidity or internal funds of the hospital, which can determine access to debt markets. They pointed to previous research of Sandrick (1986) and Wilkinson(1988) to suggest that access to debt markets at the time of the study was becoming difficult, driven by various cost containment methodologies by insurers which lowered hospital operating margins and thus liquidity (Calem and Rizzo, 1995).[5] They suggested that there may be a causal relationship between investment activity and the availability of internal funds. Using a balanced panel data set of 1,400 hospitals from 1985-1989 and GLS regression analysis, they postulated that small hospitals and freestanding hospitals were more likely to encounter financing constraints in comparison with large hospitals or multi-hospital chains. By separating the hospitals by size and chain affiliation, they examined the relationship of liquidity and investment. Measuring investment by way of the change in fixed assets from one period to the next, and controlling for labor, labor to capital, occupancy of beds, market growth, credit standing, and marginal revenue of product, they used a fixed effects model to regress investment against liquidity and control variables. Results from their regression analysis concluded that small hospitals and freestanding hospitals face borrowing constraints due to agency costs as liquidity was closely related with investment in small and freestanding hospitals. This is in contrast to their finding that large hospitals do not, as the internal liquidity of large, multi-chain hospitals did not correlate to investment. While Calem and Rizzo (1995) were not analyzing Agency Costs of Free Cash Flows as suggested in this research, but rather Agency Costs of Capital Markets, it is important to notice that they reference underlying payment methodologies as primary reasons for increased difficulty in access to debt markets and as a consequence making select ACHs more reliant on internal fund for investment. It is interesting to note that the premise suggested under the existence of agency cost of free cash flow may actually increase agency costs of capital markets as described by Calem and Rizzo (1995). It is the effect of these payment methodologies on free cash flows and the consequence of such changes may lead to difficulties in ACHs obtaining debt to fund new investment, therefore leaving them more reliant on internal funds. Additionally, this research may provide evidence of a

[5] Calem and Rizzo primarily point to the Prospective Payment System, implemented by Medicare in 1984 as the primary example of cost containment via payment methodologies. The Prospective Payment System provided a fixed level of payment for specific services regardless of the hospitals actual charges. This payment arrangement increased the hospitals risk of incurring uncovered charges and therefore lowered margins on those services.

different type of agency cost that affects hospitals, which is acting as a primary driver for increasing the agency costs of capital markets.

Leland (1998) considered the optimum amount and maturity of debt for a firm. He noted that the agency costs of debt related to the asset substitution problem (Jensen & Meckling 1976) are significantly less than the tax advantages provided by debt. Therefore, firms will position themselves by taking on the optimum level of debt regardless of the value transferred to the bond holders because of the risk reduction value presented in debt.

Parrino and Weisbach (1999) suggested that the optimum leverage for a firm is when the incremental increase in the cost of debt via agency costs equals that of tax benefits for the increase in debt. They suggested that overinvestment is more likely in firms with stable cash flows and little growth opportunities. They concluded that the stockholder/bondholder conflict affects debt levels, and that this distortion usually increases as the debt levels increase. Their findings also concluded that the agency cost of debt can be large and can vary greatly across firms. This is important, as ACHs have stable cash flows and few growth opportunities. Therefore, if ACHs have few growth opportunities, they are more likely to have overinvestment.

Rivenson (2000) considered the liquidity of hospitals and the differences between non-profit and for-profit hospitals, as well as what strategies are used by ACHs to determine their cash position. Through public data and interviews, they concluded that the cash reserves were increased deliberately by nonprofit ACHs, mostly derived from previously built-up reserves that subsequently had been invested, as well as improved payables and receivables policies. They suggested that in light of the anticipated future reduction in reimbursement by the public and private insurers, ACHs have been holding greater cash reserves. Accordingly, this increase in cash reserves and investments serves to supplement earnings from healthcare services, and to provide access to capital markets and a lower cost of capital (Rivenson 2000).

Harvey et al. (2003) analyzed the effect of capital structure on limiting agency costs. They suggested that debt creates value for firms that have high agency costs, especially when the debt reduces the likelihood of overinvesting. Using 1,014 exchange listed firms from emerging markets, and including ownership and stock return data, Harvey et al., using a three-stage least squares regression model, concluded that debt mitigates the reduction in firm value that is induced by asymmetric information between the principal and agent, in this case management and stockholders. This is accomplished by reducing the overinvestment problem by increasing debt.

Morellec (2004) analyzed the impact of managerial discretion and corporate control mechanism on debt levels and the value of the firm. Capital structure in the study incorporates the tax advantage of debt minus bankruptcy and the agency costs associated with management discretion.   Morellec uses a contingent claims model to analyze the relationship between debt and management discretion (assuming managers obtain perquisites from investment). He analyzed the impact of management's opportunistic behavior on leverage policy, asset values, and firm value. He concluded that principal-agent conflicts via the manager-shareholder relationship explain the lower debt levels experienced in real firms, as well as the fact that firms with high growth opportunities carry less debt. He also suggested that these agency conflicts could explain the apparent cross-sectional variation in capital structures. Morellec supported the position that principals can and do benefit from a reduction in free cash flow.

Harvey, Lins, and Roper (2004) conducted tests on data from emerging market firms' ownership structures to see which would lead to large/extreme agency costs. They used both traditional financial statement data and global debt contract data to analyze the premise that debt should create value in firms with high expected agency costs. To measure a firm's potential overinvestment tendency, they used higher levels of assets in place and limited growth opportunities. Cross-sectional tests utilizing financial accounting data revealed that leverage mitigates losses in a firm's value. They reported that the benefit of leverage is concentrated in companies that have limited growth opportunities or have a higher percentage of assets in place. This suggests that there is evidence of large-scale recognition that debt can minimize overinvestment, thus creating value for the principal. The work of Harvey, Lins, and Roper is applicable directly to this research, as the argument put forth in this study recognizes that ACHs' management may signal efficiency to government payors, and in doing so minimize overinvestment by the ACHs, thereby creating value for the government via savings, as described earlier.

Iacobucci and Winter (2005) analyzed the incentives for asset securitization that are driven by informational asymmetries within a corporation. They defined asset securitization as the partial or complete segregation of a specific set of cash flows from a corporation's other assets, and the issuance of securities based on these cash flows. Under their findings, asset securitization enhances monitoring efficiency by reducing noise in the relationship between firm and managerial performance, and consequently the agency cost of free cash flow, which is supported by Jensen (1986).

In the context of this research, the increase in monitoring efficiency comes at the expense of small ACHs. According to Calem and Rizzo (1995), small and freestanding hospitals face borrowing constraints due to agency costs. He noted, "From a policy perspective, the results suggest that efforts to limit payments to hospitals during the past decade may have been particularly onerous to the investment decisions of small hospitals and free standing ones. Such hospitals, we find are more dependent on their own liquidity for investment funds" (Calem and Rizzo1995, p. 1012). Borrowing constraints upon small hospitals are created by efforts to limit payments to hospitals, as discussed by Calem and Rizzo (1995), and this is evident in the data provided in this research, as small hospitals consistently show lower debt than other larger sized facilities. When looking at debt measurements from Chapter 3, Category 1 hospitals (those with less than 100 beds) had less debt. Category 1 sized facilities showed the lowest debt to equity ratio, with a value of 0.73, and the second lowest debt ratio, with a debt ratio of 0.45. Calem and Rizzo suggested that limitation in payments is the underlying cause of these constraints. The findings in Chapter 3 also suggest that larger hospitals are better able to reduce the effects of agency.

Chalkley and Khalil (2005) utilizing an agency theory framework between insurers and providers (ACHs) demonstrate that monitoring schemes differ in their effectiveness in utilizing patients as a disciplining mechanism and showed that the choice of the type of monitoring tool itself may depend on the strength of the patients change in demand to variation in quality of service. The agency framework used in their research assessed two fundamental ways of calculating payments, one based upon input measures (treatments) the other on output measures (health outcomes or improvement to health statusThey showed that when demand is responsive to quality of service, payment mechanisms based upon outputs or outcomes, reduce the overall cost to the insurer when compared against payment mechanisms based upon treatment or inputs. They suggest that this is because payments based upon outputs or outcomes make misrepresentation of the type of patient being treated more costly to the provider in terms of demands for services, because services rendered will have to be tailored to the patient type such that the outcome is consistent with what was originally claimed by the provider.

The research of Chalkley and Khalil is important to this research in several ways, one is that they recognize the Agency relationship between insurers and ACHs. The government is the largest insurer and consumer of health services in the U.S. They in effect hire agents (ACHs) to act on their behalf to treat patients. The principal-agent relationship is one in which monitoring is difficult. This difficulty in monitoring means that the principal must incur monitoring costs in order to limit abhorrent behavior by the agent, in this case providers. The second key point from the research of Chalkely and Khalil (2005) extends this last point. They recognize that payors may be able to reduce agency costs through payment schemes to providers (ACHs). This research suggests two forms of symptoms of the agency relationship may be present within U.S. healthcare, signaling and agency costs of free cash flows. In this case, signaling by ACHs maybe an effort on their part not to be subjected to payment schemes as described in Chalkley and Khalil (2005) and likewise agency costs of free cash flows may likely be a form of agency costs incurred by those ACHs already being subject to payment schemes.

Nahata et al. (2005) examined the moral hazard within U.S. healthcare. They analyzed the demand for medical services in relation to out-of-pocket expenses by the insured. Their assumption was that a third-party insurer always is involved in the consumption of the healthcare services. They incorporated the demand inelasticity of medical services, in which any increase in medical services could be passed on directly to the consumer. Using a broad range of elasticity, a utility function (utility maximization model) was created to analyze demand under various conditions. The finding was that cost sharing between the consumer and insurer is the single most important factor in limiting the rise in medical expenditures. Their findings support the notion that providers do not compete based upon price, but rather on quality or the perception of quality.

As described by Nahata et al. (2005), the moral hazard in the healthcare markets is one of the prime reasons that ACHs compete on quality or perceived quality, and thus have a propensity to overinvest, as discussed previously. Like “loss leaders” in retail, the investments by ACHs are not always to generate a direct return on the investment, but rather work as an indirect means of increasing patient volume, and thus revenues. Under this scenario, the CMS ultimately will carry the burden of those losses in its request for additional reimbursement, or perhaps greater quantity of services rendered. Ideally, by reducing the amount of free cash flows available to hospitals, the CMS curbs ACHs' ability to overinvest.

Peterson et al (2006) provides a review of 17 empirical studies, from 1980 to 2005, on pay for performance in healthcare to examine the effect of explicit financial incentives on measures of the quality of health care services. Pay for performance was a concern as they point to the poor quality of healthcare in the United States, suggesting via a report from the Institutes of Medicine (2001) that numerous factors contributed to the poor quality of health services including the structure of the present healthcare payment system. CMS along with private payors have been using explicit financial incentives to try to induce quality, but questions remain as to the effectiveness, optimal design and implementation needed to be answered. Peterson et al (2006) suggest that the provider patient relationship is a type of principal agent relationship. The principal (the patient) cannot directly observe or know the level of skill or effort expended by the agent (the provider) doing the contracted work. Because of this lack of information on the part of the principal (the patient), they do not have knowledge of their own medical condition, how much care they need and or expected outcomes of services rendered, so hence rely strictly on their agent to perform these action/services. Because of the asymmetry of information on need and outcome for healthcare services, demand for healthcare services maybe unresponsive to quality. In this light, performance-based pay or explicit financial incentives may provide an answer when patient demand is unresponsive to quality. Peterson et al (2006), conclude that providers are paid the same regardless of quality of the healthcare they provide, producing no financial incentives for quality and in some cases disincentives. Based upon the literature search conducted they suggest that performance based pay provides a real opportunity to align both principal and agent interests using incentives for the agent.

Schneider and Mathios (2006) expanded the application of principal agency theory to health services. They used a principal-agent framework to examine the role that monitoring costs faced by an insurer had on healthcare utilization. Using a theoretical model to consider an alternative to incentive-compatible contracting, they proposed for the insurer to actually monitor the care prescribed by providers under a fee for service arrangement. They compared ACH length of stay for fee for service patients with those of capitated patients in both high and low monitoring conditions. Looking at the variance in length of stay, they assumed high monitoring costs with a higher variance in length of stay for a given procedure. Their theoretical model develops predictions for healthcare utilization for fee for service arrangements in cases of both low and high monitoring costs. Testing predictions of the theoretical model via utilization using length of stay measures in their the research; they compare outcomes of those treated by providers under a fee for service arrangement with those treated under a capitated plan. Utilizing the two basic types of insurance plans within the U.S, traditional indemnity (fee for service) and managed care (capitated), they suggest that capitated plans transfer the financial risk of treatment from the insurer to the ACH. This provides an excellent example to implement and how the incentive compatible contract to contain excessive use of services (measure by the length of stay) can be used to contain agency costs. Using principal-agent theory, they suggest that this transfer of risk from the insurer to the provider maybe expensive if the provider is risk averse. This may be a problem as incentive compatible contracts may cause the provider to not be as good an agent for the patient or the insurer, which might lead to a condition of the under provision or lack of quality of care depending on how risk averse the provider is.

Bazzoli et al. (2006) examined ACHs' financial performance from 1993-2000, separating the study into two time frames. They analyzed financial data accumulated from the CMS cost reports and the survey data from the AHA. Using this information, their sample was divided into groups: those considered financially strong, and those considered financially weak. Performance was dictated by the use of profit margin and ACH cash flows with strong or weak performances, divided at the twenty-fifth and the seventy-fifth percentiles. Over time, performance was examined to understand better whether strong hospitals were getting stronger and weak hospitals were getting weaker.

Bazzoli et al. (2006) concluded that the strong hospitals were not getting stronger over time, as the very highest performers at best were maintaining their financial performances, while the weaker institutions were performing worse at the end of the longitudinal study. Weaker hospitals were found mostly to be rural hospitals (Morellec & Smith 2007). This is consistent with Calem and Rizzo (1995), who found that small rural hospitals face borrowing constraints due to agency costs. The evidence for Calem and Rizzo is shown in thefindings of Morellec and Smith (2007), which provided evidence that the restriction or constraints on borrowing is most likely the result of the lack of profit margin and consequently free cash flows within this dimension of the U.S. ACH market.

Eldridge and Palmer (2008), conduct a systematic review of current literature on the topic of performance-based payments as a methodology to improve the performance of health systems in low-income countries. The use of performance-based payments had recently become a popular methodology to achieve specific health targets in low-income countries. In their research, they find performance based payments as the primary approach used to resolved problems of the principal agent relationship. They describe the principal-agent relationship as "one in which an actor (the principal) can act more effectively by relying on the services of a so-called "agent" whose utility function differs in some sense from the principal, meaning that they cannot be relied upon to act in entirely the way desired by the principal" (Eldridge and Palmer 2008). The problem, as they suggest for the principal, is how best to create a contract that will incentivize or motivate the agent to behave in the desired manner required by the principal, even when the principal cannot monitor outcomes or output. Recognizing that many health systems in the developed world are adopting this approach and have made great strides in moving from input based budgets to fee-for-service models, including payments based upon diagnosis-related groupers. Using the research of Peterson et al (2006) they suggest that performance-based pay has been found to have generally positive effects in aligning incentives , but recognize that adverse activities such as gaming are still of concern. They conclude by recognizing some of the success of performance based payments but provide for some concern in utilizing these methodologies in low-income countries as these methodologies transfer risk to the providers of healthcare services, which are working in more challenging or fragile settings. Where monitoring is difficult,.they suggest it may be difficult to define proper performance and how to measure it, whether the targets are achievable and more importantly how incentives via payments may skew activities and the performance of the providers in a way that may be detrimental to the local health services long-term.

Conrad and Perry (2009) asks the question, utilizing a conceptual theoretical framework drawn from microeconomics, behavioral economics and agency theory, whether financial incentives can improve the quality of healthcare services. They analyze eight propositions in their research. (1) Rewards vs Penalties, (2) Nature of Incented Entity and Focal Quality Behavior, (3) General versus Selective Incentives, (4) Extrinsic versus Intrinsic Motivation, (5) Relative versus Absolute Performance Incentives, (6)Size of Incentives, (7) Certainty of Incentives and (8) Frequency and Duration of the Incentive Payoffs. They conclude that properly designed incentives can improve the quality of healthcare services along the dimensions of structure, process and outcomes. However, they suggest that under the current market structure for healthcare services, incentive-induced improvements to quality of healthcare services are likely to be small.

The Conrad and Perry (2009) paper is important to this research as their approach recognizes and considers the principal-agent relationship and the need to align incentives between the principal, the payor in their research with the agent, the provider via payment methodologies. The alignment of incentives and solving agency problems within the healthcare market between CMS (a government payor) and ACHs (a healthcare provider) is one of the primary considerations of this research. The recognition of this problem by other researchers suggests an understanding of the principal-agent problem between CMS and ACHs and a need to align incentives via payments as a valid strategy, supports the premise of this chapter that agency costs may exists and the government may be trying to solve these via reimbursement strategies. Likewise, that agents may be trying to reduce agency problems and costs by bonding (signaling).

4.3 Data

4.3.1 Description of the Data

Data used in this study was collected from the CMS, and is referred to most often as the MCR. The MCR contains provider information such as facility characteristics, utilization data, cost and charges by cost center (in total and for Medicare), Medicare settlement data, and financial statement data. The CMS maintains the cost report data in the HCRIS. A full description of the data was provided in Section 3.4 of Chapter 3, and a list of ratio variables was provided in Section 3.5.2**.**

Additional variables were created for analysis in Chapter 4. A description of the variable, its creation, and its use is discussed below. A table of all variables used in Chapter 4 can be found in Table 4.1. Separate variables were used for signaling and agency cost of free cash flows.

No breakdown by certain characteristics, i.e. for-profit/ non-for-profit, is possible, as the variables necessary to do so are not contained in the data.

4.3.2 Additional Variables

This chapter proposes two separate models of agency: one for signaling, and the other for agency cost of free cash flows. In both models, the percentage of government business, (%Gov_Bus) is used as a primary variable, in the case of signaling the dependent variable and for agency cost as the primary independent variable. Therefore, it is important to understand how this variable is calculated.

Due to the formatting and information of the MCR, we were not able to get direct information of what percentage of the ACHs' revenue is derived in dollars from government sources, and so a proxy had to be established. The variable %Gov_Bus is a proxy, using inpatient and outpatient days from government payers as a percentage of total inpatient and outpatient days/visits for all payers accepted by the ACH as reported by the MCR for each year. Government payors include Medicare and Medicaid, amongst others. While this does not provide exact dollar reimbursement or revenues from government sources, it did allow this study a proxy of those revenues. As government payers pay inpatient services by a DRG, each DRG has a length of stay measure associated with it. The length of stay measure quantifies the maximum allowable number of days recognized by the government for a given DRG. Each DRG is paid a flat fee that takes into account the appropriate number of patient days utilized by the DRG. Outpatient procedures are delivered via a patient day. Normally, one has no overnight hospital services, and is counted as outpatient. Because the payment can be equated to patient days, this allowed us to take the percentage of patient days consumed by the government of total patient days and directly correlate it back pro-rata to free cash flows. While this was not an exact match, it provided a good proxy. This is not to say there are not limitations to the proxy to accurately represent the percentage of revenues derived from government payors. Government payors reimburse less than private payors for services rendered by ACHs, so ACHs may be receiving higher reimbursement for those patient days sold effectively to private payors for each patient day. This will have some tendency to mean the actual revenues derived from the government may be overstated slightly. However this is expected to be minimal as the government reimburses on average around 25 % to 27% of charges where private payors reimburse on average around 30% of charges according the claims data used later in this research.

The MCR provided the necessary variables to calculate %Gov_Bus, which is defined as the sum of Title XVIII and Title XIX, divided by total inpatient/outpatient days. Title XVIII is defined as Medicare (Social Security Agency). Title XIX is defined as Medicaid (Social Security Agency). The CHIPS program was ignored for the purposes of this research, as it was deemed small, and most importantly, not all ACHs participate in it. Government employees also were excluded, as the amount was relatively small and not definable from a research perspective.

Total Inpatient/Outpatient Days is defined as the total number of patient days produced by the ACH for that year on both an inpatient and outpatient basis. Total Inpatients/Outpatients had a total N of 53,240 out of 55,582, with 2,342, or 4.2% missing. As Total In/Outpatient Days is a given number from the MCR, these cases were dropped. Using Tukey's (1977) definition, outliers and extremes are those with values above 100,707 Day/Visits, and a total of 34% of the cases were categorized as extremes.

The extremes were allowed to remain in the study, as the highest Day/Visits was 582,274 patient days/visits, which is possible with a hospital with 1,595 beds. Also in consideration for this decision was the fact that Total In/Outpatient Days/visits also is comprised of outpatient visits, which do not required a hospital bed to provide healthcare services.

The Total In/Out Days/Visits on the other prospective end with a value of zero were excluded, as the hospital was considered non-operational for this portion of the study. For %Gov_Bus = (TitleXVII + TitleXIX) patient days/(Total In/Outpatient Days), N= 50,095 with 5,487 missing. The %Gov_Bus is a calculated variable, so missing data is due to missing data in the underlying variables in the MCR used to calculate %Gov_Bus.

The mode of %Gov_Bus was close to 1.00. Initially, this value was of concern; however, upon further review, it was determined that the majority of ACHs with values close to 1.00 were highly correlated, with a value of 1 in (num_bed_cat), which described ACHs in the category with the lowest number of beds, between (0-100) beds. These hospitals tend to be in rural areas, where few have private insurance, and reimbursement is derived primarily from Medicare and Medicaid.

All negative values for %Gov_Bus were rejected, as negative values for this variable were considered invalid. All values for %Gov_Bus had to be greater than zero (%Gov_Bus > 0). All missing values were ignored, and those cases were omitted from the study. Methodologies for the analysis of both signaling and agency costs of free cash flows were similar; however, they will be addressed separately.

4.3.2.1 Variables included in Signalling Models

Signalling Variables		
Variable Name	**Actual Variable**	**Definition**
% Gov Bus	% Gov Bus	CMS patient days /Total In/Out patient days
Leverage		
	Leverage	Total Longterm Liabilities/Total Assets
	Leverage_2	Leverage (non-negative value)
	Debt/Equity	Total Debt /Equity
	Debt Ratio	Total Liabilities/ Total Assets
Profitability		
	Net Margin	Net Income/ Sales
Cash flows		
	Operation Cash Flows	FCF + CAPEX
Liquidity		
	Liquidity	Current Assets/ Total Assets
Size		
	LnTA	Natural Log of Total Assets
Time		
	Fiscal Year	Fiscal Year Reported

Figure 4.1: Signaling Variables:

Shows the variable to be included in the signaling model. This figure provides the variable name and the definition of calculation of the variable. In addition, it provides the actual variable name used in the data. All variables were calculated with the exception of fiscal year. Multiple variables are used for some variable categories. For example, Leverage has four underlying actual variables that are used in the modeling. This was done so that the modeling could observe the relationship of %Gov_Bus and multiple definitions of leverage. A full list of variables for Chapter 4 is available in the Appendix to Chapter 4. The list provides variable name, nomenclature, whether the variable was calculated or provided with the data itself and a definition of the variable.

Table 4.1: Correlation Matrix for Variables in Signaling Regression:

This shows the correlation matrix for the variables used in the signaling regression. Of interest is the negative correlation of the Leverage, Leverage2 and the Debt Ratio. Signaling theory would suggest a positive relation between all the variables and the percentage of government business. These negative relationships are contrary to the signaling theory put forward in this thesis. Net Margin is also slightly negative which may explain the negative correlation with government business as this may have impact on cash flows which effect an ACHs ability to take on debt. Operation Cash Flows hasa similar relationship. Liquidity however has a slightly positive relationship this is counterintuitive with the relationship of Net_Margin and Operation Cash Flows. LnTA has a negative relationship with %Gov_Bus which suggest that larger ACHs have less of their total business coming from government sources. All variables denoting leverage variable show a dgree of endogeneity with one another; however this does not present a problem within the regressions as they are not included together in any single model.

	%Gov_Bus	Leverage	Leverage2	Debt to Equity	Debt Ratio	Net_Margin	Operation CF	Liquidity	LnTA	Fiscal Year
% Gov_Bus	1.0000									
Leverage	-0.1117	1.0000								
Leverage2	-0.1117	1.0000	1.0000							
Debt to Equity Ratio	0.0045	-0.0019	-0.0019	1.0000						
Debt Ratio	-0.0512	0.8149	0.8149	0.0147	1.0000					
Net_Margin	-0.0629	-0.0901	-0.0901	-0.0022	-0.2086	1.0000				
Operation cash Flows	-0.0799	-0.0065	-0.0065	0.0120	0.0356	0.1291	1.0000			
Liquidity	0.1951	-0.2495	-0.2495	-0.0016	-0.0012	-0.0130	-0.1969	1.0000		
LnTA	-0.3981	0.2590	0.2590	0.0027	0.0693	0.1472	0.1349	-0.4808	1.0000	
Fiscal Year	-0.0280	0.0450	0.0450	0.0032	0.0364	-0.0364	0.0176	0.0115	0.1017	1.0000

Table 4.2: Statistical Descriptives of Signaling Variables:

All variables have large samples with few missing cases. This allows a more complete analysis via regression as fewer cases are omitted due to missing variable data. The smallest sample size for a variable is for the Debt to Equity Ratio with 42,651 cases. All descriptive statistics are within normal value range. All outliers and extremes have been rermoved.

Variable	n	Mean	Median	Std Deviation	Range	Skewness	Kurtosis
% Gov_Bus	48910	0.6575	0.6728	0.14678	0.7500	-0.3680	-0.3520
Leverage	45109	0.3058	0.2838	0.22741	1.3300	0.5090	-0.0170
Leverage2	44419	0.3171	0.2905	0.22379	0.9900	0.6790	-0.0290
Debt to Equity Ratio	42651	0.7780	0.6100	0.71562	4.5500	1.0240	1.0300
Debt Ratio	49996	0.4778	0.4400	0.29558	1.7100	0.5000	0.0840
Net_Margin	51471	0.0093	0.0200	0.06171	0.8900	-3.4670	24.9660
Operation cash Flows	44005	4344600	2112300	12133500	68059285	0.4480	0.7630
Liquidity	51527	0.3510	0.3216	0.16205	0.9000	0.5920	-0.2320
Fiscal Year	55582	2001.03	2001	3.351	12	0	-1.1830

Leverage (primary independent variable) - (Leverage, Leverage2, Debt Ratio, Debt/Equity) several definitions of leverage were used to measure and control for the outstanding debt of each ACH. The different measures allowed multiple models to be considered, each accounting for the various definitions and the possible relationship with %Gov_Bus. Debt is the primary independent variable in the signaling regressions. It is proposed that a positive correlation exists between the percentage of government business and all Leverage ratios. This relationship is proposed, as ACHs may desire to signal to the government efficient use of capital in order to protect revenues derived via government sources. ACHs may use signaling as there is very little capability for monitoring of health services and/or ACHs by the government. Initial results from the correlation matrix in Table 4.1 contradict the signaling premise as three out of the four leverage ratios how a negative relationship, however this is to ignore the possible effect of control variables . In this case, control variables are important as they help to better explain the relationship between Leverage and %Gov_Bus and ultimately may yield a negative relationship in the panel data regression analysis. All definitions are available in Figure 4.1. Additional information on the variables included in Chapter 4 is included in the Appendix, including name, nomenclature, if the variable was provided or calculated, outliers and definition.

Profitability - (Net Margin) was included as a control for profitability, and as access to debt markets can be constrained by non-profitable firms, therefore limiting leverage, which may affect their ability to signal. Evidence of this may be seen in Table 4.1 as Net Margin has a negative relationship with all the leverage variables. This may suggest that similar to Calem and Rizzo (1995) smaller hospitals are more reliant on internal cash flows for investment. Therefore, as Net Margin increases ACHs are using more internal funds for investment. However, this does not align with a rational conclusion that the higherthe Net Margin the more debt an ACH could take on. The correlation matrix in Table 4.1 suggests that as ACHs get larger they take on more debt. This is shown in the positive relationship with LnTA and the leverage ratios. Profitability as measured by net margin takes into account other income of ACHs besides revenues derived from services to patients. This is important as net margins were shown to be positive in Chapter 3; however, operating margins, which are derived from service to patients, are not. Therefore, ACHs are only generating a profit on those revenues derived from other sources besides service to patients. This may explain the deviation in the leverage ratios and Net Margin.

Cash Flows - (Operational Cash Flows) were included as a control within the study in order to account for any variation in access to debt markets, which would influence the ability to signal via debt. Operational Cash Flows are promised to lenders in order to take on debt. The less the free cash flows the less debt that an ACH can potentially take on. A positive correlation can initially be seen in Table 4.1 between Cash Flows and the Debt to Equity Ratio and the Debt Ratio. This provides evidence to support this overall relationship. Operational Cash Flows is defined as free cash flows plus capital expenditures. Cash flows including capital expenditures is important and capex can be paid for with financing and or out of cash flows. Therefore, pre-investment dollars were added to cash flows in order to give a control variable that captured the full pre-investment potential of an ACH.

Liquidity - (Liquidity) was included in the model to control for ACHs' ability to access debt markets. It also is a measure of overinvestment. In this case, liquidity would suffer under prolonged overinvestment. Liquidity, in this case measured as current assets as a ratio to total assets, indicates the potential for an ACH to use internal funds rather than obtain new debt. We would expect to see a negative relationship between debt and liquidity. As liquidity increases, it provides an additional alternative source of investment funds. In Table 4.1, we see that liquidity is negatively correlated with all leverage variables.

Size - (LnTA) the natural log of total assets was used as a control for size. This logic followed previous research in its utilization to control for size. Controlling for size takes into account the magnitude of assets of the ACH and their ability to generate more revenues and thus free cash flows, which can support more leverage. Larger ACHs should have larger proportions of leverage in place. Total Assets is a variable provided by the MCR.

Time - Fiscal year is the control for time. Its inclusion was to reduce temporal effects within the model caused by time. Fiscal year is a variable provided by the MCR. Time accounts for temporal effects of the increase in government participation within the healthcare market, where the government is consuming more of the healthcare services generated year on year. Additional information on the variables included in Chapter 4 is included in the Appendix, including name, nomenclature, if the variable was provided or calculated, outliers and definition.

4.3.2.2 Agency Cost of Free Cash Flow Variables

Free Cash Flows Defined

The agency cost model of free cash flows uses free cash flows as the dependent variable. While Jensen (1986, p. 323) defines FCF as, "cash flows in excess of that required to fund all projects that have positive NPVs when discounted at the relevant cost of capital," this study uses the accounting definition of FCF:

FCF = (net income + amortization/depreciation - changes in working capital - Capex)

(All FCFs are presented in nominal dollars).

Calculated Free Cash Flows

In order to calculate free cash flows from the MCR data, several underlying variables had to be calculated. Net Income was taken directly from the MCR data. Depreciation and amortization partially were provided by the MCR data. Amortization was not and could not be calculated. The amount of amortization is likely to be insignificant, so it was ignored when calculating the overall variable depreciation and amortization. The change in working capital was determined previously in this research, and as such is defined in those chapters. Change in working capital was not able to be quantified for the year 1995, as this was the first year of the study and the author did not have prior year information to calculate the change. CAPEX was a calculated variable composed of the change between capital assets at time (t) and capital assets at (t - 1). Only the new purchases/acquisitions were considered to be CAPEX or investment. While MCR data considered donations as growth to capital assets, this research excluded them from consideration, as no operationally-derived cash flows were spent to acquire the assets.

Initially, there were problems with calculating the FCF due to N or (n) being greatly reduced. The sample size by variable is as follows: Net Income N= 55,230, Total Depreciation N=1161, Change in Working Capital N= 54,051, CAPEX N= 1,161, and ultimately, FCF N= 1,044. From the information, it was determined that calculation problems existed within the Total Depreciation variable and CAPEX.

Improper values were handled in the CAPEX variable by changing the value within the database from system missing to zero, as it was possible for firms not to have reported their old capital assets and new capital assets, which were the underlying variables used for the calculation. System missing values were replaced in both variables with zero, and the most likely cause was user input error by the ACH filing the MCR. No attempt was made to recreate the system missing data, as underlying variables necessary for recreation were unavailable. The adjusted variables were used to create a new CAPEX calculation with an N= 55,582. Any new CAPEX values that remained with a negative number were removed, as negative CAPEX values were unlikely due to ACHs' competition via quality driving capital expenditures. In addition, replacement of at least some of the capital equipment is necessary by each ACH every year. Thus, negative values were viewed as implausible.

Total Depreciation, with an N = 1161, was analyzed along with its underlying four variables. The variables were as follows: depreciation of old capital related cost building and fixtures, depreciation of old capital related cost movable equipment, depreciation of new capital related cost build and fixtures, and depreciation new capital related cost movable equipment. In all cases, zero replaced the system missing denoted values. Missing values were assumed to be missing as a result of user error in reporting, as all ACHs have long-term assets and would have some depreciation expense. Post-correction to the underlying variables of Total Depreciation, N= 55,582.

All negative values were removed and counted as system missing in the data, as a negative Total Depreciation value is not possible. These were removed rather than placing a zero for depreciation, because ACHs have large assets in place, and it is unlikely for an ACH to have zero depreciation within a year. Therefore, to rule out any error this might bring into the research, these were removed. Net Income as a variable also was corrected, and any system-missing values were replaced by zero.

Limitations with the calculation of free cash flows were presented by missing data within the MCR, specifically total depreciation and capex. Very few firms' cases reported total depreciation or capital expenditures. The cases where total depreciation was unavailable cause the free cash flows to be understated, while in the cases where capital expenditures were unavailable cause the free cash flows variable to be overstated. As both variables were unavailable for the majority of cases within the MCR it is likely that free cash flows on a whole are slightly understated as ACHs have many assets in place and carry a large proportion of accumulated depreciation on their balance sheets. It is more likely that total depreciation expense would slightly exceed total capex each year, therefore the slight understatement of free cash flows.

Variables used in Agency Cost of Free Cash Flows Analysis		
Variable Category	**Actual Variable**	**Definition**
Cash Flows		
	Free Cash Flows	net income = (amort/depreciation) - changes in working capital - capex
% Gov Bus	% Gov Bus	CMS patient days /Total In/Out patient days
Size		
	Size Category	Only sizes 1-4 out of the 5 categories were utilized
	LnTA	Natural Log of Total Assets
Time		
	Fiscal Year	Fiscal Year Reported
Inflation		
	Consumer Price Index	Consumer Price Index for Hospitals 1996-2007
Capital Expenditures		
	Capex	Change in capital assets between time (t) and (t + 1)
	Change in Fixed Assets	FA- Prev_Yr_FA
Leverage		
	Leverage	Total Longterm Liabilities/Total Assets
	Leverage_2	Leverage (non-negative value)
	Debt/Equity	Total Debt /Equity
	Debt Ratio	Total Liabilities/ Total Assets
Cost of Capital		
	CCProxy	total interest expense/ total long-term liabilities
Profitability		
	Net Margin	Net Income/ Sales

Table 4.3: Variable Categories and Definitions for Cost of Free Cash Flow Analysis:

The table provides names of variables used in the Agency Cost of Free Cash Flow regressions. Definitions are the calculations used to generate the variable. With the exception of Fiscal Year, all variables were calculated. Additional information on the variables included in Chapter 4 is included in the Appendix, including name, nomenclature, if the variable was provided or calculated, outliers and definition.

	Free Cash Flow	%Gov_Bus	Hosp_Size 1	Hosp_Size 2	Hosp_Size 3	Hosp_Size 4	Hosp_Size 5	LnTA	Fiscal Year	CPI 96_07	Capex	Change FA	Leverage	CC Proxy	Net_Margin
Free Cash Flow	1.0000														
%Gov_Bus	0.0566	1.0000													
Hosp_Size 1	0.1095	0.2976	1.0000												
Hosp_Size 2	-0.0561	-0.1568	-0.7620	1.0000											
Hosp_Size 3	-0.0793	-0.2004	-0.3931	-0.2472	1.0000										
Hosp_Size 4	-0.0253	-0.0885	-0.1317	-0.0828	-0.0427	1.0000									
Hosp_Size 5	-0.0047	-0.0265	-0.0342	-0.0215	-0.0111	-0.0037	1.0000								
LnTa	-0.1582	-0.3948	-0.6978	0.3882	0.4355	0.2161	0.0714	1.0000							
Fiscal Year	0.0369	-0.0195	0.0586	-0.0335	-0.0336	-0.0274	0.0113	0.0836	1.0000						
CPI 96_07	0.0392	-0.0130	0.0566	-0.0343	-0.0302	-0.0237	0.0092	0.0800	0.9822	1.0000					
Capex 2	-0.1832	-0.2219	-0.3500	0.0912	0.2902	0.2960	0.1516	0.4766	-0.0140	-0.0089	1.0000				
Change in FA	-0.0013	-0.0069	0.0047	-0.0035	-0.0018	-0.0006	-0.0002	0.0016	0.0095	0.0107	-0.0009	1.0000			
Leverage	-0.0014	-0.0001	0.0050	-0.0038	-0.0020	-0.0007	-0.0002	-0.0661	-0.0046	-0.0049	-0.0019	0.0000	1.0000		
CC Proxy	0.0047	-0.0116	-0.0077	0.0108	-0.0033	-0.0013	-0.0007	0.0041	-0.0058	-0.0075	-0.0034	-0.0001	-0.0002	1.0000	
Net Margin	0.0535	-0.0325	-0.0310	0.0139	0.0236	0.0123	0.0002	0.1048	-0.0090	-0.0009	0.0530	0.0008	0.0006	-0.0002	1.0000

Table 4.4: Correlation Matrix for Agency Cost FCF Variables in Regression:

From the correlation matrix we can see that the primary independent variable %Gov_Bus has a small positive correlation with the dependent variable Free Cash Flows (FCF). This is unexpected. If this holds true after the regression analysis, it could contribute to a lack of evidence of agency cost of free cash flows. The binary for hospital size shows that for the most part FCF are negatively correlated, the only exception being Hosp_Size 1. This suggests that small hospitals have more FCF. While this may seem significant. this may be due to the fact that larger hospitals are investing more in Capex therefore taking on more debt and thus using more cash flows to pay for debt service. Capex supports this as it positively correlates with the binary variables representing the larger hospital sizes 3-5 and it is also positively correlates with the natural log of total assets. As expected net margin is positively correlated with FCF. A more detailed discussion regarding the matrix can be found in the text.

Variable	n	Mean	Median	Std Deviation	Range	Skewness	Kurtosis
Free Cash Flow	43247	1538100	549163	12217600	68423446	0.1480	0.7520
%Gov_Bus	48910	0.6575	0.6728	0.14678	0.7500	-0.3680	-0.3520
Hosp_Size 1	28753	N/A	N/A	N/A	N/A	N/A	N/A
Hosp_Size 2	16904	N/A	N/A	N/A	N/A	N/A	N/A
Hosp_Size 3	7878	N/A	N/A	N/A	N/A	N/A	N/A
Hosp_Size 4	1843	N/A	N/A	N/A	N/A	N/A	N/A
Hosp_Size 5	148	N/A	N/A	N/A	N/A	N/A	N/A
Fiscal Year	55582	2001.03	2001	3.3510	12	0.0000	-1.1830
CPI 96_07	54453	130.6652	123.6000	25.5940	83.5500	0.3900	-1.2090
Capex 2	37668	2601800	1305600	3005130	12348490	1.4150	1.1210
Change in FA	54188	30982.77	0.0000	7725930	1910000000	231.224	53725.778
Leverage	45109	0.3058	0.2838	0.22741	1.3300	0.5090	-0.0170
CC Proxy	29546	0.0364	0.0323	0.04145	0.8200	8.4860	108.107
Net Margin	51471	0.0093	0.0200	0.06171	0.8900	-3.4670	24.9660

Table 4.5 Statistical Descriptives of Agency Cost of Free Cash Flow Variables:

All outliers and extremes have been removed from each variable. Hosp_Size variables are binary so no descritives are presented other than sample size. All variables considered have a large sample size except for the CC proxy with 29k cases. Missing cases with the data set limits the regressions by only allowing cases with all variables present to be included within the analysis. Therefore, cases that do not contain all variables are omitted. All statistical descriptives presented for the variables above are considered within acceptable values.

Size - (LnTA) & (Hospital Size _1-4): The natural log of total assets was used as a control for size. This follows previous research in which size was seen as a modifying factor in the agency attributes and unit characteristics. In particular, the size variable takes into account the production capability of the ACH when looking at FCFs in relation to %Gov_Bus. Total Assets is a variable provided within the MCR.

In addition, a binary variable was created from the size categories described in Chapter 3. Hospital Size_1-4 was a categorical binary set of dummy variables used to differentiate the size of the ACH by physical size. Category 5 was excluded from the binary set so as to avoid over-fitting the model. A value of one was given to cases that were in the size category, and a zero given to those cases not in the category. This variable allowed the research to take into account the size of the ACH by bed size. The size should be positively correlated to free cash flows, as FCF is the actual value of free cash flows. One would expect that larger ACHs generate larger free cash flows. The positive correlation of size and free cash flows however is not supported by the correlation matrix in Table 4.3. In all instances of the size variable except hospital size one; there is a slight negative correlation with FCF. This is most likely due to inefficient use of assets to generate FCF. However, no variable is included in the regression that takes this into account. The correlation of these variables may be distorted by underlying variables, which would only come to light in the regression when additional control variables are considered. There is a limitation in using a binary size variable based upon bed size, as licensed beds listed within the MCR may not accurately indicate the actual numbers of beds in service to produce revenues. However this is compensated as ACHs can quickly put these beds in to operations should demand require it.

Time - (Fiscal Year): The fiscal year was the control for time and was used to reduce temporal effects within the model caused by time. The expectation was that this variable in the study would correlate positively with the dependent variable FCF, and should increase due to the inflation of reimbursement and the inflation of healthcare cost over the course of this study. This relationship is supported by initial evidence in Table 4.3.

However, time is a linear construct, and its inclusion within the model did not completely account for inflation, so a Consumer Price Index (CPI) inflator was also used. The CPI control, while increasing, does not increase at the same rate each year, and thus is a better control for inflation within the model, as inflation is a non-linear construct. The combination of time and CPI should work in tandem with the model to improve explanatory power

Inflation (CPI): The CPI for hospital services was used to control for inflation within the model, and was only available from 1996 onward. All regression with CPI as a control was limited to 1996-2007 (U.S. Bureau of Labor Statistics 2009). Inflation is an important variable to be considered within this research as healthcare inflation has increased at a greater rate for healthcare services than that of inflation for general products in the U.S. Economy (Jonas, 2007).This variable should correlate positively with the dependent variable of FCF, as the CPI for hospital services increases year on year. This relationship has initial confirmation via the correlation matrix in Table 4.3., where there is a slight positive correlation of 0.0369. While the CPI control variable controls for inflation, it should increase at a non-linear rate each year, corresponding to the increases in the FCF due to inflation.

Capital expense - (CAPEX), (Change in FA): CAPEX and change in fixed assets (FA) were used as the control mechanisms for the uses of free cash flow and leverage in acquiring assets. Increases in CAPEX and positive changes in FA can lead to increases in leverage. The FCFs used for acquiring new assets caused FCFs to decrease. This allowed the model to account for ACH free cash flow in light of capital spending. CAPEX is a calculated variable that represents the change between capital assets at time (t) and capital assets at time (t -1). Change in FA is a calculated variable created using the change in Fixed Assets from the previous year. CAPEX should deliver a negative relationship with free cash flows overall, because the calculation of FCF removes CAPEX, so as CAPEX increases, the FCF should decrease. This relationship is initially confirmed by the relationship in Table 4.3, however this relationship may change in the regression due to the presence of other control variables. The use of this variable is somewhat compromised and limited by the number of ACHs, which recorded total capital expenditures. So Change in FA is expected to provide a better estimator as fewer cases will need to be ommitted.

Leverage - (Leverage2): Leverage was used to control for size of debt in relation to the assets in place of the institution. Controlling for leverage takes into account how differences in ACHs capital structures affect FCF. For instance the greater the leverage the less FCF as FCF must be used to pay for debt coverage and therefore would reduce the amount of FCFs. Leverage is one of the key considerations in the agency model as it is proposed that the government seeks to control overinvestment in healthcare by reducing FCF which , as suggest by Calem and Rizzo 1995, would reduce access to debt markets and thus reduce the leverage of the ACH. Leverage_2 was calculated as Total Long-term Liabilities/Total Assets. Leverage in the study was defined to be a non-negative number, so any negative values were omitted from the study. Leverage was expected to have a negative correlation to the FCF, as the FCF is derived after cash flows have been used to service debt obligations. Therefore, as leverage increases, the amount of cash flow utilized to service debt increases, reducing the amount of FCF.

Cost of Capital- (CCProxy): CCProxy was used in the study to control for the cost of capital associated with the amount of debt used by ACHs. The study assumed that firms with similar debt sizes would differentiate themselves in free cash flows due to the different costs of capital associated with the debt. The addition of a cost of capital proxy extends the role of the leverage variable in explaining FCFs of ACHs as ACHs with higher cost of capital would incur greater interest fees associated with a given level of debt. Inclusion of this variable allows the model to consider all levels of credit for ACHs. A proxy was created by taking the total interest expense as a ratio to total long-term liabilities. The proxy actually measured the cost of debt for the ACH; however, the cost of debt and the cost of capital were correlated positively, which allows the use of cost of debt as the proxy. In addition, ACHs are leveraged heavily; therefore, the bulk of their capital funding is via debt. By measuring the cost of debt, the model accounted for a great portion of the cost of capital. Limitation in the use of this proxy was the possibility that some of the long-term liabilities carried on the balance sheet did not require interest to be paid. In cases where this was true, it caused the cost of capital to be understated. One would expect that similar to leverage, the cost of capital would correlate negatively to FCF. The basis for this is that the FCF is computed after payments for servicing debt.

Profitability - (Net Margin): Net Margin was used as a control within the study to take into account the variability of generating FCF. Net Margin is an important variable as it indicates the size of net income in comparison to total revenues. Net income is the primary variable in the calculation of FCF. As is such net income the primary driver in the Net Margin ratio, affects the ability to generate FCF. Net Margin is meant to provide a control for the variance in production of Net

Margin and consequently FCF of ACHs. Net Margin should correlate positively with the FCF in the model, because an ACH that is more profitable should generate more free cash flows. One might be concerned that Net Margin and FCF are endogenous; however, the correlation matrix in Table 4.3 indicates that Net Margin and FCF are only slightly positively correlated. Net Margin was calculated by taking the net income/total revenue.

Additional information on the variables included in Chapter 4 is included in the Appendix, including name, nomenclature, if the variable was provided or calculated, outliers and definition.

4.4 Models

4.4.1 Overview

Two panel data regression models to test for the presence of agency effects in the presence of the principal-agent relationship were proposed. As discussed previously, this research looked at two separate agency relationship effects: 1) signaling via debt; and 2) agency cost of free cash flows. Through these two effects, the research searched for the presence of agency within the ACH market and the relationship of agency and capital structure.

4.4.2 Signalling

The premise of signaling within the ACH market put forth within this research would suggest that signaling is present if the amount of leverage that an ACH carries positively correlates with the percentage of government business present for that ACH. In other words, the act of signaling with increased leverage shows better compliance and greater prudence by management of ACHs due to third-party monitoring; thus, we would expect a positive correlation of leverage and the percentage of government business, as government would choose more efficient/compliant firms. This leads to the following hypothesis:

Hypothesis 4-1: Signaling Hypothesis

$(No\ Signaling) \quad H_0{:}\ \%Gov_{Bus}$
$= no\ significant\ or\ significant\ (-) relation\ to\ Leverage$

$(Signaling) \quad H_1{:}\%Gov_{Bus} = Significant\ (+)\ relation\ to\ Leverage$

$\%\mathbf{Gov_{Bus}}$
$= CMS\ consumed\ patient\ days\ as\ a\ percentage\ of\ total\ patient\ days$
$\boldsymbol{Leverage} = Total\ Longterm\ Libilities\ as\ a\ ratio\ to\ Total\ Assets$

We reject the null hypothesis if a significantly positive relation is found between %Gov_Bus and Leverage... (β_1) is positive.

Signaling was analyzed via the following relationship in **Equation 4-1:**

Equation 4-1: Signaling Equation

$$\%Gov_{Bus} = a + \beta_1(leverage) + \beta_2(profitability) + \beta_3(cash\ flows) + \beta_4(liquidity) + \beta_5(size) + \beta_6(time) + \varepsilon$$

The model consists of conducting a random effects panel data regression on 13 years of ACH financial data to provide evidence of signaling. Random effects allow the regression coefficient to be driven by variation over time within each ACH. The signaling equation examines the relationship between the percentage of revenues derived from government payors (%Gov_Bus) and the amount of debt of the ACH (Leverage). The equation contains no instrumental variables.

The primary dependent variable %Gov_Bus denotes the amount of business of an ACH consumed by the government as a percentage of total business measured in patient days. Leverage is represented by one of the leverage ratios discussed in Section 4.3.2.1. The primary independent variable leverage ratio alternates between Leverage, Leverage_2 (non-negative leverage), Debt to Equity, and the Debt Ratio. The alternation of the leverage variable allows for different calculations of leverage to be considered within the research. A dispersion of leverage may be caused by changes in capital expenditure policy of the ACH, free cash flows, growth rate, bank covenants, and market opportunity.

All of the control variables have been included to capture the operating characteristics of the ACH. Profitability is defined in Section 4.3.2.1 as the net margin of the ACH (net income/sales). The inclusion of profitability is to control for profitability of the ACH in the model, as fluctuations in profitability may affect the ability of the ACH to leverage, and the government may seek more profitable or less profitable ACHs depending on policy. Dispersion of the profitability variable may be caused by reimbursement, patient volume, operating costs, changes in tax policy, patient mix, and payor mix. Cash flows denote cash flows of the ACH. Cash flows are defined as free cash flows + capex; as such, any changes in either underlying variable will cause dispersion. The variable of Cash flows is to control for free cash flows of the ACH and account for capex. Excess cash flows may lead to investment in negative NPV projects. Liquidity denotes the liquidity of the ACH-measured ratio of current assets to total assets. Liquidity affects capex capability of the ACH, which affects leverage. The government may consider ACHs with greater liquidity more likely to invest in negative NPV projects. Variance or dispersion of the liquidity variable may be caused by any changes in current assets or total assets. Size denotes the size of the ACH, represented as the natural log of total assets of the ACH. Time denotes the annual period of the study, represented as the fiscal year reported of the CMS cost report.

ε denotes the error term. In this case, the error term is comprised of issues such as the national budget for CMS, the patient mix (the acuity of patients), aging of the population (older people require more ACH services), health policy shifts, and changes to the geometric length of stay.

4.4.3 Agency Cost of Free Cash Flows (FCF):

This research suggests that the presence of agency cost of free cash flows in the U.S. healthcare market is between the government (principal) and ACHs (agent). The research has suggested that the government is trying to limit overinvestment by the ACHs, compensate for an inability to monitor the agents output and thus a inability to form a complete contract due to the market structure, by reducing reimbursement to ACHs. While some may suggest that, the lower reimbursement for healthcare services has nothing to do with agency problems, but is merely just a typical market behavior where the consumer wants to achieve the best price. In this case, the government just wants the best price for purchased services. However, evidence suggests that the government is trying to solve issues of agency through its reimbursement strategies (Eldridge and Palmer 2008; McLean 1989; Lee and Zenios 2007;Schneider and Mathios 2006; Conrad and Perry 2009; Melnick 1999). Evidence of this is provided by changes in reimbursement, post the time frame of this study (2008). [6] Examples include evidence based reimbursement to pay for outcomes based upon quality of care, avoidance of perverse incentives to avoid unintended consequences for ACHs, and to increase transparency in the delivery of care that will improve quality that leads to moderate cost growth (Trude et.al, 2006, Rosenthal, 2007, Diamond and Kaul, 2009).

Therefore, if we assume that the government is trying to control for agency problems via its reimbursement strategy we would expect that as the level of consumption by the government of health services for an individual hospital increases, the less free cash flows available to ACH, thereby limiting overinvestment by the restriction in free cash flows. It is from this premise that Hypothesis 4-2 is derived. The null hypothesis is that there is no significant relation between the amount of government business and the free cash flows of an ACH, or there is a significant positive relation between the amount of government business and an ACHs free cash flows. However, if there is a significant negative relationship between the percentage of government business and the free cash flows of ACHs, then the null hypothesis in Hypothesis 4-2 can be rejected, providing evidence of agency cost of free cash flows.

[6] Congress order the Secretary of Health and Human Services in 20005, (which runs CMS) to change reimbursement methodologies to reduce perverse incentives for ACHs which caused increased cost of healthcare due to poor delivery which included preventable secondary health conditions created while in hospital. An example would be nosocomial infections.

Hypothesis 4-2: Agency Cost of Free Cash Flows

$$(\textbf{No Agency Cost of FCF})\ \ \boldsymbol{H_0}:\ \ \boldsymbol{FCF} = \textbf{no significant relation or significant}\ (+)\textbf{relation}\ \%\textbf{Gov\_Bus}$$

$$(\textbf{Agency Cost of FCF})\ \ \boldsymbol{H_1}:\ \ \boldsymbol{FCF} = \textbf{significant}(-)\textbf{relation with}\ \%\textbf{Gov\_Bus}$$

$$\boldsymbol{FCF} = \textbf{Annualized free cash flows of U.S. Acute Care Hosptials}$$

$$\%\textbf{Gov Bus} = \textbf{CMS consumed patient days as a}\ \%\ \textbf{of total patient days}$$

We can reject the null hypothesis if we find a statistically significant negative relationship existing between the FCF and % Gov_Bus... (β_1) is negative in Equation 4-2.

Agency cost of free cash flow was analyzed by observing the following linear regression model expressed in Equation 4-2:

Equation 4-2: Agency Cost of Free Cash Flow

$$\boldsymbol{FCF} = \boldsymbol{\alpha} + \boldsymbol{\beta_1}(\%\boldsymbol{Gov_{Bus}}) + \boldsymbol{\beta_2}(\textbf{Inflation}) + \boldsymbol{\beta_3}(\textbf{captial expense}) + \boldsymbol{\beta_4}(\textbf{leverage}) + \boldsymbol{\beta_5}(\textbf{cost of capital}) + \boldsymbol{\beta_6}(\textbf{profitability}) + \boldsymbol{\beta_7}(\textbf{time}) + \boldsymbol{\beta_8}(\textbf{size}) + \boldsymbol{\varepsilon}$$

The linear regression model present in Equation 4-2, above, is used to analyze the correlation and magnitude of such between free cash flows and the percentage of government business while taking into account inflation, capital expenditures, the debt of the ACH, the cost of capital paid on such outstanding debt, the profitability of the ACH, the size of the ACH, and any effect time might have on the model. The model consist of a random effects panel data regression on 13 years of ACHs' financial data to determine if there is sufficient evidence to support the presence of agency cost of free cash flows. The model examines the relationship of ACH free cash flows and the percentage of government business (%Gov_Bus). The regression contains no instrumental variables.

The dependent variable free cash flows denotes the amount of free cash flows for the ACH using the definition provides in Section 4.3.2.1. The primary independent variable %Gov_Bus represents the percentage of government business of an ACH's total revenue measured in patient days. Dispersion of the primary independent variable can be caused by policy shifts, reimbursement changes for procedures, changes in the GMLOS (geometric length of stay), and/or variation in the acuity of patients covered by government programs.

All of the control variables included within the regression are included to provide controls for the operating and financial characteristics of the ACH. Inflation is represented by use of the CPI for health services and is included in the regression to correct for changes in both reimbursement and free cash flows that may be derived from inflationary influences. A capital expenditure variable is included to provided control for capex policies and trends within the ACH, as these influence the FCF of the ACH. Leverage was included within the model to control for the use of external debt financing. As the debt of an ACH increases, more of the ACHs cash flows are used to support repayment of principal and interest. This is combined with a proxy for the cost of capital. Cost of capital proxy is included to control for variation in FCFs due to higher or lower cost of debt. A definition for the cost of capital proxy can be found in Section 4.3.2.1.

Profitability of the ACH has an influence on the amount of FCF, as ACHs with higher profitability normally have higher free cash flows. Profitability has been defined in the previous section on signaling as well as in Section 4.3.2.1. Size is controlled for in the model, as larger ACHs usually have larger FCFs, and vice versa. Size is controlled for using a binary categorical variable with the five categories used in Chapter 3. Time is controlled for using the fiscal year in which the financials were filed.

ε (the error term) is comprised of issues such as volume of patient, physician practice patterns (some physicians order more test than others), cost of labor and efficiency of the ACH with its assets and its human capital, acuity of the patients in any given year, and external pricing pressures by the open market. In light of agency theory, one would expect a negative correlation between the percentage of government business (%Gov_Bus) and the FCF, given the control variables. In other words, more government business would harm the amount free cash flows an ACH would be able to generate. The null hypothesis is that there is no relationship or a positive relationship between %Gov_Bus and free cash flows.

4.5 Results

4.5.1 Signalling:

Several variations of the model were built based on the different definitions of Leverage that were discussed earlier and the number of control variables. All regressions were performed at the 95% confidence level. No outliers were removed, except in the utilization of leverage_2, which removed all negative values for the leverage variable. The results are presented in Table 4.3.

Table 4.3: Signaling Models:

All models are random effects panel regression covering 13 years (1995-2007). All significant P-values for leverage are denoted by an asterisk prior to the P-Value (* denotes 10% significance, ** 5%, and *** 1%). Three out of eight models proved significant for the variable representing leverage. In all models where the primary independent variable representing leverage is significant, the coefficient is negative, which does not allow us to reject the null hypothesis. Therefore, no evidence of signaling was found. All regressions have been scaled by 1,000,000.

Signalling Model (1-4)	**Model 1**	P Value	**Model 2**	P Value	**Model 3**	P Value	**Model 4**	P Value
N	38761		31888		38273		31462	
Dependent Variable								
	% Gov_Bus		% Gov_Bus		% Gov_Bus		% Gov_Bus	
Independent Variables								
Leverage	-5.09E-09	0.167	-1.25E-09	0.745				
Leverage 2					-6.80E-09	* 0.092	-2.59E-09	0.542
Debt Ratio								
Debt/ Equity								
Net Margin	1.63E-08	0.189	3.53E-08	** 0.025	1.84E-08	0.144	3.82E-08	** 0.017
OCF			-1.72E-17	0.606			-9.96E-18	0.767
Liduidity	-1.48E-08	*** 0.007			-1.45E-08	** 0.01		
LnTA	-2.10E-08	*** 0.001	-2.33E-08	*** 0.000	-2.12E-08	*** 0.000	-2.37E-08	*** 0.000
Fiscal Year	-7.15E-10	*** 0.000	-4.88E-10	** 0.03	-7.60E-10	*** 0.000	-5.53E-10	** 0.015
Within R^2	0.003		0.001		0.0033		0.002	
Between R^2	0.177		0.173		0.178		0.175	
Overall R^2	0.197		0.166		0.197		0.166	
Significance	0.000		0.000		0.000		0.000	

Signalling Model (5-8)	**Model 5**	P Value	**Model 6**	P Value	**Model 7**	P Value	**Model 8**	P Value
N	43909		37052		**36145**		30229	
Dependent Variable								
	% Gov_Bus		% Gov_Bus		% Gov_Bus		% Gov_Bus	
Independent Variables								
Leverage								
Leverage 2								
Debt Ratio	-8.62E-09	*** 0.000	5.84E-09	** 0.015				
Debt/ Equity					3.27E-10	0.366	5.03E-10	0.694
Net Margin	2.25E-08	**.040	2.65E-08	** 0.043	1.78E-08	* 0.055	2.48E-08	* 0.089
OCF			-5.31E-18	0.867			7.38E-18	0.826
Liduidity	-1.60E-08	*** 0.001			1.47E-08	* 0.055		
LnTA	-2.04E-08	*** 0.000	-1.68E-08	*** 0.000	-2.22E-08	*** 0.000	-2.22E-08	*** 0.000
Fiscal Year	-5.77E-10	0.004	-6.74E-10	** .003	-2.54E-11	** 0.025	1.15E-10	0.621
Within R^2	0.002		0.006		0.001		0.000	
Between R^2	0.173		0.162		0.174		0.162	
Overall R^2	0.185		0.149		0.193		0.156	
Significance	0.000		0.000		0.000		0.000	

4.5.1.1 Interpretation of Signalling Results

All the models controlled for size, time, and profitability. Different specifications controlled for liquidity effects using either operational cash flows or liquidity in the models. The independent variable variously was leverage, leverage2, the debt ratio, or the debt/equity ratio.

All models were statistically significant at the 95 percent level, with p-values of 0.000 and F values between 1917 and 2514. The R^2 for all models was small because signaling itself only explains a small portion of the overall relationship between government business and the amount of leverage of ACHs. The debt variable was significant in Models 3, 5, and 6, with p-values ranging from 0.000 to 0.092. Where debt was significant, the coefficients were negative. On the other hand, the liquidity variable was the better control compared to operational cash flows (OCF), which was insignificant in all of the models. In models in which only the liquidity variable was changed, R^2 was lower for operational cash flows. Although Models 3, 5, and 6 were significant for the primary independent explanatory variable, the negative beta for Leverage did not allow us to reject the null hypothesis. Therefore, no evidence of signaling was found.

In all of the cases where the Leverage was significant, the explanatory variable was negative. This suggested a very small negative relationship with % Gov_Bus. Although not in line with the signaling hypothesis put forward within this research, these findings were consistent with that of Calem and Rizzo (1995), suggesting that agency costs of debt may limit investment when firms depend on the availability of internal funds. In this case, ACHs may be restricted in their access to debt markets by reduced FCFs. In other words, the liquidity of the firm is determining access to debt markets because the FCF must be promised in the future to service debt. Calem and Rizzo (1995) suggested that limits on payments to ACHs affect liquidity, and thus limit their ability to acquire financing. There is an additional possibility that ACHs are using the stability in cash flows from government to replace investments purchased via debt by using pay-as-you-go strategies utilizing excess free cash flows. However, if there is evidence of agency cost of FCFs, this would be unlikely.

Further research on signaling theory is suggested, as other factors may have affected the results. Other distortions within the data or other countermanding forces within the market that are not accounted for within this study may be restricting signaling, such as noisy or inconsistent data, which was unrecognized and unaccounted for in the data preparation or the methodologies used in the signaling models. There also may be variables that would have improved the regression results, but were either unavailable or unknown. Measurement errors or human mistakes entering the data by CMS also could have skewed the results. In addition, agency cost of free cash flows may be interfering with the ACHs' ability to signal, as reduction in free cash flows may limit firm access to debt markets.

4.5.2 Agency Cost of Free Cash Flows

Several different models were used in order to take into account the different explanatory power of the primary independent, dependent, and the control variables. Random effects linear regression was utilized to examine the relationship of FCF to %Gov_Bus for each model. All the control variables account for size, time, and inflation. Other control variables were added in subsequent models.

Eight different specifications of the model were used to provide evidence of the agency cost of free cash flows. The core model, which accounts for the primary independent variable, % Gov_Bus, also controlled for size and time. Seven additional control variables were added on the core model. Each subsequent control variable was added one at a time into the model, creating a total of eight models overall. All eight models removed the outliers for the FCF, the dependent variable. The approximate (n) for all eight models ranged from 33,324 on the low end to 38,860 on the high end. Total (N) for the population was 55,582. Losses of cases were the result of system missing values within the dependent, independent, and control variables. The majority of cases were lost due to the removal of outliers for the FCF. As control variables were included, the (n) for those models dropped as a result of system missing data.

The results of the models are presented in Table 4.4. The models were ordered by the number of control variables used in the first model, and additional control variables were added in each subsequent model. The primary driver for adding additional control variables was to increase the explanatory power of the model. Each variable added additional explanatory power as the R^2 increased with each model, with a low R^2 of 0.026 for the first model, and an R^2 of 0.056 for the eighth model.

Table 4.4: Agency Cost of FCF Models:

Random effects regressions with standard errors are corrected for clustering. All significant p-values for the primary independent variable % Gov_Bus are denoted by the grey shaded fields. Regressions have been scaled by 1,000,000.

N	38860		37906		37906		33916	
Dependent Variable	FCF		FCF		FCF		FCF	
Independent Variables								
% Gov_ Bus	0.223053	0.657	0.091947	0.857	-0.554022	0.271	-0.953518	* 0.084
Ln TA	-1.245335	*** 0.000	-1.246793	*** 0.000	-0.684044	*** 0.000	-0.814541	*** 0.000
Fiscal Year	0.196422	*** 0.000	-0.004685	0.964	-0.123997	0.225	-0.235225	** 0.032
CPI			0.028555	** 0.042	0.041239	*** 0.003	0.054491	***0.000
CAPEX 2					-2.51E-07	*** 0.000	-2.36E-07	*** 0.000
Leverage							-1.53E-06	*** 0.000
Net Margin (2)								
Change in FA								
Cost of Capital Proxy								
Hospital Size_1								
Hospital Size_2								
Hospital Size_3								
Hospital Size_4								
within R^2	0.004		0.0044		0.0316		0.204	
between R^2	0.063		0.063		0.048		0.041	
Overall R^2	0.026		0.026		0.041		0.041	
Significance	0.000		0.000		0.000		0.000	
wald chi2	488.29		489.85		573.73		603.1	

	Model 5	P Value	**Model 6**	P Value	**Model 7**	P Value	**Model 8**	P Value
N	33546		33324		33324		33324	
Dependent Variable	FCF		FCF		FCF		FCF	
Independent Variables								
% Gov_ Bus	-1.14844	** 0.037	-1.16609	** 0.035	-1.16432	** 0.036	-1.05869	** 0.055
Ln TA	-0.99534	*** 0.000	-0.98471	*** 0.00	-0.98480	*** 0.000	-1.31915	*** 0.000
Fiscal Year	-0.01281	0.909	-0.01705	0.880	-0.01763	0.876	0.03257	0.775
CPI	0.02817	* 0.063	0.02840	* 0.062	0.02849	* 0.061	0.02538	** 0.097
CAPEX 2	-2.38E-07	*** 0.000	-2.41E-07	*** 0.000	-2.41E-07	*** 0.000	2.66E-07	*** 0.000
Leverage	-1.71E-06	*** 0.000	-1.70E-06	*** 0.000	-1.70E-06	*** 0.000	2.10E-06	*** 0.000
Net Margin (2)	2.09E+01	***0.000	2.09E+01	*** 0.000	20.93769	*** 0.000	21.64283	*** 0.000
Change in FA			-5.08E-09	*** 0.000	-5.08E-09	*** 0.00	4.85E-09	*** 0.000
Cost of Capital Proxy					0.04100	0.114	0.040621	0.113
Hospital Size_1							-11.41172	*** 0.004
Hospital Size_2							-10.58711	*** 0.008
Hospital Size_3							-9.79953	*** 0.014
Hospital Size_4							-5.04388	0.210
within R^2	0.0459		0.0458		0.0458		0.0455	
between R^2	0.053		0.053		0.053		0.057	
Overall R^2	0.056		0.053		0.053		0.056	
Significance	0.000		0.000		0.000		0.000	
wald chi2	708.01		710.94		714.29		817.81	

4.5.2.1 Interpretation of agency cost of free cash flow models

All eight models were found to be significant at the 95% confidence level. Models 4 through 8 were significant for the primary independent variable % Gov_Bus. The time period used was shortened for Models 4 through 8, as the CPI was the limiting control variable, and only the years 1996-2007 were used. The reduction was due to a limitation in the CPI for hospital services; the series lacked information for the year 1995. While the generalized CPI would have been available for use in modeling, it was decided that it would be more appropriate to use a CPI for hospital services, which allowed a more precise measurement of inflation in relation to the cash flows studied. This meant reducing the period of the study by one year when including the inflation variable as a control. Models1, 2, and 3 proved not to be significant for the primary independent variable %Gov_Bus. This primarily is driven by the lack of explanatory variables within these models.

Model 1 only controlled for size and time in addition to the primary independent variable. A sample size of 38,860 cases was included in the regression. The adjusted R^2 for Model 1 was 0.026, or 2.6%. The control variables for size and time remain significant within the model with P-Values of 0.000.

Model 2 provided an R^2 of 0.026; however, it was not significant for %Gov_Bus, the primary independent variable. Only the natural log of total assets remained significant within the model, with a P-Value of 0.000; all other variables were insignificant. Model 2 was insignificant most likely because of the lack of free cash flow explanatory variables. This was confirmed, as the R^2 between Model 1 and Model 2 remained unchanged.

Model 3 added Capex as an explanatory variable to account for capital expenditures' affect upon free cash flows. Inclusion of this variable increased the R^2 from 0.026 to 0.041. The primary independent variable (%Gov_Bus) remained insignificant within the model; however, the sign was negative. The most likely cause was the lack of additional explanatory variables for free cash flows in the model.

Model 4 with an overall R^2 of 0.041 provided the smallest explanatory power for a model in which the primary independent variable %Gov_Bus was significant. Model 4 controlled for size, time, inflation, capital expenditure, and leverage. The %Gov_Bus variable beta coefficient was -0.952518 with a P-value of 0.084, and a model significance of 0.000. The inclusion of leverage as a control variable improved the performance of the primary independent variable % Gov_Bus, changing the P-Value to significant in the process from 0.271 in the previous model, to 0.084 at a 10 percent significance level. The negative correlation presented in the beta for

%Gov_Bus suggests that there is a negative relationship between FCF and the percentage of government business derived by an ACH.

This model suggested that for every percentage increase in government business, an ACH would lose $953,518 in free cash flows. This supports the theory of agency cost of free cash flows presented within this research. Natural log of total assets (LnTA) was significant as well for the model, with a P-Value of 0.000. The beta presented for LnTA was -0.814541. The beta presented for LnTA was not in line with the expectations of the research. This suggested that larger ACHs have less free cash flows, and that larger hospitals overinvest more than smaller ones. This follows Parrino and Weisbach (1999), who suggested that firms with large FCF and little growth opportunities have a greater propensity to overinvest. This also is in line with Nahata (2005) and Glied (2003), who stated that ACHs in highly competitive markets spend more on capital investments, and therefore a have lower FCF. Larger hospitals would be located in more competitive markets, as they generally are found in larger urban centers with multiple hospitals.

Fiscal year was significant, with a P-Value of 0.032. It should be noted that the beta coefficient was negative, with a value of -0.235224. This suggested that as each year progresses, the FCFs decrease by $235,224.50, which perhaps would suggest that reductions in reimbursement over time are having an effect on ACHs. As expected, the variable CPI was significant with a P-Value of 0.000. The beta value of 0.054491 confirmed the positive correlation with the FCFs, as expected. Capex had a negative correlation with the FCFs. Capex was significant with a P-Value of 0.000 and a beta of -2.36E-07. Capex was expected to have a negative relationship, and results are in line with expectations, as it should reduce the FCFs. Leverage was significant with a P-value of 0.000, and presented a negative beta of -1.53E-06. This was also in line with expectations, as an increase in leverage should increase borrowing costs, which decreases the FCFs.

Model 5 increased R^2 to 0.056, an increase of 0.015, or 1.5%. Model 5 controlled for the same variables as Model 4, plus the additional control variable of profitability via the variable Net Margin. The beta for %Gov_Bus variable was -1.148436 similar to Model 4, and had a P-value of .036. Model 5 was significant with a value of .000. The large negative beta for %Gov_Bus suggested that for every percent increase in government business by an ACH, the ACH experienced a decrease in the FCFs of $1,148,436. For larger institutions, this may not be of concern; however, for smaller ACHs, this presents concern, as they are more susceptible to changes in the FCFs (Calem & Rizzo 1995).

The size variable LnTA remained significant with a P-Value of 0.000, and this is consistent with Model 4, as the beta remained largely negative at -0.99534. This continued to suggest that larger ACHs are more likely to overinvest. This is counterintuitive and goes against the initial expectations outlined previously. Fiscal Year was not significant within this model. The CPI almost was significant in this model, with a P-Value of 0.063, and presented a positive beta coefficient, which is in line with the expectations. Capex was significant with a P-Value of 0.000, and a beta of -2.38E-07 remained in line with expectations. Leverage was significant with a P-Value of 0.000, and presented a beta of -1.71E-06, which was in line with expectations and continued to suggest that as leverage increases, borrowing costs decrease the FCFs.

Model 6 was significant for the primary independent explanatory variable, %Gov_Bus, with a P-Value of 0.035 and a negative beta of -1.16609. In this model, for every percent change in government business, there was a reduction of $1,166,087 in the FCFs. This continued to suggest that government is heavily affecting the FCFs of ACH. While adding controls for change in fixed assets in addition to controlling for size, time, inflation, capital expenditure, leverage, and profitability, the R^2 decreased slightly to 0.053. The decrease in explanatory capability of the model was explained by the change in the fixed assets control variable. The variable was significant with a P-value of 0.000; however, the change in fixed assets provided less explanatory capability when added to the model. The size variable LnTA remained negatively correlated with the FCFs, which continued to support previous models that suggested that as ACHs get larger in total assets, this negatively affects FCF. The negative correlation also supported previous concerns of overinvestment or investment in negative NPV projects. In other words, while ACHs may be adding additional assets in place, they are not efficient at producing FCFs. This lack of inefficient use of assets in place suggests that concerns of overinvestment and investment in allocative inefficient services are valid.

Model 7 added cost of capital to the control variables. The cost of capital variable was not significant, with a P-value of 0.114, and does not improve the explanatory power of the model. The R^2 remained at 0.053 and was significant at 0.000. The primary independent variable %Gov_Bus had a value -1.16432 and a P-value of 0.036. For every increase in the percentage of government business, an ACH experienced a decrease in FCFs of $1,164,322. These results continued to support the presence of agency costs of free cash flows within the U.S. healthcare market. The lack of change in the R^2 was due to the insignificance of cost of capital to the model. The LnTA was significant, with a P-Value of 0.000, and continued to support negative correlation with the FCFs with a beta of -0.98480. This beta continued to suggest that increases in total assets negatively affect FCFs. Overinvestment by ACHs and investment in negative NPV projects or allocative inefficient services has been suggested as the underlying cause for agency cost of free cash flows, and these results confirmed the premise that larger hospitals overinvest more than smaller ones..

Model 8 added four binary variables to control for size. While five categories were discussed in Chapter 3, only four binaries were included to minimize over-fitting the model (n-1). The model presented an overall R^2 which was computed at 0.056, and %Gov_Bus was significant, with a P-Value of 0.018, and a negative beta coefficient of -1.05869 For every 1% increase in the percentage of government business, free cash flows decreased by $1,058,690.00. The LnTA remained significant within the model, with a P-Value of 0.000. The coefficient for the LnTA was highly negative at -1.1915. The beta value continued to support the overinvestment problems of larger ACHs, or ACHs investing in negative NPV projects.

If this is compared with the other size variable in this regression, Hospital_Size 2-5, which provided a large negative correlation with the FCFs as well, one sees that hospital bed size is suggesting that larger hospitals have less free cash flows. This would further reinforce the results from obtained via LnTA, which suggest that larger hospitals overinvestment more and invest in allocative inefficient services, which adds to lower free cash flows. The evidence that LnTA correlates with bed size and the FCF further supports the overinvestment problem. This evidence, along with %Gov_Bus negative correlation with the FCFs, further supports agency cost of free cash flow within the healthcare market.

The R^2 value of all models were low. In order to ensure against bias due to specification error in the estimated coefficients, all data that could be obtained to explain the relationship between percentage of government business and free cash flows were included as variables. Additional explanatory variables that would have improved the R^2 values were either not available or non-definable. In addition, to allow for a more efficient model, a random effects panel regression was performed. Improvement on the regression performed may be possible with a larger dataset that provides greater explanatory variables to be included.

4.6 Conclusions

The use of agency theory to describe the relationship of payors and providers of healthcare is well established by previous literature. [7] The research undertaken in this chapter sought evidence of agency costs of signaling and agency costs of free cash flows that might be a result of reimbursement schemes or schedules used by the government insurer, CMS. Payments have long been known to be used to incentivize agents to align the goals of the agent with those of the principal. Previous research suggests that payment methodologies are used in healthcare to solve agency problems created in the principal-agent relationship between payor and provider (Conrad and Perry 2009; Melnick et al 1999; Peterson et al 2006). Alignment of incentives is important in healthcare as problems regarding the principal agent relationship are acute due to the inability of the insurer to monitor output of the provider (McLean 1989).

By analyzing the principal-agent relationship between the government and ACHs, this chapter investigated evidence of signaling and agency cost of free cash flows. Both characteristics of agency costs are suggested to exist as a result of the federal government's need to monitor ACHs and reduce free cash flows under the ACHs' control. The environment in which ACHs operate is skewed by the existence of a moral hazard on the part of patients, whereby they are not exposed to the consequence of consumption via price, and therefore make choices to consume based

[7]The use of Agency Theory in healthcare is supported by the previous research of McLean (1989); Chalkley and Khalil (2005); Jack (2004); Schneider and Mathios (2006); Ryan (1994); and Mooney and Ryan (1993).

on quality or perceived quality. The empirical results extend prior research that suggested that the presence of moral hazard within the ACH market causes ACHs to compete on quality or perceived quality as a result (Glied 2003; Newhouse 1981; Nahata 2005). The presence of the moral hazard within the ACH market is important as it creates conditions that lead ACHs to overinvest and take on projects that have a negative NPV or are considered allocative inefficient (Pauly et al. 1986; Gaynor et al. 2000; Wang 1999; Glied 2003; and Nahata 2005).

Glied (2003) made the case that ACHs make some investments in projects that have little or negative economic worth in order to compete via quality or perception of quality. Under these conditions, the CMS seeks to monitor ACHs better and therefore minimize wasteful overinvestment. Adding the agency relationship between the CMS and ACHs and agency theory indicates the behavioral outcomes of this relationship. In Chapter 4, two testable hypotheses—signaling and agency cost of free cash flows—were demonstrated.

The premise of signaling was proposed under the notion that ACHs wish to indicate efficiency to government through debt in order to avoid lower reimbursement for health services. Expanding on the premise put forward by Jensen (1986), that debt can reduce agency costs by lenders acting as a third-party monitor, this research promotes a premise that ACHs seek to signal compliance with the government and to signal that ACHs are running efficiently and not choosing negative NPV projects. Lenders acting as third-party monitors ensure that ACHs are performing with documented financial loan covenants and are able to repay borrowed capital plus borrowing costs.

The premise suggests that ACHs with greater amounts of revenues from government payors will want to signal more, and those with less revenue from the government will signal less. The reason for such consideration is that due to its long-term relationship with ACHs, the government will try to reduce overinvestment and other problems with the agency relationship through changes in reimbursement, a known methodology used to solve problems of agency and incentivize agent behavior(Lee and Zenios 2007; Jack 2004; Eggleston 2005). These changes in reimbursement usually negatively affect revenues, and consequently free cash flows; therefore, ACHs with larger revenue streams at risk will signal more. [8]

The testable hypothesis put forward was that the greater the percentage of revenues derived from the government, the more ACHs will take on debt to signal their compliance with government wishes. Eight linear regression models for signaling were created with the percentage of government business as the dependent variable, and leverage of the ACH as the primary independent variable. Additional variables controlled for profitability, liquidity, size, and time.

All eight models were significant, with three of the eight significant for leverage. The significant coefficients for leverage were all negative, indicating a negative correlation between government and leverage. Therefore, the regression analysis did not support the signaling premise put forward within this chapter. There was no positive correlation between the amount of debt within ACHs and the percentage of government revenues derived by those ACHs. Therefore, no evidence of signaling was found. The negative correlation may be due to noisy data, or signaling may be affected by other countermanding forces within the market that prohibit either a desire or capability by ACHs to signal via debt, such as the agency cost of free cash flows and or other agency costs.

The second premise in this chapter was that agency cost of free cash flow is suggested to exist because the government, acting as the principal, wishes to reduce free cash flows to ACHs in order to inhibit overinvestment or investment in allocative inefficient services, as well as other abhorrent agent activity. The research indicated that ACHs are overinvesting due to the presence of moral hazard within the ACH market, which causes ACHs to compete on quality. The government, seeking to reduce free cash flows, lowers reimbursements to ACHs, and thus controls the overinvestment and other agency problems (Peterson et al 2006; Melnick et at 1989; Conrad and Perry 2009; and Mclean 1989). The argument was constructed using the

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[8] Penalties have been shown to be more effective in curbing abhorrent agency behavior than bonuses or additional payments (Conrad and Perry 2009; Kahneman and Tversky 1979; Town et al 2004; Tversky and Kahneman 1986).

premise that the more ACHs derive their revenues from government payors, the lower the free cash flows of the ACH.

The testable hypothesis was that there is a significant negative correlation between the percentage of government business and the ACHs' free cash flows. Eight regression models were created, with ACH free cash flows as the dependent variable, and percentage of government business as the primary independent variable. Additional control variables were size, time, CPI, capital expenditure, leverage, profitability, and cost of capital. Size was controlled via two variables: natural log of total assets, and four binary variables accounting for hospital bed size.

All eight models were significant; however, only five of the eight were significant for the primary independent variable Percentage of Government Business. In all cases of significance, the beta coefficient for %Gov_Bus was highly negative, suggesting that for every percentage change increase in government business, free cash flows are likely to suffer anywhere from $953,518 to $1,164,322. The results supported the presence of agency cost of free cash flows in the ACH market.

Additionally, analyzing the regression models for agency cost of free cash flows showed that the beta coefficient for the variable for natural log of total assets was significant and highly negative. The negative correlation of assets and free cash flows would suggest underperforming or inefficient assets. Typical assets are a measurement of the production capability of a firm to produce revenues, and consequently free cash flows, and thus correlate positively; the greater the assets in place, the greater the revenues. The evidence in the regression models suggested the presence in larger firms of overinvestment and/or investment in allocative inefficient services . This confirmed the research of overinvestment and inefficiency (Pauly et al. 1986[9]; Gaynor et al. 2000[10]; Wang 1999[11]; and Glied 2003[12]).

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[9] Pauly (1986) argued that large inefficiencies in healthcare were driven by tax subsidies, which cause more insurance to be acquired. The presence of more insurance within the market removed the consequence of consumption for patients as well as created perverse incentives for providers, which led to more costly healthcare on a per patient day basis. Overinvestment was thought to beonetype of the inefficiencies found.

The empirical results provided evidence to supports agency cost of free cash flows, as five out of eight of the agency cost of free cash flow models showed significance. The negative beta demonstrated an inverse relationship between free cash flows and government business. The results indicated that as an ACH increased the percentage of business derived from government sources, the lower its free cash flows were. These limitations placed upon the free cash flows of the ACHs have an adverse effect upon their capital structures. As ACHs have less free cash flows, the choices of capital structure become limited, as their access to debt markets is restricted. This restriction of free cash flows and limitation of access to debt markets causes managers to become dependent on internal funds (Calem and Rizzo 1995). The reduction in capital structure choices forces ACHs to incur higher opportunity cost, and thereby ACHs have more selective criteria for new projects.

Based upon the findings within this chapter, signaling is not likely to exist within the U.S. ACH market. However, the most likely cause is the effect of the agency cost of free cash flows on the ACH's ability to signal by limiting free cash flows. By limiting free cash flows, not only is the government restricting overinvestment, but also limiting ACHs' access to debt markets. These findings make sense as alignment of goals between principal and agents via payments in healthcare are widely recognized (Peterson et at 2006; Eldridge and Palmer 2009; Melnick et al

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[10] Gaynor et al (2000) had suggested that moral hazard due to insurance introduces a distortion into the medical market that requires analysis of the second-best outcome. In the presence of moral hazard due to health insurance, consumers will demand "too much" medical care ex post. They suggest that the presence of moral hazard may lead to overinvestment by hospitals.

[11] Wang 1999 examined efficiency amongst hospitals and found that larger hospitals were more inefficient. They suggest that larger hospitals were inefficient due to excess services that were under-utilized. Underutilization via excess services was promoted in this research to be a form of overinvestment.

[12] Glied (2003) blamed the moral hazard of insurance for creating an environment which created demand for new healthcare technologies and consequently created demand for healthcare facilities to purchase these new technologies. She suggests that this maybe exists even though there is not enough utilization of such resources. The research presented suggests that the demand and purchase of new technologies by hospitals when underutilized is overinvestment.

1989; Conrad and Perry 2009; Lee and Zenios 2007; Jack 2004; and Eggleston 2005). Furthermore, the findings of this chapter are similar to Calem and Rizzo (1995), which suggests that payments by insurers have an effect on free cash flows of hospitals and where hospitals had lower free cash flows this affected their ability to attain debt or limited their access to debt and made them more dependent on internal funds for investment. The similarity of these findings also explains why signaling was not found. As Calem and Rizzo (1995) suggest hospitals with lower free cash flows are restricted in their ability to obtain debt. ACHs with greater government business have less free cash flows this makes it difficult for them to have access or take on additional debt, therefore limiting their ability to signal compliance via debt. Findings within this research supported previous research that suggested that the limitation of payment to ACHs impedes their ability to invest, as it restricts cash flows and cash under management. The restriction of cash flow available to management limits the ability of the ACH to overinvest (Stulz 1990). While Stulz (1990) research was applied in a traditional firm perspective it is applicable to the agency environment described in this research.

The evidence of agency costs of free cash flows in this research suggests that these costs have an effect on the capital structure of ACHs. The results presented here confirm the previous findings of McLean (1989), who suggested, “Some of the supposed unequal access to capital among providers may be a result of differing degrees of agency costs.” The findings of the current research suggest that the variation in access to capital could be due to the varying amount of government business, which has the effect of limiting free cash flows. These limitations following on from Calem and Rizzo (1995) constrain access to debt markets and thus as variation in free cash flows occurs, so does access to capital via debt.

Agency costs of free cash flows partially explain McLean’s (1989) statement. Thus, the presence of agency costs of free cash flows is important for us to understand fully as it may prohibit ACHs from acquiring new equipment and services, and may have consequences (e.g. reducing the quality of health care). By constraining the financial freedom of ACHs may lead to variation in quality of healthcare between hospitals, as ACHs with greater cash flows would be able to provide better quality and possibly even better access to newer forms of treatment. This is important to consider, as current policies are concerned with better quality and equal access to healthcare for all.

5. Monopsony in Healthcare and Literature

5.1 Introduction

Monopsony rarely exists in markets. However, when it does exist, it creates inefficiencies within that market. As a result of monopsony, firms encounter situations in which financial decisions about their capital structures can be affected.

Previous chapters of this thesis contemplated inefficiencies and tested theories of firm behavior (with respect to capital structure decisions, agency cost of free cash flows, and signaling). Using economic theory, this chapter focuses on an alternative and/or complementary condition within the ACH market, monopsony. Just as Jensen and Meckling (1976) used agency as a substantial factor in decisions of the firm, monopsony also affects firm behavior and must be considered as an underlying reason for management decisions regarding capital structure, especially within the U.S. healthcare market. This is driven by a legal framework, which allows monopsony to exist within healthcare, while other markets must comply with traditional interpretations of the antitrust laws present within the U.S. Taking this point further there is prior research, which either indicates the possible presence of monopsony or that it is present within U.S. Healthcare. The purpose of this chapter is to provide a review of the economic theory of monopsony, antitrust via the Sherman Antitrust Law and monopsony, and an examination of previous relevant research, in order for the reader to have a greater understanding of monopsony within healthcare and to contextualize the empirical research presented in Chapter 6.

This chapter begins with a discussion of monopsony in its traditional form and compares it with the monopsony structure under the all-or-nothing contract scenario considered in this research. The construct of monopsony is then examined in the context of U.S. antitrust law, with an in-depth discussion of how monopsony is able to exist within the healthcare market. The research then provides an overview of monopsony literature as it relates to non-healthcare and healthcare contexts, providing evidence of monopsony of healthcare via prior studies and market relationships. The discussion presented here, provides a basis for the empirical research conducted later in Chapter 6 as similar studies present considerations and constructs for the models used there, including collusive monopsony, the dichotomy of healthcare insurance as two markets, and the misunderstanding of monopsony and its effects on consumer harm via financial harm to the supplier, as represented by Zerbe(2005).

5.1.1 Theory of Monopsony

Monopsony in a market causes distortion within that market from its efficient form. The demand side of the market reaps excess economic rents by setting lower prices for input goods/services than it would in a perfectly competitive market and ultimately consuming less than if the market was perfectly competitive. The supplier within the market suffers from lower prices, less consumption, and consequently lower profit margins and less free cash flow. The traditional model of monopsony often is used for insight into the allocation of resources and the distribution of income as a consequence of buyer power. Traditional monopsony assumes the followingabout the monopsonist and seller of inputs: Sellers are free to determine the quantity of inputs to supply for a given price; prices paid by the monopsonists are equal to the marginal cost; and the monopsonist has full knowledge of the industry supply curve and will use this knowledge of the industry supply curve to leverage price discounts.

All monopsonists exhibit profit maximizing behavior, thereby seeking to capture additional rents available within the market. By using knowledge of the industry supply curve, the monopsonist is able to lower the price paid to the supplier to the marginal costs of the supplier. This behavior can be seen in the following description of traditional monopsony. In Figure 5.1, we see that market equilibrium at Point C where supply equals demand. The supply curve typically answers the question of what is the quantity of goods that will be supplied at a given price. In this case, Qc represents the quantity demanded, and Pc represents the market price under the competitive market equilibrium. Thus, the supplier is choosing to supply quantities equal to full demand. Under the traditional model of monopsony, the monosonist forces the supplier to sell at the monopsonist’s price, Pm, which reduces the quantity supplied at price Pm to quantity Qm.

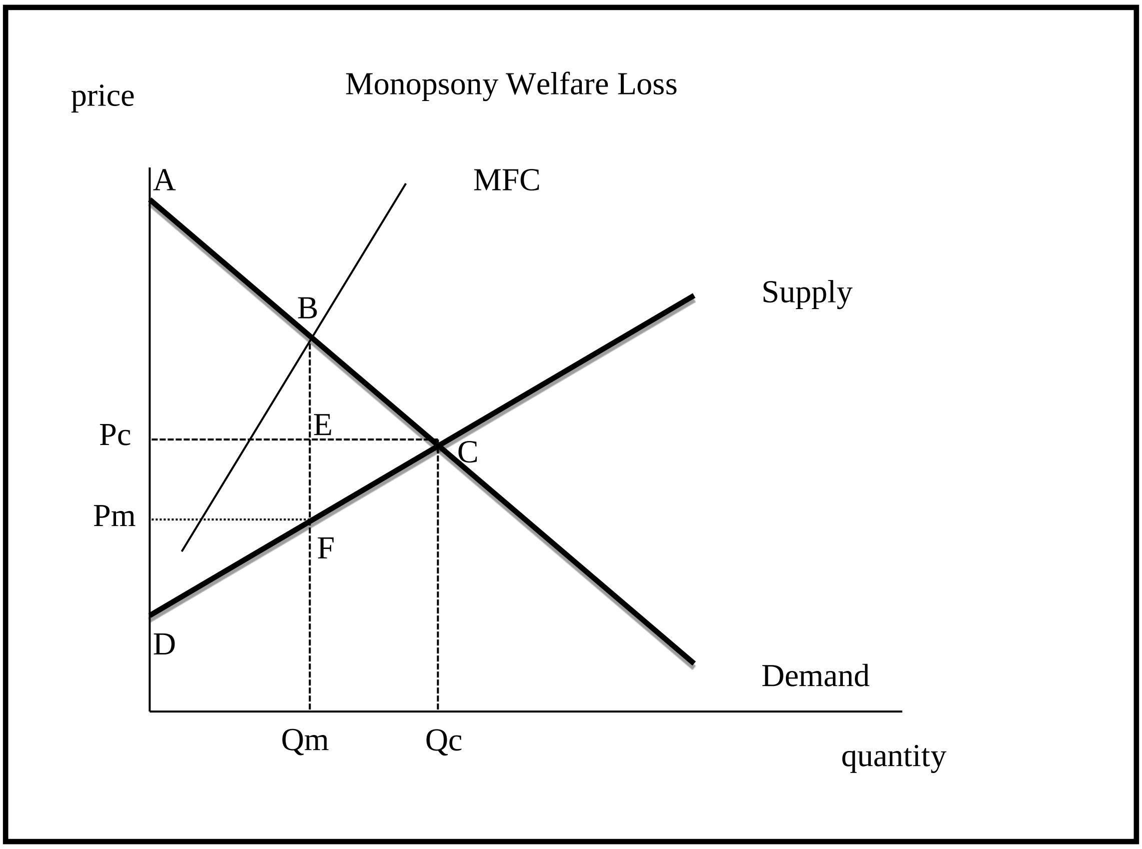

Figure 5.1: Monopsony Welfare Loss:

Qm = Monopsony Output, Qc = Competitive Output ; Consumer surplus (Insurance) = A,C,Pc; Producer Surplus (ACHs) = Pc,C,D; ACH surplus declines by area (Pc,C,F,Pm); Insurance surplus rises by the difference between the rectangle (Pc,E,F,Pm), and triangle BFC. The area Pc,E,F,Pm represents a wealth transfer from ACHs to Insurance companies. Illustration based upon Sevilla (2005).

This shift from a competitive market to a monopsonistic market allows the monopsonist, or buyer in this case, to obtain additional rents along the areas of Pc, E, F, and Pm, while losing the area of BFC to the inefficiencies of monopsony. The supplier loses Pc, C, F, and Pm. While there is an overall loss due to inefficiency within the market, the monopsonist is able to obtain additional rents, therefore complying with firm profit maximizing behavior. Monopsony under this scenario still allows the supplier to choose quantity of output for a given price, and thus the supply curve is still answering the question: How much to sell at a given price (Taylor 2003). In this case, quantity supplied at Qm is less than the market demanded. The under consumption or lower output of Qm and the lower monopsony price Pm of monopsony often are used in conjunction to provide evidence of the existence of monopsony or lack thereof within a market.

Under consumption occurs because the monopsonist's marginal factor cost curve (marginal expenditure curve) is greater than and thus lies above their supply curve (average expenditure curve). The monopsonist chooses to consume until the marginal value of consuming an extra input equals the marginal factor cost (marginal expenditure). The marginal value curve has a negative slope; therefore, it cuts the marginal factor cost curve (marginal expenditure curve) to the left of where the marginal value curve cuts the supply curve (average expenditure curve), and thus the quantities purchased choose to consume less than that in perfect competition (Pindyck & Rubinfeld 2009). The level of under consumption is determined by the upward sloping supply curve, as the more strongly the supply curve slopes upward, the greater the likelihood of lower output, and hence there is less consumption than in the competitive equilibrium (M.V. Pauly 1988).

The previous research of Pauly (1988), Feldman and Wholey (2001), and Seth (2006) sought evidence of monopsony in the U.S. healthcare market via traditional monopsony indicators, such as the combination of lower prices paid with lower consumption of inputs. Because lower price alone is not an indication of monopsony, researchers often look to a drop in quantity consumed when price is reduced as an indicator of monopsony. If no drop in consumption is found, then it is normally concluded that such changes in price were due to monopoly-busting behavior. However, this research does not suggest the structure or behavior of the insurance companies follows the traditional monopsony model, but rather that the arrangement between the insurance companies and ACHs within the U.S. operate on more of an all-or-nothing contractual arrangement (Sevilla 2005; Taylor 2003). Sevilla (2005) explains the theoretical all-or-nothing supply curve in the context of medical laboratories and insurance providers. This study follows his explanation here. Under an all-or-nothing contractual arrangement, the supplier, ACHs, is placed in a position of selling services at a given price or not selling anything. This arrangement is pervasive in U.S. healthcare. The all-or-nothing contractual arrangement changes the monopsony model from that shown in Figure 5.1 to that of Figure 5.2, below**.**

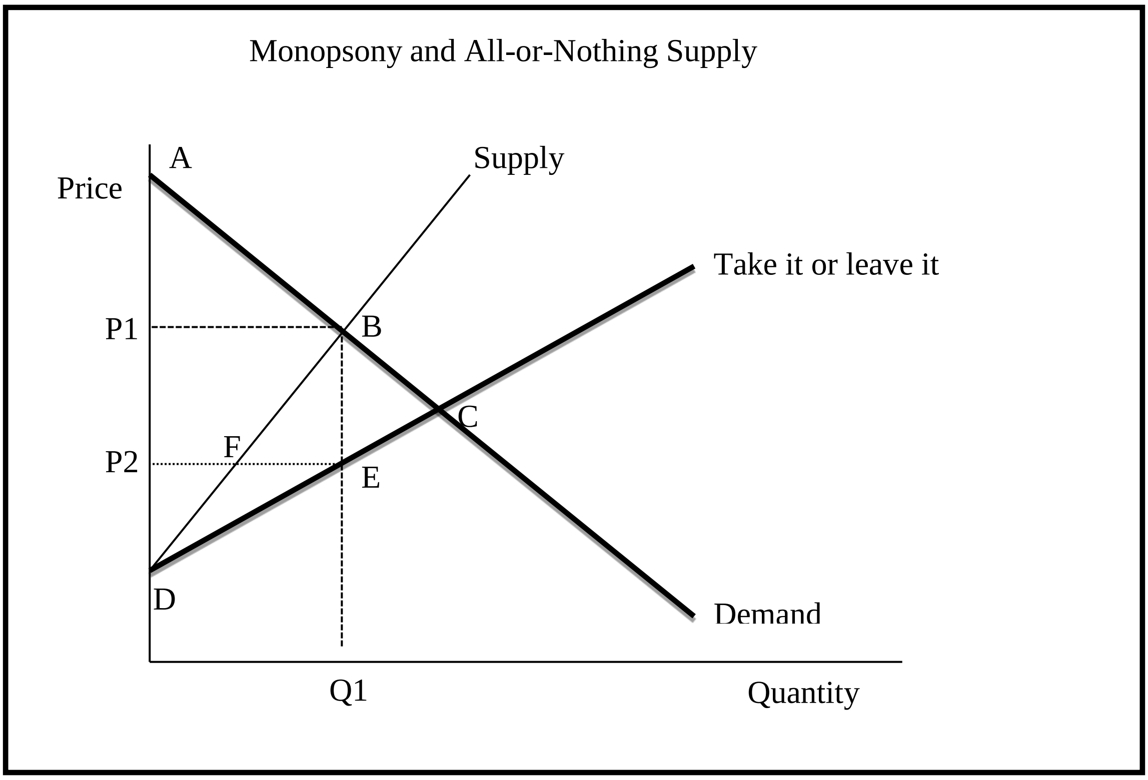

Figure 5.2: All-or-Nothing Monopsony Model:

All of the service provider surplus is transferred to the collusive payers. In a competitive market, the consumer (payors) surplus is the area demarked by ABP1. The provider's surplus is the area demarked by P1BED. After imposing all-or nothing condition on the providers, the collusive payors increase their consumer surplus by the area P1BEP2. Illustration, Sevilla (2005).

Under the all-or-nothing scenario, the supply curve answers the question of what is the maximum quantity to supply at each price, when the alternative is to sell nothing at all. When the buyer frames the question slightly different from that of the traditional monopsony supply curve, the buyer seeks to obtain all of the supplier's surplus. The buyer is able to force the supplier, or ACH, off its traditional supply curve (marginal cost of the supplier) and onto the all-or-nothing supply curve (average cost of the supplier) by dictating both price and quantity. The buyer is able to achieve additional rents buy using market power to push the supplier to accept a price for services less than that of a competitive market. This process is illustrated in Figure 5.2 where the supply curve represent marginal cost and the take-it-or-leave-it curve represents average costs. When the payor is able to move from P1 to P2, under the all-or-nothing scenario, the quantity demanded does not change. The quantity supplied at the current demand does not change because the supplier only can determine whether to supply the quantity demanded at the monopsony price, but cannot dictate the quantity supplied. This is important, as most view the outcome under an all-or-nothing contract as an efficient outcome because quantity supplied does not change with the price, taking no consideration for supplier harm. Its relevance will be revisited and evidenced later in this thesis. The additional rents accumulated by the buyer/payor can be seen in the area of P1, B, E, and P2. Because the quantity demanded did not change, there is no efficiency loss. The only loss is that of the rents that are lost by the supplier (or ACH). Those rents or excess supplier surplus then are recouped by the payor.

The difference between the traditional model of monopsony and monopsony under the all-or-nothing supply curve is that traditional monopsony leads to a social welfare loss. Under all-or-nothing monopsony, the monopsonist may be able to acquire excess rents from the seller or input provider while maintaining an efficient allocation of resources or inputs; however, the income allocation received by the seller is less than in a competitive market, and is close to or at their average cost. Suppliers, the ACHs that supply under an all-or-nothing scenario, may have supplier profits pushed to zero, and in doing so, increase bankruptcy risk.

Firms placed onto the all-or-nothing supply curve find themselves with restricted margins, and therefore restricted free cash flows. These distortions may affect capital structure decisions within the U.S. healthcare market, and are the concern of this research. Monopsony is possibly a distortion; therefore, comprehension of its presence and effects upon capital structure are salient.

In the U.S., monopsony can explain the behavior of the ACHs regarding capital structure and the amount of free cash flows that exist within the ACH market. This research will examine the all-or-nothing contractual arrangement. This new aspect will give a much greater insight into ACHs' behavior in regards to capital structure. The understanding of market behavior in the presence of monopsony, and in particular collusive monopsony and its effect upon firms, capital structure, and limitations placed upon their financial decisions is pertinent to financial research, as it ultimately may be detrimental to firms, restricting their performance or increasing their risk of bankruptcy.

5.1.2 Conditions for Monopsony

The research conducted in this thesis differentiates the ACH market from that of a traditional monopsony to that of a collusive monopsony. In this case, collusive monopsony describes the relationship between both government and commercial payers to provide a restricted reimbursement scheme to ACHs within the U.S. The existence of this particular relationship is allowed to continue because the U.S. Government consumes more than 65% of patient days from ACHs annually (determined using MCR data in longitudinal study of Chapter 4). The federal government is under pressure to cover as many citizens as possible for the lowest cost.

This creates pressure to provide healthcare at a below-market price, which is compounded by the ratchet effect that occurs each year as the CMS recognizes the ability of the industry to cope with lower and lower prices. Each year, the CMS continues to lower prices until their actions are stopped politically, or ACHs' attrition from the program threatens its viability, thus ensuring the lowest price possible without firm failure. The government is a low-cost payer for services in this market. The CMS regularly releases information to the public regarding its policies and payment practices, and these payment practices are inclusive of reimbursement schedules in the form of a fee schedule by DRG. It consists of the diagnosis of the patient, and results in a placement in a categorization. The price determined for each categorization includes all cost and is capped in time by a length of stay measure. Therefore, regardless of the length of stay, ACHs are paid only for the DRG. This sometimes can be altered by the severity of the patient.

This public release of information allows other commercial payers within the market to utilize this information to guide their own policies, procedures, and reimbursement schedules. Commercial payers within the market then utilize this knowledge to ratchet down ACHs' reimbursements, thereby allowing the payor to gain additional economic rents that otherwise would have remained with the ACH in a more competitive/capitalistic market. While there is no intention on the part of the commercial payers to collude with the CMS, it is their action of seeking additional economic rents and the use of the fee schedules that present the environment for collusive monopsony. The use of the CMS fee schedule by commercial payers essentially creates tacit price fixing within the market, thereby reducing the competitive nature of the market and increasing the inefficiencies within the market, as evidenced in the laboratory services market discussed by Sevilla (2005). These inefficiencies are the costs of the monopsony condition.

5.1.3 Antitrust

One might assume that monopsony would not be possible within the U.S., and that the Sherman Antitrust Act would prohibit such an anti-competitive structure as monopsony. However, previous research has suggested that U.S. courts do not interpret issues of monopsony as inefficient or destructive under a standard of consumer harm. This is important, as current conditions within U.S. healthcare would be different if courts viewed monopsony in a negative light.

Hammer and Sage (2004) cited the existence of buyer-side market power and the view of the consumer good provided by the use of buyer-side market power and its ability to reign in healthcare costs, attributing it to the year 1984 and the ruling by Judge Stephen Breyer in the First Circuit Court of Appeals in the case of *Kartell v. BlueShield of Massachusetts*. The case involved balance billing by physicians. Balance billing is when physicians accept payment by the insurer for services rendered, yet seek compensation from patients for any outstanding balance left unpaid by the insurance company. Blue Shield of Massachusetts, an insurance company, contractually had prohibited physicians from balance billing. A group of physicians had sued Blue Shield, claiming Blue Shield was the largest insurer in the state and had used its market power to conduct unfair business practices primarily related to the restriction upon physicians to balance bill patients, and therefore was in violation of state and federal antitrust laws.

The judge ruled that Blue Shield had contractually prohibited balance billing and therefore did not violate the antitrust laws, even though the defendant in the case was the largest insurer in the state at that time. In this case, Judge Breyer did not look at Blue Shield as a separate entity within the market, but rather as a buying group; therefore, any discounts forced on physicians would flow through to the insured, and consequently, premiums would be discounted. Judge Breyer, "focused on the centrality of the insurer-insured agency relationship thereby framing the dispute in a manner where he could conclude that Blue Shield's conduct did not create antitrust liability, even assuming Blue Shield possessed and exercised significant market power" (Hammer & Sage 2004, p. 955). The judge did not regard this market as two separate markets, one for purchasing healthcare services and one for health insurance, but combined those markets into one single market in which insurers were just buying agents for the insured, and therefore physicians were obligated to accept the discounted rate in return for the purchaser's quantity (Hammer & Sage 2004).

This notion that the insurer is nothing but a buying agent disregards the fact that insurance is a product itself and has its own markets with its own profit motives that are derived from inputs of purchased health services. Insurance is a financing mechanism for purchasing health services. The consideration of insurance, as two markets, is a key concept carried forward in this research and is a primary consideration of the profit maximization under monopsony. In his decision, Judge Breyer also failed to verify that the lower input prices of purchased health services actually lowered premiums to the insured of Blue Shield. The monopsony issue was completely ignored, as Breyer failed to realize that a monopsonist maximizes economic rents (Hammer & Sage 2004).

The judge also was concerned that antitrust law might be used to try to regulate the healthcare industry, and left the responsibility up to regulatory agencies within Massachusetts to take on that burden. This decision failed to ensure proper competition within the market itself, as it did not take into account that discounts are not passed on necessarily from the insurance to those being insured. Hammer and Sage (2004) hold that although the Breyer decision was a relatively contextualized ruling, further court cases involving healthcare antitrust have utilized this case as the foundation to suggest that insurers stand in and act on behalf of those they insure.

Distortions of the idea presented by Judge Breyer have been used to defend exclusionary activities of buyers, "health insurers," which would violate Article 2 of the Sherman Act. In *Ocean State Physicians Health Plan v. Blue Cross*, the court upheld that having a policy that insisted on a supplier's lowest price was not in violation of the Sherman Act, as long as it was not predatory or below the supplier's incremental cost, and in fact would be promoting competition. The *Kartell* case has been used to substantiate decisions in favor of insurers; however, the *Kartell* case and others similar to it provide an inadequate basis from which to evaluate medical monopsony power, because they fail to see the insurance market as two separate markets (insurance and health services), and assume that savings or excess rents generated from insurers predatory practices are passed on to the consumer (Hammer & Sage 2004).

While monopsony continues to be addressed in non-healthcare arenas in the U.S., as per the Supreme Court's decision in *Wyerhaeuser Co. v. Ross-Simmons Hardwood Lumber Co., 2007* (Rosenfelt 2008), it is unlikely to be addressed the same way in healthcare, as healthcare is seen to be unique by many. As James Robinson (2001, p. 1045) expressed,

> "…the salient characteristics of health care, including professionalism, licensure, nonprofit organization, third-party payment, and heavy government regulation, can be found in other sectors, albeit not bundled in quite the same distinct and dysfunctional manner. The uniqueness doctrine hence proves too much. More importantly, the principle serves as a two-way barrier to entry between the health and non-health sectors. In one direction, it discourages mainstream economists from importing the principles of industrial organization, game theory, and transactions costs to health care issues by raising a wall of acronyms and institutional trivia that impedes dialogue. In the other direction it fosters complacency among the virtuosi of health policy analysis, allowing us to achieve fame and fortune in our small pond without fear of competition from denizens of the scholarly shark tank."

If mainstream economists are unwilling to venture into a new area fraught with "walls of acronyms and institutional trivia that impedes dialogue," then certainly, very little progress can be made to help courts understand the inefficiencies within healthcare and how consumer harm is established by allocative inefficiencies (Robinson 2001, p.1045). Robinson (2001) condemned the views expressed by K.J. Arrow (1963), which via asymmetric and imperfect information, justified the rationale for the existence within healthcare of, "every inefficiency, idiosyncrasy, and interest serving institution in the healthcare industry," basically stating that the rationale for non-traditional contracting and organizations and their market responses were, in effect, an "efficiency-enhancing" response to the limitations of information (Robinson 2001 p.1046). Robinson further explained that Arrow used such interpretations of distortions within the healthcare market to justify antitrust exemptions reducing costs, and that consumers are incapable of comparing insurance plans and must yield this function to politicians (Robinson 2001). Therefore, it is understood how judicial decisions regarding monopsony could become distorted with regard to market inefficiency when underlying literature supports such views, especially when one considers that in addition to the literature, the courts use an out-of-date model to measure consumer harm. Such is the case with the ancillary restraints model.

Alexander (2007) addressed the use of Blair and Harrison's ancillary restraints doctrine and its use by courts in interpreting cases of monopsony. The ancillary restraints doctrine is used to judge cases of monopoly, The ancillary restraints doctrine defines that agreements among competitors are illegal unless the defendant/competitors can show that the agreement has pro-competitive benefits and that the overall effect is good for the consumer (Alexander 2007). Alexander (2007) pointed out that the overall quest of the model is to correct consumer harm, but appropriately, it gives evidence that within a situation of monopsony, it is not the consumer that is harmed, rather the supplier. Because courts interpreting monopsony cases have validated the ancillary restraints model explicitly as a determinate method, this has left economists and attorneys with a void left from this model's inadequacy, as it mostly addresses consumer harm.

The ancillary restraints model views monopsony similarly to monopoly in that the case is judged on a few parameters. According to Alexander (2007), the defendant must address three issues when addressing the ancillary restraints doctrine: 1) The agreement must be shown to increase competition; 2) Price fixing is a necessary evil in order to bring about the benefits of increasing the nature of competition; and 3) The agreement is only as restrictive as necessary to bring about these benefits. Alexander addressed the shortcomings of the ancillary restraints theory of monopsony within the courts by offering additional insight into the Sherman Antitrust Act and its intended beneficiaries. She identified the shortcomings of the ancillary restraint model and analyzed the arguments used to fill in where the ancillary approach fails.

The ancillary restraints model does not concern itself with harm to the supplier, only to the consumer. However, supplier harm is an inefficiency of the market that ultimately may harm consumers, just not directly. Zerbe (2005) recognized the harm created by such inefficiencies. Zerbe had suggested that agreements should be analyzed for inefficiency of markets, stating that ultimately, all consumers are harmed by inefficiency. Zerbe felt that any time the price for a product deviated from marginal costs, resources were wasted. He suggested that resources have an opportunity cost. The limitation of resources, due to monopsonistic inefficiency, has repercussive effects for those resources other uses and/or markets, and the use of these resources in alternative markets would be beneficial to consumers in those markets. Monopsony prevented the use of such resources in other markets; therefore, the consumers were harmed. Additionally, he suggested the idea that the identification of consumer price changes to consumers for a limited set of markets is incorrect, and suggested that consumer and producer surpluses are the income equivalent measures of welfare. Zerbe saw both consumer and producer surplus as a measure of reduction in satisfaction. According to Zerbe, the use of economic efficiency as the general standard is a reasonable assumption; consumers will lose from inefficiency wherever it is found. The presumption should be that the market distortion introduced by the monopsonization will cause consumer harm, both in the output market and in all related markets taken together (Zerbe 2005). This is an important and salient point to this research as the inefficiencies of monopsony are suggested to have lasting effects on ACH margins and free cash flows, therefore possibly limiting their access to debt markets, which affects ACH decisions of capital structure.

According to Alexander (2007), these arguments fall into two separate categories, those that claim monopsony harms end consumers, and those that claim the Sherman Act is intended to protect society and others in the economy and not just end consumers. She pointed out that the arguments made by Zerbe (2005) are incorrect and inefficient, stating that it would be more efficient to ban buying cartels than actually to analyze the effects of the agreement at hand. The other problem with Zerbe's argument, according to Alexander (2007), is his promotion that, "effects in other markets to show harm to consumers," was rejected by the Supreme Court as a methodology for judging consumer harm, not to mention that it is very similar to the current consumer welfare standard in use today Alexander (2007, p.1629).

Others argue that consumer harm should not be the relevant standard against which monopsony cases are held. According to Alexander (2007), individuals within this ideology fall into two categories. They are: 1) those individuals who argue that cases should be measured by aggregate efficiency for antitrust purposes; and 2) those who argue that the Sherman Act protects others within the economy equally well as consumers. Those who believe that aggregate efficiency should be the criteria by which monopsony cases should be decided are wrong, because this is contrary to legislative intent, according to Alexander. She held that while it may be good economic policy for antitrust laws to guard against allocative inefficiency, the Sherman Act was created prior to economists' understanding of allocative efficiency. Therefore, the legislature's intent could not have incorporated the use of allocative efficiency as the basis for antitrust jurisprudence. Alexander pointed out that those who believe that the Sherman Act protects all others should consider the legislative history of the Sherman Act. The act clearly demonstrates a concern for consumer welfare.

In her paper, Alexander (2007) concluded that under the Sherman Act, it is important that aggregate efficiency and consumer prices are utilized in evaluating contentious agreements, but that these conditions are restricted when courts consider the legality of the agreement itself. It is the consideration of competition over efficiency or consumer prices that fills the gap of the ancillary restraint model. She considers it the job of Congress, not the courts, to determine if the Sherman Act should reflect sound economic policy. The previous courts decisions as well as academic literature are helpful in understanding how monopsony could be present in the healthcare market in the U.S. despite antitrust legislation. This environment described in the literature around healthcare antitrust is one in which monopsony could easily be present and readily survive as a market presence. Therefore, it is important to understand monopsony from an academic research perspective.

5.2 Monopsony in Literature

5.2.1 Literature

Due to the structure of the previous monopsony research, a relevant analysis of monopsony in literature will be considered within two categories in this subchapter: non-healthcare related and healthcare related. The first category, non-healthcare related, will be addressed in Section 5.2.1.1, followed by healthcare related in Section 5.2.1.2. Non-healthcare-related research helps establish this study within a larger research context, while the healthcare monopsony research helps to refine the positioning of this research in relation to more specific monopsony discussions in a healthcare context.

5.2.1.1 Non-Healthcare Monopsony Research

Non-healthcare monopsony research previously has focused on markets that truly exhibit monopsony conditions, and considers markets such as labor markets, poultry, or meat-processing markets for hogs and cattle, in addition to markets for public goods. In many nations, healthcare is considered a public good. In the U.S., healthcare can be viewed as a public good provided by an agency relationship between ACHs and the government and private insurers. Bish and O'Donoghue (1970) used a simple two-person model in a world in which there is a public good and at least one private good to examine equilibrium outputs of public goods, which result from consumer cooperation under conditions of both constant and increasing costs. They argued that if a market for public goods is under an increasing cost environment with monopsonistic demand articulation, the under consumption of the public good was likely. They suggest that monopsonistic environments are to be created under these conditions, as the articulation of demand is likely to come from individuals represented by a monopsonistic organization (Bish & O'Donoghue 1970). They suggested that this was true, as bargaining costs are high, and consumers of public goods are numerous. This encourages individuals to be free riders; therefore, they would wait for others to provide the public good. Bish and O'Donoghue (1970) suggested that under these conditions, the government and/or private demand articulating groups would emerge and incentivize individuals to join their groups. These groups would then act as monopsonistic buying groups. This is similar to the conditional environment set forth in this research between CMS and private payors, because they behave as a collusive monopsony to purchase healthcare services on behalf of individuals. In this case, the present research examines the market of a public good, healthcare. Healthcare within the U.S. is under increasing cost constraints. If monopsonistic demand articulation is present underconsumption of the good is likely. While Bish and O'Donoghue (1970) remain valid, they express monopsony under a traditional context, which does not accurately describe the outcome the consumption equation. This divergence of traditional monopsony and monopsony under the all or nothing contract allow for outcomes more favorable to the consumer and the payor. This provides a basis for the models discussed further in chapter 6.

Hirofumi Shibata (1973) suggested that Bish and O'Donoghue (1970) may have been accurate, but refuted that the condition of increasing cost of the public good is a necessary market parameter for monopsony to exist. Constant costs as well as increasing costs could also be an environment in which monopsony might exist. Shibata (1973, p. 223) pointed out that under the increasing cost of a public good, the presence of income redistribution affects, "a non-cooperative party solution, one involving over-consumption rather than under-consumption."

This view is counter to monopsony theory, in which the presence of monopsony leads to underconsumption due to the inefficient allocation of resources (inputs), as was displayed in Figure 5.1. While Bish and O'Donoghue (1970) assumed that producers of public goods are price takers rather than price makers, Shibata (1973) holds that both a monopsony and monopoly could exist when one party is a price taker and the other a price maker. Taking issue with Bish and O'Donoghue's (1970) premise that producers of public goods could not be consumers of public goods, Shibata pointed out that once a public good is produced, all within a given economy are free to consume that good. Shibata held that both monopsony and monopoly could exist in markets for public goods where neither party is the price taker. He suggested the assumptions that the consumer can cooperate while producers cannot, and that the producer can cooperate while consumers cannot, are unrealistic, unless asymmetric institutional or behavioral assumptions are included (Shibata, 1973). The presence of asymmetry of information is an important concept in healthcare in the U.S. and the research presented here. There is asymmetry of information in the consumption of healthcare as most patients are ignorant of the services they receive. This transactional model is further complicated because the purchaser or payor has little information of services delivered as well (Mirmirani and Spivack, 1993; McLean 1989; Schneider and Mathios 2006).

If monopoly or monopsony does exist in the market for public goods, then the environment is conducive to over- or under consumption, barring strategic behavior; that is to say that a Pareto-optimum outcome could not exist. Shibata (1973) concluded that in the case of public goods and increasing cost versus constant cost/monopsony, under consumption is not the major concern, but rather what is of concern is the possible existence of a monopoly and overconsumption due to income redistribution or the situation of a bilateral monopoly under which both over and under consumption equally are possible. However, under increasing cost conditions, overconsumption becomes the larger problem. Shibata held that the effect of redistribution of income is significant under majority rule, as the proportion of the population that suffers from the redistribution of income often has no effective way of preventing the production of the public good by the other party or being financed by the taxes imposed upon them.

Overconsumption is an important characteristic of U.S. healthcare as it not only suggests the existence of a moral hazard created by the presence of insurance, but in an increasing cost setting, overconsumption is could be due to an income redistribution mechanism within the Medicare/Medicaid framework. This also describes the legal framework under which healthcare is supplied in the U.S., in which ACHs are required to deliver healthcare under unfunded mandates and lower reimbursements than Pareto-optimum conditions. These constructs described by Bish and O'Donoghue (1970) and Shibata (1973) help to provide a basis upon which the theoretical model of this research is based. Newhouse (1981) and Glied (2003) further support this idea of overconsumption due to moral hazard of insurance in U.S. healthcare. In addition to markets for public goods, one primary area of focus for monopsony research has been labor markets.

Labor long has been an environment for the study of monopsony, and can be correlated and helpful in determining the consequences of its existence in healthcare. Usually, firms that are studied are isolated geographically, and therefore have market buyer power in the surrounding markets of labor. Michael Bradfield (1990) examined the long-run consequences of monopsony in this context. Bradfield used the traditional monopsony model and the Cobb-Douglas production function to lay framework for his argument. He assumed monopsony power only in the input labor market, while the firm operates in a competitive market in the output market. This allowed Bradfield to show that the long-run equilibrium for wages and quantity of labor are lower than in a competitive labor market, even under the presence of a union representing the input labor.

Backwards integration in the healthcare market has been thought to exist because payors may try to internalize the inefficiencies of the input market. An example of this is where HMOs directly control the production of healthcare, and therefore better control cost, thereby allowing them to become more competitive in the upstream markets of health insurance, which is typical behavior of a monopsonist. In U.S. healthcare, there have been several efforts by HMOs to integrate backwards into supplying healthcare directly. Likewise, Azzam (1996) showed that there may be incentives for backwards integration in order to internalize inefficiencies of the input utilization of monopsony itself. Azzam examined the U.S. beef slaughter industry, applying Perry's (1978) theory of backward partial integration in order to derive the equilibrium condition for a profit-maximizing vertically integrated monopsonist firm that competes with a finished product in the final consumer market.

Partial backwards integration is a measurement of backwards integration that is independent of the production decision made by a monopsonist. The methodology allows for the examination of the impact of backwards integration on the choices of input production. The partial integration allows for the assessment at each subsequent degree of integration. This allows for consideration of the welfare implication and incentives for further backward integration by the monopsonist.

Under Azzam's (1996) study, the monopsonist only may integrate partially, as post-integration profits also include monopsony inefficiencies plus the economic rents derived from the target. Given that the monopsonist will have a purchase price for the target, the monopsonists are likely only to partially integrate when considering the cost of acquisition, internal cost of production, and the additional economic rent. Azzam concluded that there is support for the monopsonist's backwards integration when taking inefficiency into consideration in the model. He suggested caution for his research, as there may be other considerations taking place in backward integration that are not considered within his research examples, such as transactional economies and market imperfections.

Therefore, while a monopsonist may integrate backwards to internalize input market inefficiencies, it does not have to be full integration to realize some additional economic rents. Likewise, in the U.S. healthcare market, HMOs and MCOs have tried to internalize some of the production efficiencies into their organizations in order to be more competitive in the market for health insurance. This is typical monopsonistic behavior; however, traditional monopsony does not accurately describe the contractual nature, which is prevalent. It is monopsony under the all-or-nothing contract that should be considered.

Taylor (2003) examined monopsony under the conditions of an all-or-nothing contractual situation. Taylor argued that a monopsonist with market power could leave little options for suppliers of inputs. Suppliers are offered all-or-nothing contracts in which the supplier can accept and supply goods at the defined monopsonist rate, or supply nothing. Due to the quantity buyers represent, the supplier has little option because of the exploitation of the producer's surplus. Under this scenario, the input supplier is moved off its marginal cost supply curve and onto the average cost curve. Taylor used a traditional monopsony model augmented to adjust for the all-or-nothing condition, suggesting that the monopsonist exploitation of the all-or-nothing contract leads to an efficient allocation of input resources. In other words, under this all-or-nothing contract, the market would have efficient allocation of inputs to the market; thus, there would be no decrease in quantity demanded. However, the monopsonist would gain the surplus economic rents derived from the supplier, and therefore, input prices would be allocated inefficiently. Thus, the monopsonist would accrue all profits normally attributed to competitive input suppliers.

This is supported when one considers that the standard supply curve provides the quantity that suppliers will provide at every possible price. This combination of supplied quantity and price for various prices form the usual supply curve. The seller's choice is how much to supply at a particular price. According to Blair and Harrison (1993), the all-or-nothing supply curve is different. It reveals the maximum quantity suppliers will make available at each price when the alternative is to sell nothing at all. The all-or-nothing supply curve lies below the standard supply curve. This enables the monopsonist to exploit the seller by pushing the seller off its traditional supply curves and onto the all-or nothing curve (Blair and Harrison, 1993).

Taylor (2003) concluded that monopsonist firms that take advantage of the all-or-nothing supply curve in a competitive input industry will have a socially efficient allocation of resources. However, he pointed out that the distribution of income will not be equitable in comparison to competitive markets, as the monopsonist will have appropriated all the excess rents from the input suppliers. He commented that while there may be no need for antitrust legislation to mediate for efficient allocation of resources, there should be some concern and interjection to deal with the, "distributional consequences of exertion of all-or nothing-buyer power" (Taylor 2003, p. 14).

Taylor's (2003) work provided support for antitrust positions that monopsony can lead to the competitive market allocation of resources leading to increased consumer welfare. Therefore, there is no need for intervention within a monopsonistic buyer market with these characteristics. This is important to the research in this chapter, as this helps us gain some understanding as to why one might not interfere within markets with monopsonists utilizing the all-or-nothing contractual arrangement, especially when one considers the antitrust environment discussed previously. This is also important because this contractual arrangement is predominantly the contractual arrangement that occurs within the ACH market between ACHs and insurers, both government and commercial.

de Fontenay and Gans (2004; hereafter DG), carried the research of vertical integration further, investigating whether vertical integration by a monopsonist causes consumer harm. They suggested that under a normal economic environment, the monopsonist and the consumer interests are not aligned in regard to vertical integration. They modeled one-on-one bargaining between a monopsonist and independent suppliers when the set of suppliers cannot be expanded easily ex-post. They showed that a non-vertically integrated monopolist is susceptible to holdup. They suggested that without integration, a monopsonist has an incentive to encourage more upstream entrants than normally would occur in a neoclassical monopoly. Having more suppliers alleviates the holdup problem. This increases industry output and lowers the industry marginal costs in order to increase the monopsonist's bargaining position. Vertical integration mitigates the hold-up problem faced by the monopsonist, and vertical integration allows the monopsonist to generate and appropriate an increased level of industry profits at the expense of consumers. DG expressed that most concern for consumer harm is achieved when the monopsonist forces the exit/foreclosure of suppliers from the input market. This is a salient point as courts have failed to see this concern, which allows monopsony to exist and allows monopsonistic behavior to affect ACHs, which consequently have effect on their capital structures decisions.

Inoue and Vukina (2006) further analyzed the presence of monopsony power in agency contracts within the livestock industry. They observed the impact of the livestock integrator on the market for contract growers. The model examined the relationships between the observable consequences and unobservable grower characteristics. This is accomplished by imposing first-order conditions for the principals' profit maximization. Their research states three reasons why the grower market is not competitive and might have monopsonistic characteristics: 1) Geographical areas show differentiation in the levels of competition for growers; 2) Market power may be derived from contracts with integrators and the necessary investment to produce inputs; and 3) Production contracts in animal agriculture contain issues of moral hazard. In this last case, the monopsonistic behavior arises from the integrator facing an upward sloping supply curve as a result of having to pay the grower more for greater effort. The integrator/monopsonist must use more resources to ensure compliance, and therefore hires fewer workers, in other words, below competitive levels.

Inoue and Vukina's (2006) model used three performance indexes: live grain, mortality, and feed conversion. They used these three indexes in a first-order condition to maximize the integrators profits. Estimating with the generalized method of moments (GMM), using data on the individual grower contracts and one primary integrator, they found that no monopsony is present in this market. They attributed this to the fact that integrators may not have to pay higher fees for higher output of production, stating that they do not believe the sample is representative of the market as a whole. This outcome is important as it suggests that not all environments, which are ripe for a monopsonist, actually create monopsony. The research of Inoue and Vukina (2006) provides a contra argument for the research presented within this thesis and is included to show that it is necessary to conduct research akin to this thesis, as the outcome is not a forgone conclusion even though there is clear evidence to suggest that certain market constructs should be present.

5.2.1.2 Healthcare Monopsony Research

Monopsony in healthcare is discussed widely throughout literature, although initially it was discussed as an allocative efficiency issue. The healthcare industry is known to have distortions that affect the market: moral hazard, agency, and the allocative efficiency issues (monopsony/monopoly), amongst others. Researchers long have tried to further understand the healthcare market within the U.S.

Philip Hersch (1984) examined competition and market efficiencies within non-profit hospitals. Hersch created a theoretical model that assumes that hospitals compete in the market for physicians based upon hospital prices and resource allocation. Hersch argued that an increase in market concentration results in raising hospital costs when adjusted for quality, ultimately reducing hospital admissions and the quality of care per admission. Theory would predict that hospital prices, adjusted for quality, should increase with market concentration. Hersch's study lacked any measure for quality, and therefore used a proxy. The proxy said that higher prices would be shown in reduced admissions and the length of stay in the hospital.

Hersch (1984) used a sample of 260 Standard Metropolitan Statistical Areas (SMSAs) and six potential 1972 SMSAs to create a regression of hospital stays and quality measures. Hersch utilized total expenditure per admission as a proxy for hospital care. Hersch concluded that despite the fact that the hospitals within the study were nonprofit, they exhibited profit-maximizing behavior. Hersch explained that the implications of the market structure of healthcare are consistent with previous empirical results that market competition plays a central role in overall market performance. In Hersch's case, this led to higher admissions and greater levels of hospital care per patient. His results suggested that efforts to control costs via competitive forces have been counterproductive, because competition has raised the cost of healthcare by increasing the level of care provided per admission. The increases in cost more likely are the result of a misallocation of resources as a result of extensive hospital insurance. The extensive hospital insurance, because of the moral hazard, decreases the allocative efficiency of competition (Hersch, 1984).

Hersch (1984) recognized the implications of the moral hazard and its possible ability to distort markets for healthcare. Competition under this moral hazard is skewed, and hospitals compete for patients and physicians utilizing mechanisms other than prices. Quality certainly is one of these competing variables, as is the resources for both patient and physician. Along with Hersch's empirical results, these distortions help explain the excessive capitalization and thus overinvestment found in the ACHs and mentioned in this research. Hersch (1984) findings are important as they suggest that first, non-for-profit hospitals exhibit profit maximizing behavior. Second, that moral hazard of insurance is prevalent and causes distortions within the market, which provides perverse incentives to providers and increases the costs of providing services. All of these are issues payors seek to control and as a consequence reduce the amount of inefficiency inherent in the supplier market.

Mirmirani and Spivack (1993) examined the causes of distortions found within the healthcare market and used these distortions to explain any deviation from Pareto efficiency. They cite five reasons for the deviation from Pareto efficiency: 1) lack of competition; 2) insufficient/asymmetric information; 3) inadequate access to health care services; 4) presence of externalities; and 5) market disequilibrium (Mirmirani & Spivack 1993). They pointed out that these are all reasons for the failure of the healthcare market within the United States.

Considering the lack of competition, Mirmirani and Spivack (1993) suggested that special interest groups within healthcare determine the supply of healthcare, conspiring to keep incomes up by restricting supply. They suggested that two major groups, the AMA representing doctors, and the AHA representing hospitals hold the majority of control. These two organizations have turned over, changed, or blocked the majority of legislative policy decisions by the U.S. Government to benefit themselves. The AMA has reduced supply by lobbying against allowing foreign medical graduates from entering the U.S. to practice, and at the same time, reduced the amount of students accepted for medical school at U.S. institutions.

Studying hospital markets, Mirmirani and Spivack (1993) pointed not only to the special interests influencing policy, but also to the failure of HMOs to increase competition. This is because the HMOs need to compete against larger, better, and more expensive technologies that cause their premiums to climb. This ultimately resulted in HMOs' inability to compete in the marketplace, and therefore they had less impact on the overall competition level. As previously determined, providers of healthcare compete on variables other than price. Healthcare consumers within the U.S. value quality above price. This is driven primarily by the moral hazard created by the heavy presence of health insurance within the market. In this case, health insurance insulates the patient from the prices of healthcare. If individuals were to pay for their own healthcare, then these variables of technology and quality would be lessened as a determinant of market share, as individuals would strengthen the importance of price in the equation for determining health consumption. Currently, individuals with health insurance, whether from government or private insurance, are not exposed to concerns of price in consumption of healthcare. Thus, the moral hazard of insurance is present. Moral hazard effects are heightened by the lack of information on the part of the patient consuming the healthcare services.

According to Mirmirani and Spivack (1993), insufficient information or asymmetric information exists within healthcare. They noted that all information regarding healthcare services is located within the servicing body, whether physician or hospital. The lack of information on the patient's behalf causes the patient to incur higher costs in order to acquire healthcare services. Mirmirani and Spivack promoted advertising as a method of reducing this asymmetry of information, by educating the patient on the services offered and the benefits of such services. They argued for advertising, which at the time of their research was illegal; however, advertising since has been utilized by both physicians and hospitals, lowering the informational disparity that was prevalent at the time of their research. This is not to say that informational asymmetry has been removed completely from the provisioning of healthcare, as it has not.

Mirmirani and Spivack (1993) promoted inadequate access to healthcare as a reason for the inefficiency. They also outlined the impact that externalities can have upon the healthcare market. Mirmirani and Spivack pointed out that disease epidemics as well as medical malpractice lawsuits can have large impacts on the operations of the healthcare market. Their example cited a case of Acquired Immune Deficiency Syndrome that led to an increased level of insurance claims and treatment expenditures in the 1980s, and they anticipated this epidemic would add additional burdens to the health market. Further, medical malpractice lawsuits cost the sector $2.6 billion by 1988 (Mirmirani & Spivack 1993). In both cases mentioned, they cite the government as the intervener of choice.

Market disequilibrium is discussed by Mirmirani and Spivack (1993), suggesting that a continuous disequilibrium exists due to excess demand causing inflation within the market. They cited Mirmirani and Otts' (1990) suggestion of increasing the patients' contribution of payment in order to reduce the overall disequilibrium within the market. Mirmirani and Spivack (1993) concluded that in order to countermand these market imperfections, the only solution is one in which healthcare is provided for all via a government plan, as all citizens would have equal access to healthcare. This would remove the inefficiencies within the market of inadequate access to healthcare, which they saw as an underlying cause of the inefficiency. According to their view, a capitalistic market is incapable of handling healthcare, and only a socialist system of free healthcare with equal access resolves such disequilibrium. Mirmirani and Spivack (1993), provide additional evidence for the context and construct of monopsony within U.S. healthcare by payors, ultimately suggesting that a single buyer solution organized by the government is the only solution. In other words, the only methodology moving forwards is a monopsonist within the market controlling the input market of health services.

Mark Pauly (1998) examined the disequilibrium within healthcare, suggesting the theoretical possibility of monopsony behavior by managed care insurance providers. He used microeconomic theory to investigate how managed care plans acting as a monopsonist might behave, and the expected effects upon the consumer and supplier welfare. His interests in monopsony were driven by concern that antitrust courts misunderstand monopsony. He opined that the measurement of consumer welfare that is used as a mechanism for the justification of the presence of monopsony within the marketplace may need to be reexamined when interpreting decisions in healthcare. He suggested this because monopsony does not necessarily reduce the welfare of the end consumer. Therefore, the goal of antitrust law, consumer protection, and the objective of economists of welfare maximization may need to be revised in light of monopsony, because consumer harm and economic inefficiency is not readily apparent.

Pauly's (1998) second reason for concern was that it may be difficult to recognize the inefficiencies of lower prices for healthcare as below the competitive level, especially in light of the previous monopoly power held by providers, in other words, a monopoly breakup. The lower prices may be interpreted as monopoly-breaking activity. Pauly used the traditional definition of monopsony power with its outcome of lower input prices and lower consumption of the input. Pauly (1998), defines inputs as ACH services purchased by managed care providers.

Pauly (1998, p. 1444) further stated that the input market monopsony, "arises when there is only one managed care play (buyer) in a local market, but there are multiple competitive sellers of that service, and when the market-level supply curve of those services is upward sloping." Pauly noted that it is difficult to tell if monopsony is taking place just from the presence of lower prices for inputs, or if it is bilateral negotiations taking over from a monopoly on inputs by the seller. The delineating variable is the quantity of inputs acquired by the buyer, as mentioned previously. He modeled both a traditional single-buyer market monopsony as well as a partial monopsony, which consists of a large dominant buyer with monopsony power with additional fringe buyers without monopsony power in the marketplace. In both cases, Pauly conceived that monopsony is possible in both markets; however, monopsony in the partial monopsony market is not as clear. His partial monopsony market in healthcare is similar to the argument in this research of collusion between the U.S. Government and commercial insurers. The U.S. Government acts as the dominant firm, and the commercial insurers act as fringe buyers. The research conducted within this thesis seeks to potentially clarify the existence of monopsony within the healthcare market, by finding empirical support for the theoretical work by Pauly (1998).

The consideration of monopsony by MCO's/HMOs was revisited by the research of Feldman and Wholey (2001). Feldman and Wholey designed a two-stage study to determine the market power of HMOs and whether monopsony power exists under the traditional definition (monopsony implies lower input prices and lower consumption of those inputs). Using time series data on all HMOs operating within the U.S. from 1985 to 1997, they estimated regression equations to explain prices paid by HMOs for ambulatory visits and inpatient hospital days in terms of the importance of HMOs as a buyer of these services. Next, they regressed the utilization of ambulatory and hospital services per enrollee of an HMO to determine HMO buyer power. They found that increased HMO buying power does reflect monopsony conditions, as input prices lowered, but utilization of the inputs increased. According to their research, this can be attributed to the continued breakup of monopoly power of hospitals. Thus, Feldman and Wholey concluded that HMO buying power improved the efficiency of markets for hospital services.

This is notable, as the traditional model for monopsony does not describe the healthcare market accurately, or the contracted relationships therein, because markets for healthcare services often operate under an all-or-nothing contractual basis. However, Feldman and Wholey (2001) made an incorrect assumption that the traditional definition of monopsony will provide an accurate model for use in the case of U.S. healthcare markets. They assumed that hospitals could provide partial quantities to the HMOs, instead of HMOs and insurers using all-or-nothing contractual arrangements with the providers of healthcare services. This incorrect assumption erodes their interpretations of the results. In the case of an all-or-nothing relationship, utilization or quantity demanded would increase while prices decrease, as ACHs must either supply the quantities demanded at the offered price or supply nothing. Their interpretation that the continued breakup of monopoly power results in increased efficiency of the market is misleading. Feldman and Wholey's approach is similar to the research conducted within this thesis; however the monopsony model discussed within this thesis perhaps more accurately depicts the relationship of the payor and hospital. This provides a more complete answer to the monopsony question and its effects upon decisions of the capital structure of ACHs in U.S. health care.

M.V. Pauly (2004) examined the concepts of quality in healthcare and competition's effects on quality in the marketplace. His paper mainly focused on hypothetical cost quality tradeoffs in the presence of competition and the ramifications of such. He defining quality as, "everything about some good or service relevant to consumers (actual and perceived) welfare that is not measured by quantity" (Pauly 2004, p.114) , and argued that quality and price often trade off eventually, and that competition will make consumers better off, but will not be able to maximize quality. He also argued that the cost of such quality has an impact on a firm's financials, whether as leverage or liquidity. He maintained that due to distortions within the market, such as the "medical arms race" previously noted in this research, the distortions have an impact because it has been shown that firms that cannot compete on price compete on quality, whether real or perceived (Robinson & Luft(1985). However, he further noted that the average level of quality may be lower than if the market consisted of a competitive environment resulting from the ceiling on price precluding high quality at a higher price. What Pauly (2004) expressed in his research is relevant, because it continues to suggest that ACHs, even under restriction, still compete on quality because price is not a factor, and that the market is restricted by asymmetric information and by artificial pricing. It is also important as it expands the possible measurement for monopsony. This is salient as it provides a contextual reference for how monopsony is measured within research.

Allocative efficiency of the healthcare market was also examined by D.L. Sevilla (2005). He proposed that a collusive monopsony exists in U.S. laboratory services between government and commercial insurers who collude to fix prices for medical services. Sevilla examined the use of the Resource Based Relative Value Scale (RBRVS) by government payers to determine reimbursement for medical procedures is a mechanism for collusion. He suggested that the RBRVS mechanism used for pricing ultimately acts as a price-fixing tool because of its availability as public information. Sevilla theorized that this mechanism allows other commercial payers to coordinate pricing and policies following government reimbursement. Because the government is the largest consumer of healthcare services, it acts as the major market power. Sevilla utilized collusive monopsony to describe this occurrence, rather than oligopsony. His reasoning was that oligopsony does not accurately describe the nature of the collusion that is taking place.

The U.S. Government implemented a fee schedule in 1992 (RBRVS) to pay Medicare providers for their services. Sevilla (2005) argued that the textbook definition of monopsony does not adequately describe the supply decisions facing a medical provider when confronted with a dominant health insurer. He, like others, pointed to the all-or-nothing contractual nature of healthcare insurers and the effect this has on the healthcare provider. He suggested, similar to Taylor (2003), that an insurer using the all-or-nothing contractual arrangement could lower prices for services while still consuming the competitive market. This fee schedule was based upon RBRVS. Sevilla (2005, p. 66) noted, “From the viewpoint of tacit collusion theory, the preparation and circulation of RBRVS adversely affects competition.”

Sevilla (2005) utilized nine years of billing data (1990-1999) from CSG, Inc., a private laboratory operating in Orange County, California. The data represented laboratory services for Pap smears, a service in which CSG, Inc. specialized. The Pap smears during the longitudinal study remained a manual process performed by the laboratory cytologist, and the underlying technology did not change. This limited the scope for lower costs by reducing the opportunities of lower prices due to underlying cost changes in the services provided. California state law limits production to 80 Pap smears/day per cytologist, therefore limiting product output. Sevilla analyzed reimbursement for Pap smears, and found that beginning in 1991, almost all private insurers were paying $18 per Pap smear, as invoiced, while Medicare and Medi-Cal were paying $9 and $8.25, respectively. From 1991-1999, private insurers continuously curtailed reimbursement, coming closer to Medi-Cal and Medicare reimbursement, whilst CSG, Inc. continuously raised their standard billing rate for the

Pap smear laboratory service to reflect increases in underlying costs. The median reimbursement from the private insurers decreased the reimbursement until the median reimbursement for Pap smears in 1999 was $9, almost in accordance with the Medi-Cal rate. Sevilla pointed out that the standard deviation from the median reimbursement in 1991-1992 was (0.488) and changed over the years as reimbursement to charges changed, with the standard deviation in 1999 becoming (6.55). This meant that reimbursement for Pap smears was lower over time in comparison to charges.

Sevilla (2005) concluded that a collusive monopsony exists within the healthcare field as the result of insurers reimbursing for services well below the competitive rate. The government is trying to substitute for perceived market failure with the implementation of the RBRVS pricing methodology. Sevilla argued that while some may view healthcare as influenced strongly by social non-market forces, he believes that traditional market forces influence the insurance market. He argued that because monopsonists are profit maximizers, competition requires that medical laboratories be able to accept or reject a given level of reimbursement without punitive consequences. Sevilla's findings are significant, as the proposed empirical methodologies of this thesis mirror Sevilla's in many respects, with similar data and controls for underlying changes in cost, which are technology neutral throughout the longitudinal study. While Sevilla (2005)identification of the market is slightly different, the two markets function similarly with similar payor/ service provider relationships and similar reimbursement strategies.

Pallavi Seth (2006) carried forward the notion of monopsony by insurers, in particular HMOs, and presented evidence of monopsony and long-term effects upon input providers. In particular, he examined the exercise of monopsony power and its ability to lower equilibrium levels for primary care physicians' (PCP) earnings and services. Seth used a monopsony model consisting of physicians' earnings employed by health providers owned or operated by MCOs, setting an environment in which hospitals and the levels of services are under a monopolistic health insurer, which is similar conceptually to that of Pauly (1998). Seth (2006) explained physician behavior under monopsony as similar to Foreman (2003) and Taylor (2003). This examination was comprised of creating HHIs of the HMOs, along with an additional control variables for 218 Metropolitan Statistical Areas (MSAs) adjusted for market size. Using the HHI, he observed the impact of HMO concentration on the earnings of PCPs and the per capita number of PCPs. This paper provides evidence for the presence of monopsony within the U.S. healthcare market. Similarly to Paul (1998) and Sevilla (2005), Seth (2006) provides additional evidence to suggest that the presence of monopsony is a valid theory which should be tested further.

Seth (2006) concluded that there is evidence of monopsony in the 70 largest MSAs in which increases in HMO concentration were associated with lower or decreasing PCP earnings. He summarized that the reduction in earnings has a negative effect on the number of PCPs. The lowering of wages below the competitive rate is accomplished by HMOs employing fewer physicians. He suggests that this may provide an explanation for the shortage of PCPs in many states and the declining applications to medical schools.

5.3 Conclusion

This chapter provides a basis for the empirical analysis in the next chapter as it gives evidence to an environment which monopsony is allowed to exist legally, with legal precedence being set by the courts for monopsony’s statutory basis as a market force in the Kartell vs Blue Cross Blue Shield of Massachusetts case. The courts ignored one of the crucial pieces of evidence against health insurers, that health insurance is in fact two separate markets, one for the financing of health coverage and the other as a purchase of the inputs (health services) for the financing of health coverage (Hammer & Sage, 2004). The existence of these two markets causes insurers to exhibit profit maximizing behavior. Thus, insurers seek to maximize their profit at the expense of the supplier (ACHs), via lower reimbursement for healthcare services. The legal framework used to examine monopsony by the courts fails to consider the harm to the consumer via the detrimental effects of monopsony on the supplier and allocative inefficiency, which affects ACHs (suppliers of health inputs) financially by restricting revenues akin to zerbe (2005).

Previous research supports the existence of monopsony within the healthcare market. Both traditional monopsony as well as monopsony under the all-or-nothing contract were considered in previous literature. In general, monopsony is considered under the framework of one entity; however, under the scenario considered in this research, monopsony is a collusive behavior between government and private payors. The government via the CMS is the lowest payor for services within the market and acts as the market leader. The government publicly posts policies, procedures, and fee schedules for other private payors to consider in directing their own behavior within the market. This mechanism allows all payors to extract additional rents from the market, effectively establishing price fixing.

Previous research supports monopsony within healthcare under the traditional and non-traditional definitions of monopsony (Pauly 1998; Sevilla 2005; Seth 2006). It is on the premise of monopsony as a market force and its effects upon ACHs' decisions of capital structure that underlies this research. Chapter 6 provides a detailed discussion of the monopsony argument, in addition to outlining the model and methodologies for testing for its presence and its effects.

6. Empirical Evidence of Collusive Monopsony

6.1 Introduction

Chapter 5 discussed collusive monopsony under the all-or-nothing contract and described the conditions within the healthcare market that led to its existence. Its existence is supported directly by the previous research of Pauly (1998), Sevilla (2005), and Seth (2006). The purpose of this chapter is to address one of the primary research questions of this thesis, which is to examine collusive monopsony under the all-or-nothing contract. In doing so, it seeks to provide empirical evidence of the existence of collusive monopsony and an understanding of its influence on ACHs' decisions of capital structure. This is important, as collusive monopsony is thought to have negative effects upon ACHs' decisions of capital structure, thereby affecting ACHs' behavior and financial health.

By combining two datasets, one private and one public, the research formed a new dataset that provides insight into the ACH market. The MCR from Chapters 3 and 4, which contains ACHs' financial data for each year, was combined with private electronic claims and payment data from individual ACHs. While the sample of ACHs within the private data is smaller, all ACHs found in the private database were included in the MCR. This allowed for pricing information and health services information to be combined with ACHs' financial information.

In order to provide evidence of collusive monopsony, the research combines two separate indexes, thereby measuring different market attributes. The first index is is the Lerner's Index (LI), which measures market power of ACHs. This provides the ability to examine the supply side of the market and any market power contained therein. This is combined with a regression of the real FCFs of ACH's to examine the effects of market power upon FCFs to determine if those affects may influence decisions of capital structure of the ACH. Additionally, the LI is also regressed against the NISP (Net Income from Service to Patients) of the ACH's. This regression allows the research to consider market powers effects and correlation with NISP. In this case, NISP is used in addition to FCF as NISP provides a better indication of ACHs revenues derived from insurers (payors). The FCFs of ACH's derived from the MCR might be distorted by revenues classified as Other Income by the MCR. These Other Incomes are revenues derived from avenues other than services provided to patients. Thus, with both regressions the research is able to examine market power direct via a Lerner's Index calculated on behalf of the ACH's, but also account for price taker status of the ACH, which might be evident via the Lerner's Index correlation via the NISP.

The second index the Herfindahl Hirschman Index (HHI), which is used to measure market concentration of payors. To show evidence of collusion, the real FCF of ACHs was then regressed on concentration via the HHI. Presence of collusion would be indicated by the negative effects of concentration on real FCFs. Combining concentration and collusion (if any) with an assumption of price inelasticity using the New Empirical Industrial Organization (NEIO), the research attempts to provide a measure of market power for payors. This ability to measure the market power of payors is important as it provides the research with the ability to examine the market power of the consumer, which cannot be measured directly via a calculated Lerner's Index as price and marginal cost data is not available. This methodology enabled the research to consider both sides of the market equation simultaneously, i.e. market power of the supplier (ACHs) and the consumer (the payors), to capture a self-supporting condition of monopsony power, and to gain insight into the effects it has on the capital structures of ACHs.

6.1.1 Monopsony's Importance to the Study

Monopsony is important to this study, as it has proven through research to place distortions on upstream markets for goods and services, causing inefficient allocation or unfair prices for inputs (Bradfield 1990; Shibata 1973; de Fontenay 2004; Taylor 2003; Alexander 2007). For the purposes of this research, unfair prices are considered prices below a competitive market price. In the case of the U.S. ACH market, these distortions have serious implications for the decisions of capital structure chosen by ACHs, as monopsonist prices under the all-or-nothing contract move the supplier (ACHs) off its marginal cost curve and onto the average cost curve. The consequences of this action are less ACH free cash flows, which influence decisions of capital structure.

> "...the all-or-nothing monopsonist appropriates all the profits that would accrue to the competitive input suppliers. Thus, the all-or-nothing monopsony solution is equally efficient to the competitive solution, but it is inequitable or

unfair compared to the competitive norm because exploitation of the monopsonist's power to dictate both price and quantity to suppliers results in appropriation of all potential profits in the input industry." (Taylor 2003, p. 11-12)

By pushing ACHs onto their average cost curve and reducing free cash flows to ACHs, insurers force ACHs into difficult financial positions, because restrictions in free cash flows limit access to debt markets and thus affect ACHs' decisions of capital structure, akin to Calem and Rizzo (1995). This is a problem, as hospitals compete on quality or perceived quality, or in the case of the research of Stein (2001), if hospitals are leveraged heavily, they are prone to underinvestment. In these cases, lower free cash flows increase bankruptcy cost. Under these conditions, managers of ACHs must consider these influences when deciding the capital structure of the firm.

If one takes into consideration Taylor (2003), payors can limit reimbursement to ACHs without affecting the health-consuming public, as ACHs operate under the condition of all-or-nothing contracts. This is cause for concern, as the consequences for operating under monopsony conditions are not a short-run, but rather a long-run problem (Bradfield 1990). Although there is research on the effects of monopsony in the U.S. healthcare market, there is little study on ACHs and the effect the monopsony construct has on their decisions of capital structure. A better understanding of collusive monopsony's effect on the capital structures of ACHs is necessary. Healthcare is a market that is full of distortions and complexities, and this likely is the reason that so few economists and financial researchers have addressed this specialized market (Robinson 2001).

6.2 Data

6.2.1 Data Description

Data for this research was provided via two databases on U.S. hospital financial information. The first is the MCR data provided by the U.S. Government. U.S. hospitals are required to file information with the CMS annually regarding financial operations. The first set of data is comprised of this filed data. This database relates to all hospitals that accept Medicare and Medicaid patients. The time periods covered in the database are 1995-2007. There are 6,000 ACHs in the U.S.

This cost report data covered between 5,500-6,000 of those hospitals at any given time. Details of this data were explained in Chapters 3 and 4. This data remains exactly the same as the data used previously.

The second database is compiled by the researcher via the SSI Group, Inc., a company specializing in the healthcare electronic billing industry. The data consist of 12,722,238 electronic claims (837s, bills) submitted to both private insurers as well as government payers for services delivered by ACHs. The electronic remittance (835s, payment) for each claim within the database is tied to the original claim filed so that a match can be made, a comparison of services delivered, and so that the payments made for each service can be determined. This provides the reimbursement information on health services delivered by ACHs. The claims/remittance data was merged into the MCR financial data for each hospital so that a comparison of the ACHs' financials can be compared with reimbursement for procedures. The ACHs used are a subsample of the hospitals used in the agency study in Chapter 4. The database relates to 1,500 hospitals that correspond to the MCR database. The longitudinal time frame (2000-2007) for this receivables cycle information corresponds with a partial overlap of the time frame found in the larger MCR database, ultimately representing eight years of data. The second database provides information such as detailed accounts of the claims filed with insurance companies, and remittance data, such as the amount billed, date billed, payment date, and amount of payment received.

It must be noted that the information on claims and remits (payments) contains some negative numbers. While all payments to the ACHs were positive in dollar terms, there are two reasons for such an occurrence. The first is that the payor lists the notation on the electronic remit as negative because it is in fact a "take back."[13] The second is due to the notation of the insurer on the electronic claim, and while it is not a notation of a negative value, the notation has another meaning within the

[13] "Take backs" are when a payer rescinds a payment previously awarded, and is common place within the industry to compensate for over or wrongful payment.

individual payor's computer system. All such values were removed in the process to expunge outliers from the study for clarification and sterilization purposes.

The geographic coverage of the two databases represented is slightly different. The MCR database covers the entire U.S., while the smaller claims database geographically covers parts of the U.S. The use of these two datasets provides the opportunity to investigate monopsony using a combination of methodologies that allowed for the analysis of the effect of monopsony on the capital structure of the ACH.

6.2.2 Advantages of Data

The data provided covers multiple ACHs. This allowed for a broad comparison of payment data across a broad geographic area. When combined with the cost information contained within the MCR, the research was able to calculate an LI for each ACH, thereby measuring the market power of the ACH at the ACH's market level. In addition, payor concentration could be calculated for each ACH market, as the payor information was recorded within the private claims data, thus allowing an HHI to be calculated. For this research, 12,722,238 claims provided the nucleus for the calculation of both the LI and the HHI. This granularity of billing and remittance data was significant, and it provided the basis upon which this research was able to create a snapshot of the relationship for each ACH in the study and its individual market conditions.

Both government and private payer reimbursement was included for inpatient and outpatient procedures ranging from simple to complex. The data was constructed in a panel data format, allowing longitudinal studies to be conducted over a significant time frame. Panel data linear regressions could be conducted that allowed insight into previously unrecognized relationships, both across the MCR and private ACH reimbursement data. The data allowed analysis of both payer and ACH market power simultaneously within the same data. Therefore, the data combined with proper methodologies provided for the possibility of evidence of monopsony on the part of the payor and the lack of monopoly power of the ACH.

6.2.3 Limitations of Data

The data provided does not completely cover the geographic area covered in Chapter 4. This may lead to geographic bias within the study, as there may be a greater presence in the sample of hospitals from one geographic region. Due to differences in reimbursement by both government and private insurers by geographic region, this may skew results and may not be representative of the entire nation. This especially was true when the price of healthcare services was utilized. The ACH reimbursement database does not cover the exact time frame of the previous chapter; therefore, a limitation must be placed upon the temporal frame of the study. The claims data represented a unique set of procedures that may not fully represent all the procedures provided by an ACH or ACHs within the market. This may skew results that use pricing information from these procedures. An additional breakdown of the results by ownership type was not possible due to limitations within the data. However, this did not affect the research as this limitation in the data can be ignored in the light of the ownership effects of capital structure considered within this research This was possible due to the findings of Wedig et al (1988) that indicate the ownership structure of U.S. ACHs has no effect upon their capital structure.

6.3 Data Organization, Behaviour, and Sample Creation

6.3.1 Overview

Monopsony often is studied via the inputs and outputs of a market. Previous monopsony studies have dealt with different markets and industries, in particular, labor markets and the meat-packing industry, and this study references Bradfield (1990), Azzam (1996), Taylor (2003), and Inoue and Vukina (2006), among others. Inputs are identified as the prices paid for goods and or services, and outputs are the goods and or services generated by the inputs and labor. This study intends to use the two indexes previously discussed, the HHI and the LI, to provide evidence of monopsony in the U.S. healthcare market. The HHI is a measure of market concentration, and the equation using HHI is illustrated in Equation 6-6 (p. 162). The LI is a measure of market power, as is illustrated in Equation 6-3 (p. 155). The LI measures the excess margin captured by a market participant, and normally is used to examine monopoly power. Through the combination of measurements of the HHI, the NEIO, and the LI, this research attempts to provide evidence of monopsony. For the LI study, nine procedures generated by ACHs were chosen to be studied as the outputs of this market. The procedures are broken down in Table 6.1, below.

Table 6.1: Monopsony Study Clinical Procedures (DRG = Diagnosis Related Grouper) (ICD9= International Classification of Diseases):

The table provides a list of the nine procedures used in creation of the Lerner's Index. Each procedure is listed along with its DRG and the matching ICD9 code and diagnosis codes. The right-hand column provides the methodology for determination of the match between the diagnosis codes and both the ICD9 codes and the DRG. The DRGs are used by the government for determining reimbursement, while ICD9 codes are used by the commercial payors to determine reimbursement.

Procedure Rendered	Inpatient	Outpatient	DRG	ICD9 Procedure Code Primary	ICD9 Procedure Code Secondary	Diagnosis Code/s	Determination of Match
LAVH	X		359	68.51	65.63	617.0,617.3,618.1,625.3,626.2,626.8	Combination of Primary or Secondary ICD9 Procedure/Diagnosis Codes
Coronary Bypass	X		107	36.11	36.11,36.15,36.16,36.19,39.61,88.56,88.57		Must have a left Heart Cath Procedure 37.22 coded in first 5 procedure code positions
Cholecystectomy	X		494	51.23		574.1	Straight Match
ESWL	X		323	98.51		592.0 or 592.1	Primary ICD9 procedure plus one Diagnosis Code
Bronchoscopy	x		100	33.22 or 33.24		786.2,7786.3,786.6 or 986.9	Either Procedure codes with one of the Diagnosis codes
Colonoscopy	x		183	45.23		562.10 or 792.1	Primary ICD9 procedure plus one Diagnosis Code
EGD	x		183	45.13		530.10,530.11, 530.81, 535.40,536.8, 553.3, 787.01, 787.1, 787.2, 789.00, or 789.06	Primary ICD9 procedure plus one Diagnosis Code
Total HIP	x		209 (pre- 2005), 544(post 2005)	81.54		715.36, 715.96	Primary ICD9 procedure plus one Diagnosis Code
Total KNEE	x		210 (pre- 2005), 544(post 2005)	81.51		715.35, 715.95	Primary ICD9 procedure plus one Diagnosis Code
Created 08.05.2009	*Note: determination of matches was conducted in cooperation with Springhill Memorial Center decision support personnel, (Melanie Sigler).*						

All procedures included must have existed during the entirety of the longitudinal study (1995-2007), and each service delivered must not have changed technologically. It is important to isolate any price changes in the market as just pertaining to market pressures, with no underlying technological changes in the services delivered, similar to Sevilla (2005). The ACHs participating in the sample for the monopsony study were not predetermined; rather, they were determined by the match of the claim submitted with the remittance received. The ACHs represented in the study must have had both government and commercial payments represented in the same year. In order to ensure a clear comparison between government and commercial payers, claims were chosen that had a single procedure rendered, or a combination of procedures and an underlying diagnosis that was tied to a single DRG. The government reimbursement is calculated via a DRG, and the commercial payer reimbursement via a combination of ICD9[14] procedure codes along with a primary diagnosis.

In order to improve the sample size included for the study, an assumption of procedure frequency was made. To clarify, the frequency of a procedure and diagnosis each year within the study was assumed to remain stable, i.e. minimal changes in the frequency of each procedure from year to year and therefore the research could expand the number of procedure/diagnosis combinations as long as they were continually tied to a single DRG. Charges for services were derived from the use of an electronic claim (837) that denoted the services provided to the patient and the associated charges. Payment information was derived from electronic remittances (835) picked up by the SSI Group, Inc. for the ACH. By selecting only the nine procedures listed in Table 6.1, the large pool of hospitals was limited to 372 distinct hospitals. The primary reasoning for this limitation was that both a claim and a remit must be available for one of the nine procedures. The parameter of nine procedures as well as the combination of the claim remit data resulted in the limitation of ACHs in the sample. The restriction via the nine procedures only applies to the LI sample. Greater detail of the sample creation is found in Section 6.3.2.

This study proceeded with the analysis of the data to find evidence of collusive monopsony within the ACH market, as well as to provide explanation of these conditions within this market via monopsony cost. The study relied on the data of prices paid by insurance companies for services rendered over time and the price paid via the fee schedule of the CMS for the same services over the same time frame. Sevilla (2005) conducted research using claims data similar to the data utilized in this

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[14] The ICD9 code is version of the International Statistical Classification of Diseases and Related Health Problems (most commonly known by the abbreviation ICD). It is a code created by the World Health Organization to classify diseases and a wide variety of signs, symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or disease. Under this system, every health condition can be assigned to a unique category and given a code, up to six characters long. Such categories can include a set of similar diseases (World Health Organization 2010).

ACH research. As previously discussed, Sevilla's research compared prices paid for the same service (Pap smears) in laboratories over time between private insurers and the CMS. His hypothesized RBRVS was used as a mechanism for price collusion and information sharing by private insurers.

The U.S. Government implemented a similar fee structure to RBRVS on January 1, 1992, in order to control escalating ACHs' costs in healthcare (Sevilla 2005). Using data from CSG, Inc. for the years 1991-1999, Sevilla (2005) showed that insurance companies decreased the reimbursements for Pap smears. The adjustment of reimbursements was guided by the usage of RBRVS. While Sevilla's research dealt with laboratory data and not ACH data, the ACH market operates similarly.

In order to measure the market concentration of payors, an HHI was calculated of the payors in each hospital market within the study for each year. The HHI was calculated in this fashion in order to take into account the different competitive markets facing each hospital, as they vary geographically, similar to Seth (2006). The payer matrix for one hospital will differ from that of another with a different geographic location.

6.3.2 Sample Outline

The subsamples used in this study come from the same overall sample of ACHs used in Chapters 3 and 4; different subsamples were used to calculate the HHI and LI. The sample for the LI was limited only to those ACHs with claims associated with DRGs outlined in Figure 6.2. The subsample for the HHI was not restricted, but made use of all 12,722,238 claims available for study.

6.3.2.1 Lerner's Index Sample

The sample for the monopsony research consisted of 457,146 individual cases of reimbursement by both government and commercial payers. There are nine procedures defined in Figure 6.2, which encompasses the spectrum of services delivered. Each procedure met the required specifications of no technological change in the procedure over the time period of the study.

Procedure Rendered	Full Name	Definition
LAVH	Laparoscopic Assisted Vaginal Hysterectomy	a surgical procedure using a laparoscope to guide the removal of the uterus,Fallopian tubes and ovaries through the vagina.
Coronary Bypass	Coronary artery bypass surgery	a surgical procedure performed to relieve angina and reduce the risk of death from coronary artery disease.
Cholecystectomy	Laparoscopic Cholecystectomy	the surgical removal of the gallbladder
ESWL	Extracorporeal Shock Wave Lithotripsy	the non-invasive treatment of kidney stones (urinary calculosis) and biliary calculi .
Bronchoscopy	Bronchoscopy	technique of visualizing the inside of the airways for diagnostic and therapeutic purposes.
Colonoscopy	Colonoscopy	the endoscopic examination of the large colon and the distal part of the small bowel with a fibre optic camera on a flexible tube.
EGD	Esophagogastroduodenoscopy	a diagnostic endoscopic procedure that visualizes the upper part of the gastrointestinal tract up to the duodenum
Total HIP	Total Hip Replacement Surgery	a surgical procedure whereby the diseased cartilage and bone of the hip joint is surgically replaced with artificial materials.
Total KNEE	Total Knee Replacement Surgery	a surgical procedure whereby the diseased knee joint is replaced with artificial material.
Created 08.05.2009	**Note:** *All definitions are taken from Wikipedia.*	

Figure 6.2: Procedure Name and Definition:

The table provides the full name for the procedures in the Lerner's Index study along with the definition describing each procedure.

The count of claims within the study and their distribution is illustrated in Figure 6.3. ChgStatus is the indicator of payer type, with zero referencing the government and one referencing the commercial payers. The distribution of the claims in the study was equally distributed, roughly. It is important that there was roughly equivalent representation of government and private insurers in the sample. Equal representation reduces the likelihood that the LI will be biased due to over-weighted representation by one type of payor over the other.

This monopsony study was possible through insights into the reimbursement by procedure. This was accomplished via the variable PriPayments, later labeled Reimbursement $. If we analyzed PriPayments, N = 457,146 payments in the sample with a mean payment of $7,995.98. The range within the sample via PriPayments was $3,927,300.00. This large range suggested that outliers were present within the sample. This was also confirmed by stem and leaf plot, which uses Tukey's (1977) definition of outliers: three inter-quartile ranges below the twenty-fifth percentile or above the seventy-fifth percentile. This method of identifying outliers suggested that approximately 10% of the samples identified by PriPayments were outliers or extreme values. While identification had been made of outliers in the overall sample, exclusion or removal of outliers were done at a more granular level of the procedure. The removal at the granular level was important as a result of the comparison of reimbursement by payer type, in other words, government or commercial at the case count or number of reimbursements per year by payer. Cases were defined for these purposes as a procedure performed for which an electronic reimbursement was captured.

Although the study was conducted on the data from 1995-2007, reimbursement data was available starting in 2000. While the SSI Group, Inc. (the supplier of electronic claims information), has been in business for over 20 years, the use of electronic remittance that made this study possible only gained acceptance around the year 2000. For this reason, the majority of our data was found in the later years, which is evidenced by the skewing of the sample distribution to the right, as shown in Figure 6.4.

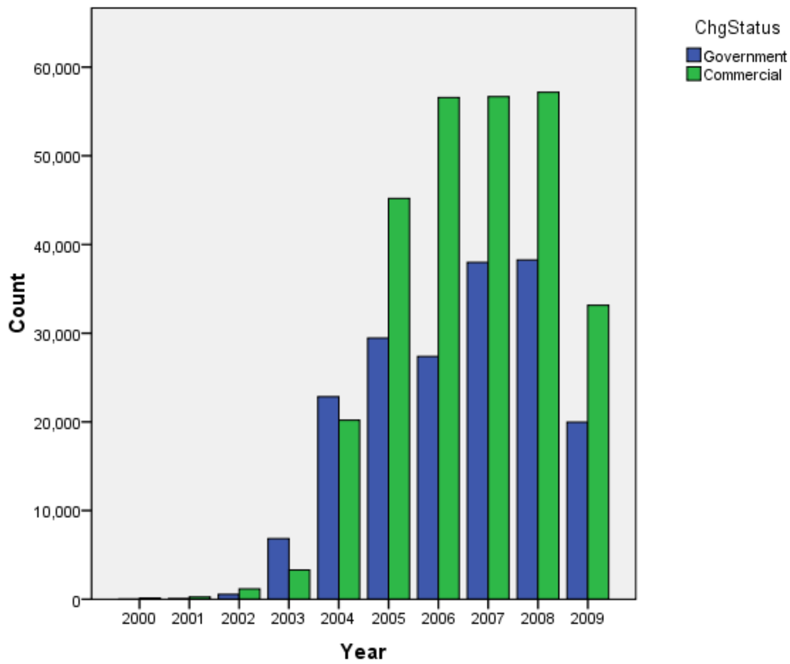
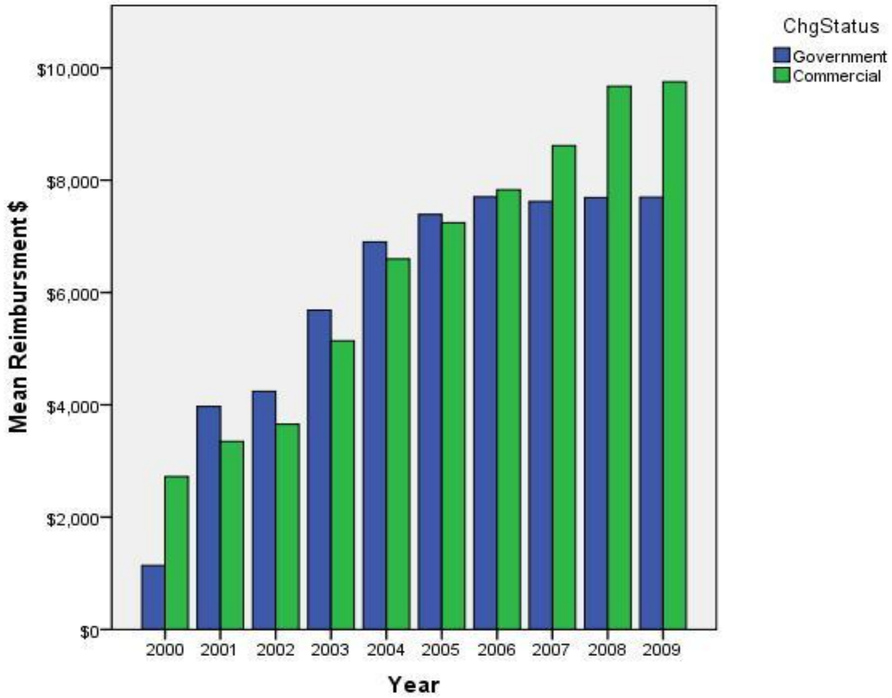


Figure 6.4: Case Count by Year and Payer:

The case counts are relatively small in the year 2000, increasing throughout the remainder of the study for both government and commercial claims. The years 2000-2009 are shown in order to provide the reader with a greater sense of frequency behavior within the data to show that trends that occur in year 2007 continue through 2008. This is important, as the research makes assumptions based upon stability of claim submittal. The year 2009 is one-half of a year. The increase in 2004 was due to the Administrative Simplification Compliance Act of 2001.

In Figure 6.4, the case count was extremely small, less than 1,000 in the year 2000, but it built up quickly through 2007. Large increases in visible cases were evident in the year 2004, approximately three times the cases as in 2003. This large increase in cases was created by ACHs accepting the electronic remittance as a methodology for keeping track of payment. The ACHs used these electronic remittances to automatically post to their accounting systems. Both government and commercial reimbursements were present, with the government representing a larger percentage of cases than commercial reimbursement until the year 2005. Beyond 2005, commercial cases outnumbered government cases by a two-to-one margin. Government cases were higher in the early years, due to the standardization of their electronic remittance in comparison to the commercial market[15]. When PriPayments (Reimbursement $) was analyzed by the mean reimbursement by year and by payer, a similar trend within the data appeared, and is outlined in Figure 6.5. The average payment increased year after year, with a stabilization of payment in 2005-2006.

Figure 6.5: Mean Reimbursement by Year and Payer



In addition to the examination of the overall sample with all procedures and reimbursements together, each procedure was analyzed separately and outliers were

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[15] The Administrative Simplification Compliance Act 2001 (ASCA) amended the Health Insurance Portability and Accountability Act of 1996 (HIPAA) and required that all claims submitted to Medicare on October 16, 2003 and beyond must be done electronically except for certain circumstances, hence the increase in 2004.

removed. Outliers removed at the procedure level will provide a more accurate identification methodology. This method for excluding outliers provides greater accuracy, because payment distributions for the chosen nine procedures vary. By removing outliers at the individual procedure level, we were able to take into account the payment distribution for each individual procedure. Therefore, outliers in the reimbursement for one procedure may not have been considered an outlier for another. This accuracy provided better results further into the study when the regression analysis was performed.

All ACH medical procedures [16]represented in the claims data within the study were invasive procedures, and six of the nine were surgeries. The three remaining medical procedures in the claims data were physically invasive examinations. This may not have been a representative sample of all procedures conducted within a hospital; however, they comply with the previously mentioned requirements of consistent technology and procedure over the course of the study, and have the ability to match directly with a single DRG of government reimbursement. Further analysis of each procedure is shown in Figure 6.6, below

Procedure	LAVH	CBYP	CHOLX	ESWL	BRON	COLO	EGD	HIP	KNEE
(n)	9,143	141,054	52,120	12,532	22,467	118,253	61,019	75	40,483
Mean ($)	5730	12838	6142	4204	15945	1775	5640	14556	12496
Median ($)	3842	7044	4475	3205	5638	788	2375	10455	10260
min ($)	-1024	-16050	-21264	0	-48614	-8443	-14116	247	1
max ($)	322971	1145851	354169	122910	1138980	611159	904256	59075	3878659
Range ($)	323995	1161901	375433	122910	1187594	619602	918372	58828	3878660
Skewness	15	10	12	6	8	36	17	2	151
Kurtosis	405	213	312	102	102	2,573	551	3	27,609
Outliers ($)	x>=13804	x>=30692	X>=16312	X>=10639	X>=34755	X>=3069	X>=12701	X>=30972	X>=20507

Figure 6.6: Procedure Name, Descriptives, and Outliers:

Detailed procedure exploratory data, outliers, and data adjustments can be found in the appendix. (X) represents outliers within the sample for each medical procedure. Values of outliers are represented in dollars. Greater detail of data exploration, outlier removal and data adjustments for each procedure is provided in the appendix for Chapter 6 under the heading "Chapter 6 Procedures".

[16]. Greater detail of data exploration, outlier removal and data adjustments for each procedure is provided in the appendix for Chapter 6 under the heading "Chapter 6 Procedures".

6.3.2.2 Herfindahl-Hirschman Sample

The sample obtained for use in calculating the HHI was significantly larger than that of the LI: N= 12,722,238 initial cases (2000-2009). Each case represented a matched claim and remittance for any medical procedure/DRG that was provided by the ACH in a given year. The ACHs had multiple claims per year, from which a single HHI per ACH is calculated. No limitations were placed on medical services/procedures rendered. Limitations of the study were temporally set for 2000-2007. Only payer information by procedure was necessary to calculate the HHI; therefore, no outliers were present within the data.

6.4 Methodology

6.4.1 Lerner's Index:

In order to show price pressures on the ACH, a modified Lerner's Index (LI) [17]was created for each ACH by year of study (2000-2007). The LI also requires marginal cost data. Normally, the LI is created by using the formula in Equation 6-1.

Equation: 6-1: Lerner's Index

$$\frac{\boldsymbol{P - MC}}{\boldsymbol{P}}$$

P = Price Received

MC= Marginal Cost

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[17] The Lerner's Index in traditional econometric research has been commonly utilized to measure market power of the firm by analyzing the marginal profitability of the firm and was created by Abba Lerner in 1934 (Lerner, 1934, Martin, 1994, Cabral, 2000, and Lipczynski et al., 2009). The Lerner's Index traditionally generates a value between 0 and 1, with 0 denoting no market power and 1 perfect market power, such as a position of monopoly or monopsony (Martin, 1994, Cabral 2000 and Lipczynski,et al, 2009). This research uses the Lerner's Index in its traditional role to measure market power. Lerner (1934), Martin (1994), Lipczynski, et al (2009) and Cabral (2000) support this approach to measurement of market power via the Lerner's Index.

Here, ***P*** is the price received within the market for the good, and ***MC*** is the marginal cost associated with producing the good. The LI also provides a measure of the monopoly power of each ACH. The LI traditionally provides an index from zero to one, with one being true monopoly power, and zero possessing no monopoly power. This is achieved, as, marginal cost (MC) equals price under perfect competition. Effectively, the formula becomes price minus price under perfect competition, as a proportion of price.

In this case, an adaptation of the LI was valuable to address concerns in the previous research of Shibata (1973), Pauly (1998), Feldmand (2001), and Taylor (2003), that ACHs are monopolistic in that the lower prices paid for services are a function of monopoly busting and not a condition of monopsony. By utilizing the LI, one can answer two questions: 1) what, if any, are the price pressures on ACHs (are they price makers or price takers)? 2) Is there any concern of a monopoly power still prevalent with ACHs? By analyzing price pressures, one is able to understand whether ACHs are price takers or price makers within the market.

As market power for ACHs is bounded geographically, the research considered the geographically bounded market power in order to reduce the likelihood of misrepresenting market power due to the distortion of the geographically bounded markets. A problem with creating the LI for each hospital for each of the years studied was that marginal cost data was not provided via the MCR. Therefore, another method was used to obtain access to cost data. This approach provided an approximate value of the LI. This modified LI provided valuable information and insight into market power of hospitals. In order to calculate the modified LI, the average total cost was used instead of the marginal cost.

The average total cost (ATC) per procedure was calculated by taking the total operating expenses provided in the MCR for each ACH per year, and dividing that by the total number of inpatient and outpatient days provided by the ACH that year which provided the average cost per patient day (ACPPD) for the ACH. The ACPPD is then multiplied by the geometric length of stay (GMLOS). However, total operating costs include depreciation and interest expenses along with general and administrative expenses. These additional expenses can be regarded as fixed costs. Therefore, in taking the ATC to equal the MC, we assume that the ATC= average variable costs (AVC) (that is, the average fixed costs are close to zero), and that the

AVC are constant with respect to output (patient days) at output ranges observed in practice. The ATC per procedure is represented in Equation 6-2. This is the fully burdened cost of providing services to a patient per day. The ACHs utilize the total cost per patient days to measure the productivity and efficiency of the firm.

Equation: 6-2: Average Total Cost Per Procedure

$$\boldsymbol{C_{jti}} = \left(\frac{\boldsymbol{E_i}}{\boldsymbol{D_i}} * \boldsymbol{g_j}\right)_{\boldsymbol{t}}$$

C = Avg. Total Cost (ATC)
j = procedure
E = Total Annual Operating Expenses
D= Total inpatient and outpatient days
g = Geometric Length of Stay
i = firm
t = Year

Each of the nine procedures outlined within the study were reimbursed by the government utilizing a DRG. Each DRG is assigned a Geometric Mean Length of Stay (GMLOS)[18], which is the geometric mean length of stay in days for that particular procedure or diagnosis. Through studies, the government has determined the GMLOS to be the amount of time for a patient to be in the hospital with each particular procedure or illness treated, weighted by frequency of the number of days. The commercial insurers also utilize this same geometric length of stay in order to determine reimbursements, as well as to determine whether scrutiny of a claim is necessary. In other words, this process is utilized to determine the appropriate length of patient stay for the commercial and government payor alike.

An assumption made in this research was that the ACH incurs the geometric length of stay cost of treating the patients. This assumed that a patient with a given DRG actually stayed in the hospital the amount of time noted by the GMLOS. When

[18] A table outlining the Geometric Length of Stay for each procedure and date range is provided in The Appendix. This GMLOS provided for each procedure is listed in days. The date ranges correspond to the time period of this research.

the actual patient time in the hospital differed from GMLOS, it is likely that the ATC will not equal the average cost (AC).

The geometric length of stay is measured in patient days. Therefore, the AC per patient day multiplied by the geometric length of stay for a specific procedure equals the ATC for a given procedure. The ATC was calculated for each procedure within the study by using the preceding equation, Equation 6-2. The ATC for each procedure was calculated, and the approximation of the LI was created using the formula in Equation 6-3.

Equation: 6-3: Lerner's Index (Modified)

$$L_{it} = \sum_{j=1}^{n} \frac{\left(\frac{P_j - C_j}{P_j}\right)_{ti}}{n_{ti}}$$

L = Proxy for the Lerner's Index
P= Price paid by the insurer
C= Average Total Cost (ATC)
i = individual ACH
t = year
j= procedure
n = total number of procedures within (*t*) for ACH (*i*)

By using the ATC, a modified LI was calculated for each claim within the study, for a total of 273,399 LIs. The LIs were then summed by year and ACH, and divided by the total number of procedures conducted in the study by the ACH for a given year. This calculation yielded an average LI for each ACH for each year it participated within the study. Using this methodology, 1,603 LIs were produced.

6.4.1.1 Lerner's Index Hypotheses:

This research examined the lack of market power on behalf of ACHs in the healthcare market, and its negative consequence for decisions of capital structure. In order for the research to proceed under this premise, two conditions must be evident: 1) The LI values must be low to show lack of market power; and 2) The LI values must positively correlate with the Real FCF. The hypothesis for this examination is found in Hypothesis 6-6.

Pauly (1988) proposed that monopsony market power was a possibility given the constructs of the U.S. healthcare market. He proposed that monopsony within this market may not be beneficial from the supplier or consumer's perspective, as it most likely could lead to lower input prices and higher insurance prices, all while making less medical services available. This was possible, as services with a value above their cost simply would not be furnished. All this was proposed as a result of discount pricing by the monopsonist insurer. Pauly (1998) furthered this inquiry by creating an empirical model to test for the presence of monopsony within the healthcare market. He concluded that the empirical model indicates a possibility of monopsonistic behavior by some insurers. In line with Pauly's suggested possibility of insurer monopsony, we would expect to find that low LI values for ACHs negatively affects free cash flows of ACHs indicating lack of ACH monopoly power. This implies the statistical hypothesis:

Hypothesis 6-6: Lack of Monopoly Power Negatively Affects Real FCF

$$\boldsymbol{H_0 = Li\ does\ not\ correlate\ with\ Real\_FCF}$$
$$\boldsymbol{or\ has\ a\ negatively\ correlation}$$

$$\boldsymbol{H_1 = Li\ is\ positively\ correlated\ with\ Real\_\ FCF}$$

The null hypothesis is that there is no relationship between the LI and FCF, or that they negatively correlate. If there is positive correlation, then we can reject the null hypothesis. In addition to the relationship between the LI and the Real FCF, this research also proposed that ACHs operate under an all-or-nothing contractual arrangement, and that this is the primary cause for the lower prices paid to ACHs. In order for this to be true, ACHs must be price takers, as Real FCF has additional variables that can influence its value and can distort consideration of price taking. In consideration of this, the research proposed constructing an additional model using the NISP instead of Real FCF, as this better measures the contractual relationship between ACHs and payors. The hypothesis for this model can be seen in Hypothesis 6-7. Lack of monopoly power or market power is expressed in low values of the LI. This implies the statistical hypothesis:

Hypothesis 6-7: Lack of Monopoly Power Negatively Affects NISP

$$\boldsymbol{H_0 = Li\ does\ not\ correlate\ with\ NISP}$$
$$\boldsymbol{or\ \ negatively\ correlation\ with\ NISP}$$

$$\boldsymbol{H_1 = Li\ is\ positively\ correlated\ with\ NISP}$$

Evidence of price taking would be provided by way of positive correlation of the LI and NISP. If values of the LI are low and these positively correlate with the NISP, then price taker status can be supported. This would suggest that low market power or lack of monopoly power by ACHs has a negative impact on market rents derived from insurers, and hence on revenues.

In order to understand the possible implications of these price pressures, and the market power of the ACH on the capital structure of the ACH, the LI was utilized in a random effects panel regression using the model in Equation 6-4, below (random effects were confirmed via Hausman Test[19]).

Equation 6-4:

$$\begin{aligned}\boldsymbol{Real}\ \mathrm{FCF_i} = \boldsymbol{a} + \boldsymbol{B_1}(\boldsymbol{L_i}) + \boldsymbol{\beta_2}(\boldsymbol{Bi_{hospsize2}}) + \boldsymbol{\beta_3}(\boldsymbol{Bi_{hospsize3}}) + \boldsymbol{\beta_4}(\boldsymbol{Bi_{hospsize4}}) \\ + \boldsymbol{\beta_5}(\boldsymbol{Bi_{hospsize5}}) + \boldsymbol{\beta_6}(\boldsymbol{Capital\ Cost}) + \boldsymbol{\beta_7}(\boldsymbol{Capex}) + \boldsymbol{\beta_8}(\boldsymbol{LnTA}) \\ + \boldsymbol{\beta_9}(\boldsymbol{Leverage}) + \boldsymbol{\beta_{10}}(\%\ \boldsymbol{Gov_{Bus}}) + \boldsymbol{\beta_{11}}(\boldsymbol{Bi_{2001}}) \\ + \boldsymbol{\beta_{12}}(\boldsymbol{Bi_{2002}}) + \boldsymbol{\beta_{13}}(\boldsymbol{Bi_{2003}}) + \boldsymbol{\beta_{14}}(\boldsymbol{Bi_{2004}}) + \boldsymbol{\beta_{15}}(\boldsymbol{Bi_{2005}}) \\ + \boldsymbol{\beta_{16}}(\boldsymbol{Bi_{2006}}) + \boldsymbol{\beta_{17}}(\boldsymbol{Bi_{2007}}) + \boldsymbol{\beta_{18}}(\boldsymbol{Net_{Margin}}) \\ + \boldsymbol{\beta_{19}}(\boldsymbol{Fiscal\ Year\ Reported}) + \boldsymbol{\varepsilon}\end{aligned}$$

- **Note: (Bi) prior to variable denotes a binary variable.**

[19] The Hausman test is a test of whether the loss in efficiency is worth removing the bias and inconsistency of the OLS estimators. The Hausman test involves fitting the model by both IV and OLS, and compares a weighted square of the difference between the two estimators. The difference in estimators is used to confirm use of the random effects model over OLS (Gibson, 2010).

The model provided an estimate of the strength and relationship of market power measured in the LI and the real FCFs (FCF measured in real [1996] terms). This relationship allowed for a better understanding of the real FCF created by the market power of the ACH, and gave the research insight into the considerations of managers who decide the capital structures of the ACHs. In addition, a second model was constructed, with the LI as the primary independent variable and Net Income from Service to Patients (NISP) as the dependent variable, as shown in Equation 6-5. The additional model was to examine LI in relation to the NISP. The change to utilizing the NISP was because the real FCF can be distorted by the variable Other Income in the MCR. Other Income is the sources of income other than revenue from service to patients, and was defined in Chapter 3. The NISP encompassed all revenue streams derived from insurance reimbursement, and would better reflect monopoly power or lack thereof, in relation to the payors. In other words, if ACHs are monopolist and can obtain a higher price margin and therefore have a higher LI, then this should be evident in the revenues derived from that monopoly power. Likewise, if ACHs lack monopoly power and have low LIs, this too should be more evident in the relationship with NISP.

The NISP was a better measure than Real FCF for price taker status because the revenue stream was supported largely by payor reimbursement. The NISP is defined as Net Patient Revenues minus Total Operating expenses. Net Patient Revenues is defined as Total Patient Revenues minus Contractual Allowances. Total Patient Revenues is defined from sources such as inpatient care, outpatient care, ancillary services, home health, ambulance, outpatient rehab, ASC and hospice. It was evident that the services included in NISP captures all revenue streams for which insurance reimbursement is likely. The NISP is included in net income calculation in the MCR; therefore, it affects the calculation of FCFs, and likewise, Real FCFs. If lower Real FCFs affect capital structure, a low value of the LI and positive correlation in the LI and NISP provide evidence of two things: price taker status for services to patients and the lack of monopoly power on the part of the ACH for services to patients, thus providing an alternative to examining monopoly power with just the relationship of the LI and Real FCFs.

Equation 6-5:

$$\begin{aligned}
&\boldsymbol{Net\ Income\ from\ Service\ to\ Patients_i} \\
&\quad = \boldsymbol{a} + \boldsymbol{B_i(L_i)} + \boldsymbol{\beta_2(Bi_{hospsize2})} + \boldsymbol{\beta_3(Bi_{hospsize3})} \\
&\quad + \boldsymbol{\beta_4(Bi_{hospsize4})} + \boldsymbol{\beta_5(Bi_{hospsize5})} + \boldsymbol{\beta_6(Capital\ Cost)} \\
&\quad + \boldsymbol{\beta_7(Capex)} + \boldsymbol{\beta_8(LnTA)} + \boldsymbol{\beta_9(Leverage)} \\
&\quad + \boldsymbol{\beta_{10}(\%\ Gov_Bus)} + \boldsymbol{\beta_{11}(Bi_{2001})} + \boldsymbol{\beta_{12}(Bi_{2002})} + \boldsymbol{\beta_{13}(Bi_{2003})} \\
&\quad + \boldsymbol{\beta_{14}(Bi_{2004})} + \boldsymbol{\beta_{15}(Bi_{2005})} + \boldsymbol{\beta_{16}(Bi_{2006})} \\
&\quad + \boldsymbol{\beta_{17}(Bi_{2007})} + \boldsymbol{\beta_{18}(Net_Margin)} \\
&\quad + \boldsymbol{\beta_{19}(Fiscal\ Year\ Reported)} + \boldsymbol{\varepsilon}
\end{aligned}$$

- **Note: (Bi) prior to variable denotes a binary variable.**

Table 6.2: Summary Statistics for all variables included in the Lerner's Index Regressions:

Lerner's Index Variable Summary Statistics

Variable	n	Mean	Std. Deviation	Min	Max
Real FCF	1367	-2837295	5.12E+07	-2.45E+08	4.56E+08
NISP	1386	-2315778	4.18E+07	-4.59E+08	1.75E+08
LI	1387	-25.208	262.7757	-8767.8	1
CC Proxy	1387	0.015113	0.0795501	-1.19634	2.298824
Capex2	1387	1.04E+07	2.07E+07	0	2.32E+08
LnTA	1380	18.33174	1.31E+00	12.07128	2.15E+01
Leverage	1319	0.292267	5.73E-01	-4.91121	4.46E+00
% Gov_Bus	1343	0.614048	1.49E-01	0.036481	9.47E-01
Fiscal Yr	1387	2004.05	1.45E+00	2000	2006
Net Margin	1376	0.198613	5.91E-02	-0.96536	1.41E+00

Table 6.3: Correlation Matrix for Lerner's Index Variables:

The highest correlation value present is for the relationship of Capex and the natural log of total assets (.4586). This value makes sense as increases in Capex expand Total Assets. There is no concern for multicollinearity in any of the values.

Variables	Real FCF	NISP	LI	CC Proxy	Capex 2	LnTA	Leverage	%Gov_Bus	Fiscal Yr	NetMargin
Real FCF	1									
NISP	0.2312	1								
LI	-0.2144	-0.0087	1							
CC Proxy	0.0088	-0.01	0.0084	1						
Capex 2	-0.171	-0.0862	0.0078	-0.0463	1					
LnTA	-0.2037	-0.1113	0.0302	-0.0094	0.4586	1				
Leverage	-0.0375	-0.1011	0.0187	0.0271	0.0061	0.0609	1			
% Gov_Bus	0.0584	0.0529	0.015	0.0498	-0.2106	-0.3821	-0.0398	1		
Fiscal Yr	0.0197	0.0469	-0.0661	-0.0709	0.2063	-0.0113	-0.062	-0.0474	1	
Net Margin	0.1013	0.3117	0.0285	-0.0533	0.0499	0.1118	-0.2323	-0.0557	0.0073	1

Variable Definitions:

LI- (Lerner's Index) was the primary independent variable and is a measurement of market power of ACHs. Given the premise that monopsony by payers exists within the healthcare market, and that ACHs presented as lacking market power, we expected the Lerner's Index, a measurement for market power, for each ACH to have a strong positive correlation with the Real FCFs of ACHs and NISP of ACHs. The lack of market power on behalf of ACHs was the primary reason for the expectation of ACHs to be price takers. Therefore, a low value of a LI will equate to a low Real FCF and NISP. There are limitations in the use of the LI in this case as the LI is a modified LI, which uses average total cost instead of marginal costs. However, it is assumed that ATC equals the MC, that ATC equals the average variable costs (AVC) (that is, the average fixed costs are close to zero), and that AVC are constant with respect to output (patient days) at output ranges observed in practice.

Leverage – (Leverage) was used to measure the outstanding debt of the ACH. Leverage is defined as total long-term liabilities divided by total assets. This is included in the regressions to control for the effect Leverage has on Real FCFs. As hospitals are heavily leveraged, inclusion of the variable allows the regression to control for any effects or explanation it might have on Real FCFs. Leverage was expected to have a negative correlation with Real FCFs. As leverage increases, borrowing costs associated with leverage increase, thereby reducing FCFs. Leverage was used to control for the amount of debt of an ACH. Leverage is a calculated variable within the data. A definition for the variable can be found in the appendix for Chapter 4 variable nomenclature and definitions. There were no limitations in calculating the variable from the data.

Profitability – (Net Margin) was included as the control for profitability while observing the relation between real FCF and LI. Profitability of the ACH affects the generation of Real FCFs and therefore its inclusion in the regression as a control variable is important. Net Margin has been deflated using the CPI for hospital services (1996-2007; U.S. Bureau of Labor Statistics 2009). Net Income iis a primary variable in calculating Net Margin; it therefore has and impact on the ability of an ACH to generate free cash flows. Net Income is comprised of two revenue streams for ACHs Net Income from Service to Patients and Other Income. Profitability was expected to have a positive correlation with Real FCFs.

Size – (LnTA) the natural log of total assets used as a control for size in the research. This logic followed previous research in its utilization to control for size. Controlling for size takes into account the magnitude and production capability of the ACH when looking at real FCFs and its relation to the LI. Total Assets is a variable provided within the MCR. Total Assets has been deflated by the CPI for hospital services (1996-2007; U.S. Bureau of Labor Statistics 2009).

In addition to LnTA, a binary variable was used to represent the size categories created in Chapter 3. Four out of the five categories were represented by a binary variable. Size was expected to have a positive correlation with Real FCF's and NISP. As assets increase, so too does the production capability of the ACH. There is a limitation in using a binary size variable which is based upon licensed beds as ACHs may not have all the licensed beds in production at all times which may cause this variable to slightly overstate their production capabilities. The concern is somewhat reduced as ACHs can quickly put these beds back in to production should demand require it.

Time - (t) Fiscal year was the control for time. Its inclusion was to reduce temporal effects within the model caused by time. Fiscal year is a provided variable within the MCR. Time was controlled for by the inclusion of a binary variable for each year of the study minus one. Therefore, while the data covered the years 2000-2007, only 2001-2007 had a binary variable. Time was expected to have a positive correlation with the Real FCFs and NISP as revenues are expected to increase slightly with inflation and increasing costs.

Real FCF- (Real FCF) The Real FCF was the free cash flow of each ACH in 1996 dollars. It is the dependent variable in both the regression for the Lerner's Index and the Herfindahl-Hirschman Index. Free cash flows were presented in 1996 dollars in order to remove changes in the FCF due to inflation during the longitudinal period of this study. It is expected that Real FCF will have a negative correlation with the Lerner's Index and Herfindahl-Hirschman Index. A limitation in the use of Real FCF comes from the underlying issues in calculating FCFs. As was mentioned previously FCF is missing data on total depreciation and capital expenditures. The majority of cases within the MCR data were missing both of these variables. Where both data components are missing FCF may be may be slightly understated. It should also be noted that free cash flows are calculated using net income as a starting point. Net income is comprised of net income from services to patients (NISP) and other income. While margins calculated using only the net income from service to patients were negative for the time period of this study, margins calculated using both NISP and Other Income were positive. This suggests that other income provides the necessary revenues for ACHs to have positive margins overall. As the Lerner's Index in this research is a measure of margin on selected health services, it may present a problem in the expected correlation between the LI and Real FCF's.

Individual ACH – (i) was the individual ACH for which the all the variables pertain.

Capital Expense - (Capex2) Capex2 was used as the control mechanisms for the uses of free cash flow and leverage in acquiring assets. This allowed the model to account for ACH free cash flow in light of capital spending. Capex was a calculated variable that represented the change between old (time *t-1*) capital assets and new capital assets (time *t*) as used in calculating the FCF and mentioned previously. Capital expense was expected to have a negative relation with Real FCFs. Any increase in Capex decreases the amount of FCFs available to the ACH. The use of Capital Expense is limited by the number of cases, which originally contained value for old and new capital assets. Where the data was missing, a zero was added. This may cause the capital expenditures of ACHs to be over or under stated.

Cost of Capital - (CCProxy) was used in the study to control for cost of capital associated with the size of debt. The study made an assumption that firms with similar debt sizes would differentiate their use of cash flows when servicing debt if the firms had different costs of capital. Taking total interest expense as a ratio to total long-term liabilities created a proxy for cost of capital. One would expect that similar to leverage, the cost of capital would negatively correlate to the FCF. The basis for this is that the FCF is computed after all cash flows for maintenance of leverage and short-term liabilities have been paid. The more it costs to maintain the debt of an ACH, the more it reduces the FCF. Including this variable accounts for all Real FCF fluctuation due to debt, both Leverage and its costs. A limitation in the variable CCProxy is generated by the possibility of long term liabilities on the balance sheet not requiring any interest to be paid. Where this is the case, it is likely that CC Proxy is understated.

Percent of Government Business – (%Gov_Bus) was used within the study to control for the amount of business an ACH receives from government payors. Government payors typically pay less than private ones. The calculation for this variable was provided in Chapter 4. Percent government business also controlled for agency cost by taking into account the amount of the Real FCFs derived from the government, and %Gov_Bus will have a negative correlation to the real FCFs, as per Chapter 4. Limitations of the Percent of Government Business were fully discussed in Chapter 4; these were generated by the difference in reimbursement between government and private payors. In this case the government reimburses ACHs less for a given patient days services, therefore it is likely that because the proxy is based upon the use of patient days consumed by the government of total patient days rendered by the ACHs, the proxy will overstated the revenues derived from government sources. The said the proxy does capture the amount of resources consumed by the government as ACHs output is measured in patient days.

Net Income from Service to Patients- (NISP) was the net income from service to patients, comprised of net patient revenues minus total operating expenses. The NISP was presented in 1996 dollars in order to remove influence in NISP due to inflation during the longitudinal period. NISP was included as the dependent variable in a subsequent Lerner's Index model to analyze the correlation of the Lerner's Index with those revenues derived solely from services rendered to patients where reimbursement was from the payors. This was done to exclude any distortion Other Income may have had on the model analyzing LI with Real FCFs. It also provided a better way for modeling price taking by ACH's in comparison to payors.

6.4.2 Herfindahl Hirschman Index:

While the LI provided value in understanding price pressures that ACHs are under and the possibly monopoly power that exist for ACHs (the suppliers) in their markets, an additional understanding of market power contained within the payors (the consumer or buyer) side of the market was required. While the research was not able to measure the market power for the payor directly, it was able to achieve measurement via use of an alternative approach. This alternative approach allowed the research to infer a value for market power via The New Empirical Industrial Organization (NEIO). While the NEIO model will be discussed later in more detail, an important variable used to achieve this inference must be created and measured as it provides the basis of the research to move forward under the NEIO model. The research utilizes this alternative methodology using the NEIO by measuring concentration of payors in the market faced by ACHs via the Herfindahl Hirschman Index (HHI)[20]. Measuring concentration of payors allowed the research to examine concentrations effect on free cash flows via regression analysis possibly providing evidence of collusive behavior. By combining concentration, collusion and demand elasticity for the market of healthcare services the model seeks to infer a value for the market power of the payors, which supports collusive monopsony.

Evidence of collusive monopsony was created in three basic steps: The primary base to support collusive monopsony was the calculation of the HHI, which measured concentration ofthe payor market faced by ACHs. The HHI value supported concentration via its numerical value in comparison to that of acceptable values applied by the U.S. Department of Justice for other instances of market power. Secondly, concentration via the HHI was analyzed to observe its influence on Real FCFs of ACHs to provide evidence of collusion of government and commercial payors via random effects panel regression. Thirdly, using evidence of collusion, the research combined both the concentration of the payor market via the HHI, an estimate of demand elasticity for healthcare services and evidence of collusion via the regression analysis into the NEIO to estimate the market power of the payor.

[20] The Herfindahl-Hirschman Index is and index used to measure concentration of a market by looking as the size of firms market share in relation to industry as an indicator of the competition amongst them (Miller, 1982, Cahen and Sullivan, 1984 and Rhodes, 1993). Orris Herfindahl and Albert Hirschman created the Herfindahl-Hirschman Index. It is widely used as an econometric concept in competition or antitrust law. The HHI takes the sum of the squares of the market shares of the 50 largest firms within an industry. This formula provides an average market share weighted by market share. It provides a measurement from 0 to 1.0 with 0 representing large competition and 1 representing monopolistic or monopsonistic power. The HHI is often express as the value between 1 and 0 multiplied by 10,000. The use of this methodology is similar in approach to Hersch (1994). Schramm and Renn (1984).

In order to proceed, an understanding of the HHI is necessary. The HHI is defined by the U.S. Department of Justice and the Federal Trade Commission as:

> "The HHI takes into account the relative size and distribution of the firms in a market and approaches zero when a market consists of a large number of firms of relatively equal size. The HHI increases both as the number of firms in the market decreases and as the disparity in size between those firms increases. Markets in which the HHI is between 1000 and 1800 points are considered to be moderately concentrated and those in which the HHI is in excess of 1800 points are considered to be concentrated. Transactions that increase the HHI by more than 100 points in concentrated markets presumptively raise antitrust concerns under the Horizontal Merger Guidelines issued by the U.S. Department of Justice and the Federal Trade Commission." (DoJ, 2009)

The HHI is the best measurement due to its ability to indicate level of market concentration similar to methodologies employed by Seth (2006). In Seth's research, the index measured concentration amongst health insurers and its effects upon physician earnings and services. Similarly, in this study, the HHI measured the concentration of insurers within the ACH market and its effects on the free cash flows of ACHs. A problem that arises when using the HHI as a measurement within healthcare is the geographically different markets of ACHs. Insurers/payers often are restricted from crossing state lines, making it difficult to compete in a broad geographic area. Therefore, ACHs face different competitive markets of insurers, which vary according to location.

In order to overcome this estimation problem, buyer side concentration must be analyzed by each individual ACH geographic region. This was accomplished by taking the payer for each claim by ACH and Year, which was available within the claims/remit database, and calculating the market share that the payer possessed out of the total number of procedures of the ACH within the study that year. Then, this value was squared and summed by ACH and year. The HHI formula is listed below in Equation 6-6.

Equation 6-6:

$$HHI_{it} = \left(\sum_{i=1}^{n} (\frac{q_b}{Q})^2 * 10000\right)_t$$

HHI = Herfindahl Index
q = quantity procedures consumed by insurer (b) of ACH (i)
Q = total quantity of procedures consumed of ACH (i)

Therefore, in effect, each ACH would have an HHI per year (*t*). This takes into account the geographical issues with market power, in other words, the insurers that have market power, and that the magnitude of that market power in one geographical area will be different for an ACH in a different geographical area. The value of the HHI determined the concentration of the market. The U.S. Department of Justice (2009) suggested that values above 1,800 are considered concentrated markets. If the values found within this research are above this number, then the payor market will be considered concentrated. Highly concentrated markets are more likely to generate collusion than less concentrated markets (Cabral 2000). Therefore, in order to validate the presence of collusion, the research examined the effect of concentration on the Real FCFs. Collusion via concentration will provide a negative correlation with Real FCFs.

In order to show collusion, the Real FCFs was regressed on the HHI using a random effects panel regression model adjusted for clustering. The random effect model was confirmed as necessary by a Hausman Test. The model can viewed in Equation 6-7, below.

Equation 6-7: Collusion Regression

$$\begin{aligned} Real\_FCF_i = \ & a + B_i(HHI_i) + \beta_2(Bi_{Hospsize2}) + \cdots + B_5(Bi_{Hospsize5}) \\ & + \beta_6(Cost\ of\ Capital) + \beta_7(Capex) \\ & + \beta_8\ (LnTA) + \beta_9(Leverage) + \beta_{10}(\%Gov_{Bus}) \\ & + \beta_{11}(NetMargin) \\ & + \beta_{12}(PayorCountBI_1) \ldots \beta_{13}\ (PayorCountBi_{n-1}) \\ & + \beta_{14}(Fiscal\ Year\ Bi_{2001}) + \cdots + \beta_{18}(Fiscal\ Year\ Bi_{2005}) + \varepsilon \end{aligned}$$

- **Note: (*Bi*) prior to variable denotes a binary variable.**

The beta for the HHI provided evidence of the strength of the relationship of concentration ability to influence free cash flows. Control variables (CV) were added factors that might explain changes in the Real FCF over time.

Table 6.4: Summary Statistics for all variables included in the Herfindahl-Hirschman Index:

Herfindahl-Hirschman Index Variable Summary Statistics

Variable	n	Mean	Std. Deviation	Min	Max
Real FCF	4581	1712729	1.08E+07	-2.52E+06	2.82E+07
HHI	4581	0.9023582	1.91E-01	9.50E-02	1.00E+00
CC Proxy	4581	0.0171296	0.1859329	-3.05781	9.315964
Capex 2	4581	4257356	1.02E+07	0	2.55E+08
LnTA	4520	1.75E+01	1.44E+00	0.693147	2.18E+01
Leverage	4109	0.26238	1.11E+00	-30.7978	3.30E+01
%Gov_Bus	3813	0.6439854	1.48E-01	0.005353	1.00E+00
Net Margin	4523	0.018182	6.10E-02	-1.57139	5.56E-01
Fiscal Yr	4581	2003	2.02E+00	2000	2007

Herfindahl-Hirschman Index Regression Correlation Matrix

Variables	Real FCF	HHI	CC Proxy	Capex 2	LnTA	Leverage	%Gov_Bus	Net Margin	Fiscal Yr
Real FCF	1								
HHI	0.0188	1							
CC Proxy	-0.0009	-0.0118	1						
Capex 2	-0.1836	-0.1179	-0.0177	1					
LnTA	-0.1907	-0.1306	0.0166	0.3928	1				
Leverage	-0.0969	-0.0393	0.0085	-0.0056	-0.0615	1			
%Gov_Bus	0.0366	0.1249	-0.0185	-0.1895	-0.4355	-0.0123	1		
Net Margin	0.0965	0.029	-0.0051	0.0806	0.1659	-0.2698	-0.0609	1	
Fiscal Yr	0.002	0.1676	-0.0492	0.1151	0.008	-0.0331	0.0094	0.0194	1

Table 6.5: Herfindahl-Hirschman Correlation Matrix:

The matrix below provides evidence that there is little concern for multicollinearity in the HHI regressions. The highest value for correlation presented with the matrix is for the relationship of for the natural log of total assets with the percentage of government business. The value of -.4355 suggests that total assets and percent government business is negatively correlated. This confirms previous statements that smaller hospitals have more government business. Thus, they are more likely to only have one payor. No other correlation values present a concern.

Variable Definitions:

HHI – is the Herfindahl-Hirschman Index, which is a measure of market concentration. In the case of this research, the HHI represented the concentration of payors within a given ACH market. This research proposed that a collusive monopsony exists within the market for healthcare services. This variable was included in the regressions as it allowed the research to analyze the effect concentration has on the real free cash flows of ACHs. Concentration affecting free cash flows negatively provides evidence of collusion. As collusion was expected, concentration, or the HHI, will have negative correlation with Real FCFs. Concentration of the payor market would not have a negative impact on the Real FCFs if collusion was not present. Concentration was calculated using the payor count that a hospital submits electronically. Where this deviates from the actual number of payors that an ACH submits bills to in any format, will cause the concentration measurement to skew, with an overstatement of concentration being the most likely. In order to control for this likelihood the research structures the models and set limits within each model for the least amount of payors a hospital could submit electronically. For instance, in the models the least amount of payors that an ACH was allowed to submit electronically ranged from 7 in one model to 1 in another. As the least allowable payor count approaches one, the model is more likely to have error due to overstatement of concentration. Payor count was also controlled for via direct variable inclusion within the model.

Payor Count - Payor Count was controlled for, as ACHs may have multiple payors. The number of payors can affect real free cash flows. A binary variable was created for each payor count up to 50. All payor counts above 50 were included in one variable. An n-1 strategy was followed, meaning that there was one less binary for the number of payor counts included in the model. Payor count was calculated directly from the claims data by counting the exact number of different payors that an ACH submitted bills electronically for. It was included also to account for the variability in payment that comes with an increase in the number of payors. This is important and most payors differ on reimbursement of the same procedure or health service.

All other variables used in the HHI analysis have the same definitions as described in the LI analysis.

6.4.2.1 Hypothesis for Collusive Monopsony Power based on the Herfindahl Hirschman Index:

The null hypothesis is that there is no collusion; therefore, the HHI does not have a negative correlation with Real_FCF. If the HHI does not correlate with Real

FCFs, then concentration does not affect the Real FCFs of ACHs, and therefore no evidence of collusion can be shown. Likewise, if the HHI has a positive correlation with Real FCFs, then concentration is having a positive effect on Real FCFs. In other words, the more concentrated the insurer market faced by the ACH, the more the ACH Real FCFs increase. Both of these situations undermine the presence of collusion by the payors. However, the null hypothesis can be rejected if a negative correlation is found, as this provides evidence of collusion. In this case, the presence of collusion indicates that the payors are using market power to affect prices paid to ACHs The interaction of concentration and collusion with market power via NEIO are discussed in greater detail in Section 6.5.2.3. A negative correlation between Real_FCF and HHI was expected, as per previous literature (Seth 2006). This implies the statistical hypothesis:

Hypothesis 6-8: Collusion Hypothesis

$$\boldsymbol{H_0 = HHI\ does\ not\ correlate\ with\ Real_{FCF}}$$
$$\boldsymbol{or\ has\ a\ positive\ correlation}$$

$$\boldsymbol{H_1 = HHI\ is\ negatively\ correlated\ with\ Real\_FCF}$$

6.4.3 Expected Results

The combination of the LI and the HHI allowed analysis through the research to determine whether collusive monopsony is present. Based upon previous research, the model will provide evidence of lower values for the LI of ACHs, indicating low market power for ACHs. The low market power of ACHs will show and affect capital structure via the FCF, and likewise, there will be positive correlation of the LI of ACHs with the NISP and Real FCF, indicating that ACHs are price takers, as the ACHs will be unable to demand prices paid. Thus, FCFs will suffer and will be reduced. The reduction of FCFs will limit access to debt markets, as less FCFs will be available to be promised to pay principle and interest on loans from borrowers. This limitation on debt will change the way ACHs' managers approach the capital structures of their organizations. Additionally, measuring concentration through the HHI of the ACH payor market will provide evidence of high concentration of the ACH payor market, and that the higher concentration of the ACH payor market will have negative effects upon free cash flows, indicating collusion in ACH markets with concentrated markets. It is only by use of market power that concentration negatively affects FCFs of ACHs. Concentrations negatively affecting FCFs suggest collusion. Collusion provides the framework by which market power expresses itself.

Feldmand and Wholey (2001) suggested that lower reimbursement indicated that conditions within the U.S. healthcare market were those of monopoly busting and not of monopsony. If the conditions within the market were those of monopoly busting, then one would expect to find that the HHI calculated for the payors has no affect upon FCFs, and therefore, there is no evidence of collusion. In addition, one would expect the LI (on behalf of the ACHs) to show evidence of market power. One also would expect ACHs to be price makers, or at least not price takers within the market. If a low value was found for the LI (on behalf of the ACH), this would evidence a lack of monopoly power. Thus, ACHs as price takers would suggest that payors are exploiting market power.

6.5 Results

6.5.1 Monopsony Results Using the Lerner's Index

In an attempt to uncover market power on the part of ACHs, the LI was calculated on behalf of the ACH. Calculating the LI for the ACH enabled the researcher to analyze two questions within one calculation. The first was, is there monopoly power on the part of the hospital? Thus alleviating the concerns expressed in the research of Feldman and Wholey (2001). If the hospital had monopoly power, then it would be reflected by a high LI. If however a low value for the LI was found, then this would provide the research with the ability to refute the findings of Felman and Wholey (2001). Feldman and Wholey (2001) had suggested that lower reimbursement to hospitals by HMOs represented a breakup of monopoly power of the ACH rather than traditional monopsony by the HMOs. The second question is if ACHs are price takers. If ACHs are price takers then they will not be able to determine prices paid for healthcare services rendered to patients. ACHs are more likely to be price takers under a collusive monopsony as business terms are dictated by the all or nothing contractual arrangement.

Lerner's Index Values

Year	2000	2001	2002	2003	2004	2005	2006	2007
Mean	-3.3886	-5.4785	-5.347	-6.8187	-6.342	-6.4891	-6.9472	-6.7088
Median	-1.79	-2.68	-3.15	-4.81	-4.94	-4.94	-5.64	-5.69

Figure 6.13: Lerner's Index Descriptives by Fiscal Year:

All mean value of the LI is negative for all years. While there is some variation in the value of the mean LI over time, the values have a declining trend. This suggests that market power of ACHs was declining over the time presented in this study. This is supported via median values for the LI, which are also negative for all years, and they exhibit negative trending over time.

Observing mean values for the LI found in Figure 6.13, large negative values were present in all years. While negative LI values normally are not considered a possibility, two conditions allowed this to occur: One is that this LI used average total costs, rather than marginal costs. The second is that low reimbursement by payers is not enough to cover costs, whether marginal or average. Median values also were negative in every year of the longitudinal study. These mean and median values supported a lack of market power by ACHs because the LI is calibrated in such a way that if the ACHs had market power, then the LI values would have approached one, and one is a monopoly condition. The evidence provided in the low LI values suggests that ACHs lack monopoly power. The lack of monopoly power affects on capital structure via the FCF is analyzed in Model 1, and price-taking status is analyzed in Model 2 by way of relationship with the NISP.

6.5.1.1 Lerner's Index Correlation with Free Cash Flows

Two models were constructed for use with the ACH LI. Each regression was conducted using random effects panel data regression. A Hausman Test confirmed the use of the random effects model. Standard errors were adjusted for clustering within each model based upon the case identifier (prv_num). This corrected the model for the assumption that each value with the variable was independent of every other value for the same case. In each model, the LI was used as the primary independent variable.

In the first model, the Real FCFs were regressed upon the LI. Control variables included size, capital cost, capital expenditures, leverage, amount of government business, and time. Additional binary variables were included as control variables for size and time.

Model	1		2	
N	1254		1269	
Number of Groups	453		454	
Min Obs/ Group	1		1	
Avg Obs/Group	2.8		2.8	
Max Obs/ Group	7		7	
Standard Error Adjustment	453 Clusters		454 Clusters	
Dependent Variable	Real FCF		Net Income from Service to Patients	
Independent Variables				
LI	-0.0427535	***	0.0039882	**
CC Proxy	0.7287221		-0.2136986	
Capex	-3.04E-07	**	-1.07E-07	**
LnTA	-4.133715	**	-0.4059566	
Leverage	0.031512		-1.013522	
%Gov_Bus	1.362973		5.396817	
Fiscal Year	-0.8164543		-0.0479383	
Net Margin	120.0879	***	223.1625	***
Rho	0.402		0.749	
R^2	0.24		0.28	

Figure 6.14: Lerner's Index Random Effects:

GLS, unbalanced panel data regression, adjusted for clustering. In addition to independent variable, listed binary variables for size and time were included. Full results are located in the appendix. LI is the Lerner's Index. CC proxy is the control variable for cost of capital. Capex is the control variable for capital expenditure. Leverage represents a control for ACH debt levels. %Gov_Bus represents a control for the amount of revenues an ACH receives from government payors. Fiscal year controls for time. Model 1, the dependent variable, is the Real FCF. In Model 2 the dependent variable is net income from service to patients. * denotes 10% significance, ** at 5%, and *** at 1%. Full statistical software outputs can be found in The Appendix under Chapter 6 Panel Data Regression Models. All regressions scaled by 1,000,000.

Model 1: LI was highly significant with a P-value of 0.000 for the primary independent variable Li. The beta coefficient was highly negative with a value of -0.0427535. There were 1,264 observations, with 454 ACHs participating. The average observation per ACH was 2.8 with a maximum of 7 and a minimum of 1. An overall R^2 of 0.24 was calculated for the model.

The results of Model 1 show that LI has a negative correlation with Real FCF. Therefore, there is no evidence to support the rejection of the null hypothesis. These findings suggest a lack market power as evidenced by the low values of the LI for ACHs has a negative impact on ACHs' Real FCF. This would suggest that as ACHs experience lower margin on their procedures that are able to create greater FCFs. This runs contrary to what the Lerner's Index is created to measure. A possible reason for the outcome of this regression is that free cash flows are calculated using Net Income from the MCR (Medicare Cost Report). Net Income is a combination of two variables, NISP (Net Income from Service to Patients), and Other Income. In context of the MCR, Other Income had great influence over Net Income in that Other Income had values that represented income streams other than patient services. Other Income included items such as contributions, donations, income from investments, and revenues from television and phone. A more complete list was provided in Chapter 3. The effect on Net Income can be seen in the difference between Net Margin and Operating Margin that were expressed in Chapter 3, Table3.5. Net Margin was calculated from Net Income, which included both NISP and Other Income, while Operating Margin was derived solely from NISP.

In Chapter 3 Operating Margins were negative, while Net Income Margins were positive. There were significant differences in the values between the margins with a range between the two financial measures of 2% on the low end and 5% on the high end. In each case, the Net Income Margin was always positive while the Operating Income Margin was always negative. The divergence between these two suggest that ACHs have negative margins on NISP as denoted by the negative Operating Margins from Chapter 3, while Net Margins suggest that ACHs have positive Net Margins as Other Income included in the Net Income equation is able to compensate for any losses on NISP and thus provide a positive overall Net Income Margin. The Lerner's Index estimated for the ACHs was calculated based upon services rendered to patients. Just as the Operating Margins shown in Table3.5 from Chapter 3 is negative in all years reflected within the monopsony study, so too is the Lerner's Index. This is understandable as the Lerner's Index is calculated using procedures, which supply revenue via service to patients. These services to patients are also representative of the operating margins expressed in Chapter 3, while FCF's are more representative of Net Income Margin, which is positive every year. Net Income is a primary component in the calculation of both and is representative of all income streams. This may explain the negative correlation between the Lerner's Index and Real FCFs, as the Lerner's Index is representative of services rendered to patients, while Real FCFs is representative of the combination of services rendered to patients and other income streams. The negative correlation of the two variables represented here highlights one of the concerns expressed previously that the procedures used to calculate the Lerner's Index may not fully represent all of the procedures of the ACH or may not fully represent all the cash flows of the ACH. These results do not allow the research to exam the consequence of the Lerner's Index for ACHs impact on decisions of capital structure. While Model 1 was the best for examining ACH market power on decisions of capital structure, the model did not provide an adequate basis to confirm price-taking status, hence Model 2.

Model 2: The Net_Income_from_Patient_Services was regressed upon LI. The control variables included size, capital cost, capex, leverage, amount of government business, and time. Additional binary variables were included as control variables according to the methodology laid out previously in the methodology section within this chapter. Model 2 was exactly the same model as Model 1, with only a change in the dependent variable.

LI was highly significant with a P-value of 0.014. The beta coefficient was positive with a value of 0.0039882. There were 1,269 observations, with 454 ACHs participating. The average observation per ACH was 2.8 with a maximum of 7 and a minimum of 1. An overall R^2 of 0.28 was calculated for the model.

The primary reason that Model 2 was able to confirm price taking is that the NISP is a more accurate representation of income derived from insurers and is not distorted by other revenues and/or other components of FCFs that may add noise within the model. As the NISP is comprised primarily of revenues from insurers, it provided a better variable to judge the price-taking status of ACHs. The model confirmed that a lack of market power by the ACHs or lower LI values leads to lower revenues derived from insurers. If this correlation is combined with the values of the LI in Figure 6.13, then the lower average annual values for the LI for this study suggests that two things are occurring. One is that the LI values presented were very low. This provides evidence that for the study sample of procedures that ACHs on average do not wield any considerable market power in setting prices on patient services. The low values of the LI provides evidence that on average monopoly power is not present. Second is that the annual average LI values decrease over the period of the study, suggesting that ACHs on average have less market power each subsequent year. This provided additional evidence that the all-or-nothing nature of the contract with insurers has a negative impact on ACHs, at least in determining price. Model 2 supports the lack of market power on behalf of ACHs. The regression of the LI values and the LI values themselves supports that hospitals are price takers on services to patients, as defined by the MCR.

6.5.2 Monopsony via HHI:

There are approximately 6,204 cases within this paper's study of monopsony using the HHI from 2000-2007, down from an initial N of 55,582, representing approximately 11.2% of the original population. An HHI for each ACH was calculated from the twelve million claims in the claim remit data. The reduction in cases resulted from several factors: temporal restrictions to the years 2000-2007 and ACH claim/remit participation. The HHI is an index from zero to one, and it was created by a sum of the squares of the share of healthcare consumption by payors for an ACH for a given year, with one representing full monopsony, and zero representing maximum competitiveness within a market. In this case, a "market" was defined as all consumption of healthcare services by payors for a given hospital in which a claim for the transaction was recorded. It was not restricted by geography in this case, but was restricted by the availability of electronic claims within the data. The distribution of HHI values was skewed to the right, with most values close to one, as is evident in Figure 6.15.

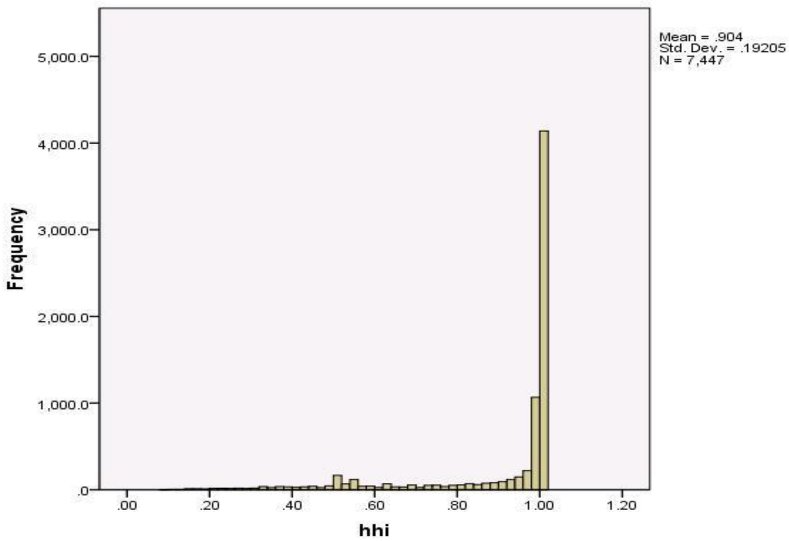


Figure 6.15: Histogram HHI (2000-2007):

The scale for this histogram has been reduced from the traditional zero to ten thousand to zero to one. This was done to better scale the histogram for presentation. As shown by the histogram, the distribution is highly leptokurtic, with a majority of the population concentrated around a value of one. The distribution also is skewed to the right. The histogram suggests that ACH payor markets are heavily concentrated.

The resulting values close to one provided initial evidence of the high concentration with which ACHs are confronted. The number of payors that ACHs submit to electronically for reimbursement affected HHI values within the study. The HHI or measure of market concentration was derived in this case by the amount of healthcare consumed from a given hospital by payors. The ability to have an accurate value for the HHI was determined by how many different payors and ACHs submitted claims electronically. The lower the proportion of the number of payors submitting electronically, the higher the likelihood that the HHI was skewed by not accounting for all payors and services rendered. This may be the case, as some ACHs still submit claims via paper.

In order to control for the payor count within the regression, a better understanding of payor count is needed. In Figure 6.16, the box plot of the payor count is very condensed and remains relatively compressed, with outliers present at the upper end of the value range above 10 payors. The box plot is representative of payor count values within the sample prior to the removal of outliers. The distribution of payor count remained skewed to the left with high kurtosis. In Figure 6.17, a majority of the distribution of payor count values remained below a payor count of 20.

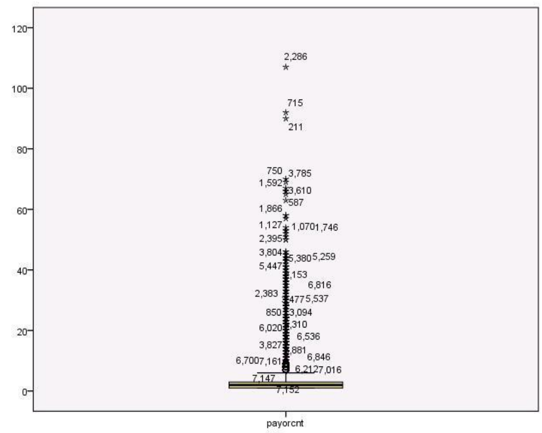


Figure 6.16: Box Plot of Payor Count (2000-2007):

The box plot shows that the box and whiskers representing the normal distribution is being compressed by outliers within the sample.

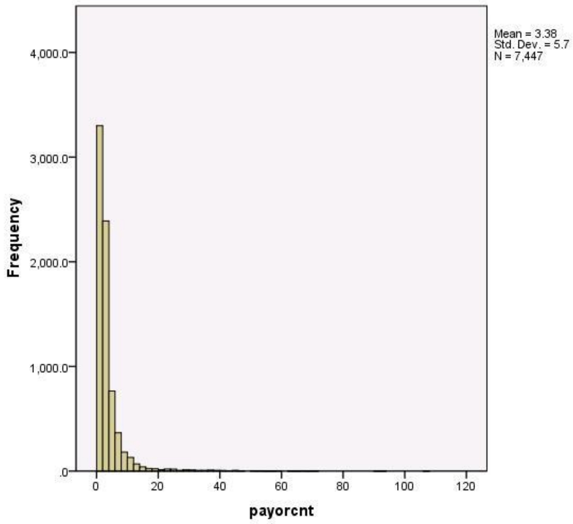


Figure 6.17: Payer Count Histogram (2000-2007):

The distribution for payor count is skewed to the left, with the highest frequency around 1. This suggests that ACHs face payor markets with few participants, which leads to concentration, as was seen in Figure 6.7.

As a result of the way payor_count affected the HHI, an HHI calculated with one payor generated a HHI value of 10,000. While the CMS consumed 65% of healthcare services rendered, it is unlikely that a payor count of 1 is feasible, except for rural facilities. Payor counts were expected to positively correlate with hospital size. The trend line in Figure 6.10 provides evidence of this. As the Hospital Size on the (x) axis increased so did the Payor Count on the (y) axis. As discussed previously within this research, small/rural hospitals are more likely to have a few payers, primarily from government. One would expect that as the size of the ACH increases, the number of payors also would increase.

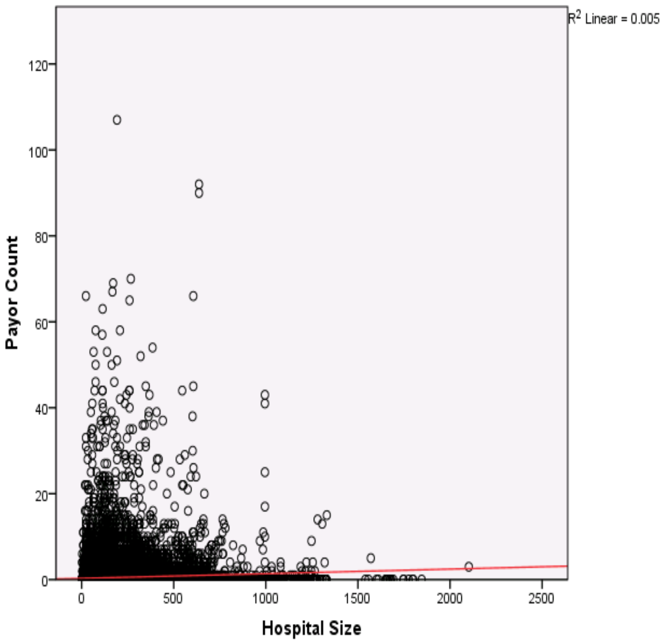
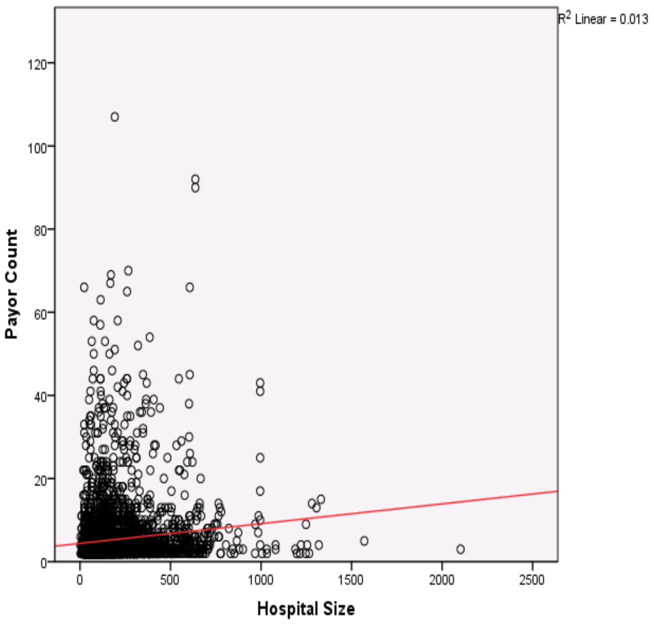


Figure 6.20: Scatter Plots Payor_Count by Hospital Size by Number of Beds (ABOVE):

The scatter plot of payor count by hospital size provides evidence that larger hospitals have larger payor counts. The trend line near the X-axis is able to provide a better visualization of this trend.Outliers excluded (BedSize x>4000) (BELOW): Evidence of the trend line is more pronounced with the exclusion of payor counts of one. Note: the scatter plot below was provided just to show how payor counts of one skew the trend line and to enhance visualization of the trend line itself. Outliers excluded (BedSize x>4000 and Payor_Count x>=2). (X denotes outliers).



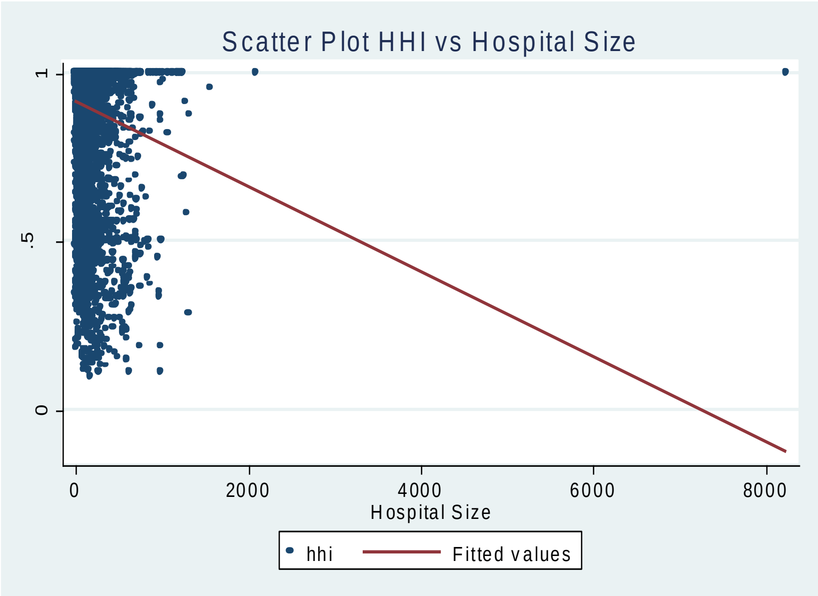


Figure 6.21: Scatter Plot of Concentration (HHI) vs. Hospital Size (number of beds):

We can see from the scatter plot above that it provides evidence that concentration is negatively correlated with hospital size. This confirms the previous illustrations regarding payor count and hospital size. In this case, as the payor count gets higher the HHI value gets smaller. What we saw in the previous figure was payor count was positively correlated with hospital size. In this figure, we see that HHI is negatively correlated with hospital size. Both support the same findings. Larger Hospitals face less concentration.

The mean payor count throughout the study is demonstrated in Figure 6.22. The figures shows that by the time the study begins in 2000, the average payor count was 2.18, increasing to 4.50 in 2007. The payor count is important, as it determines the maximum efficiency (perfect competition) that can be calculated by the HHI. In other words it determines the value of the HHI assuming perfect competition or an equally shared market amongst competitors. A chart of maximum competitive measures, determined by the HHI, is presented in Table 6.1. An HHI of below 1,800 is acceptable according to the U.S. Department of Justice (DOJ). Any HHI value above 1,800 is cause for concern, as the market is considered concentrated, and any merger or acquisition that increases the HHI (by 100) is found by the DOJ to cause antitrust concerns.

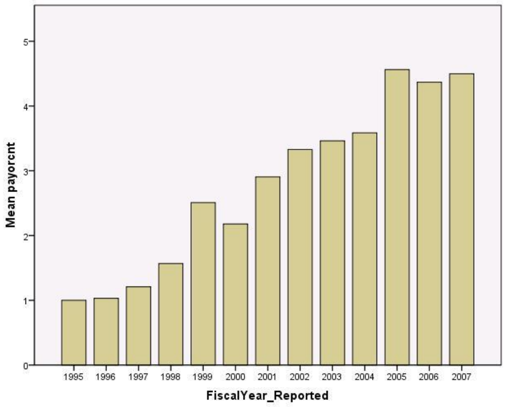


Figure 6.22: Mean Payer Count by Year (1995-2007)

In this case, the lower payor counts need to be excluded. In the research, we wanted to accept the higher payor counts, as it increased the likelihood of having an accurate HHI not distorted by a low payor_count.

In order to combat the issue of payor count within the study, the panel data regression model had to be controlled and limited at certain payor counts. Therefore, multiple models were constructed to limit minimum payor count. It was deemed that a payor_count of 7 and higher generates an acceptable HHI by DOJ standards; however, when this was used as a restriction, it still left a significantly sized sample. Therefore, seven models were constructed beginning with payor_counts >=7. This allowed the model to have a maximum competitive value for HHI calculated as 1,429, which is below the DOJ standard for an acceptable HHI.

Table 6.6: HHI Maximum Competitiveness Values as Determined by Payor Count :

(Table was created for this research by calculating an HHI for an evenly-shared market between the payors). Payor Count 7 is highlighted, as this generates an HHI of 1429. Payor Count of 7 is utilized, as it is two units from a payor count that generates an unacceptable HHI per the DOJ. In addition, when used as a restriction for modeling, it still allowed a large enough sample size.

Acceptable U.S. Department of Justice Herfindahl
1500

# of Payors		**Traditional Herfindahl**
1	1.00000	10000
2	0.50000	5000
3	0.33333	3333
4	0.25000	2500
5	0.20000	2000
6	0.16667	1667
7	**0.14286**	**1429**
8	0.12500	1250
9	0.11111	1111
10	0.10000	1000

The correlation of number of payors and the traditional Herfindahl score can be seen in Table 6.6. The calculated value assumed an equally-shared market between all payors, thus creating the most competitive market, one with the lowest possible HHI value for that number of payors. Acceptable DOJ values for the Herfindahl were used in the study, as they present a marker for limits on other markets in which the DOJ would interfere if concerns of monopoly were evident. To qualify, monopoly is a form of inefficient market in which one supplier controls the supply of a good for an entire market; it reflects the levels of market concentration of supply. The buy side of the equation warrants the same concern as those on the supply side, as they represent buyer market power and may cause consumer harm via allocative inefficiency. Models then were constructed for payor_counts >=7, 6, 5…payor_counts>=1. The inclusion of all payor_counts allowed the maximum sample to be utilized in the study.

The minimum mean HHI values, presented in Table 6.2, represent the smallest HHI that could be calculated assuming equal pro-rata participation by all payors within the research data for each year. While the minimum mean HHI values were of concern when analyzed against the mean payor counts determined in the study, the major concern was not the minimum mean HHI that could be calculated, but rather the deviation of the actual mean HHI from that of the minimum mean HHI that could be calculated. Table 6.2 shows the comparisons of the actual mean HHI with that of the minimum mean HHI (most efficient). The deviation from the most efficient mean HHI is quite extraordinary.

Even when the mean payor count moves to 4.56 in 2005, and an efficient market HHI of 2,193 is possible, the actual mean HHI remains extremely high at 8,751. The evidence of market concentration is apparent in the difference in the actual mean and the minimum mean possible. The high values of the HHI in Table 6.7, when compared against the acceptable DOJ standard of 1,800, verified that the market is concentrated. In addition, the market is more highly concentrated than would be available should all of the payors equally share the market equally. Given the level of concentration on the buyers' side of the market, as evidenced by the actual mean HHI values, the question remains: Does such concentration of the buyer side of the market have an effect upon the Real FCF?

Table 6.7: Efficient (minimum) HHI Possible to Actual Mean HHI by Fiscal Year Reported:

The mean payor count is the mean payor for each fiscal year of the study. The minimum mean HHI that has been calculated is the HHI value should the mean payor count have equal market share. This then is able to be compared with the actual mean HHI found within the study. The large deviation from the minimum mean provides evidence that the payor markets faced by ACHs are concentrated. The acceptable limit by the U.S. DOJ is an HHI value of 1,800.

Comparison Minimum HHI to Actual by Fiscal Year

Fiscal Year	Mean Payor Count	Minimum Mean HHI	Actual Mean HHI
2000	2.18	4587	9434
2001	2.91	3436	9239
2002	3.33	3003	9148
2003	3.46	2890	9031
2004	3.59	2786	9050
2005	4.56	2193	8751
2006	4.37	2288	8458
2007	4.5	2222	8568

All values above the minimum payor count for each model were allowed to remain in the study. In theory, the large payor counts should generate lower HHI values. Competition for acquiring service, in other words, increased demand for healthcare products by payors, assuming a limited supply constrained at the number of beds within a hospital should lead to increased prices, therefore more profit, and greater FCFs for the ACHs. Similarly, if the level of competition for services rendered is concentrated in the hands of a few payors, then more power would be attributed to those consuming the services rendered. Concentration of buyer power forces sellers to enter into transactions that are most likely less than optimum and are inefficient. Under this condition, ACHs are more likely to have less profit and less FCF, as was outlined previously.

By observing Figure 6.23, we can compare actual HHI versus the theoretical competitive HHI values determined by the limitation of payor count on each model. The theoretical competitive mean HHI was determined by taking the minimum payor count allowed within the sample for each model and calculating an HHI based upon equal sharing of the market. Therefore, in a market with seven payors, each payor would have one-seventh of the market. If an HHI is calculated based upon this pro-rata sharing of the market, we get an HHI value of 1,429. While higher payor count values exist within the sample, by using the minimum, we set up the maximum competitive HHI value achievable. The actual mean HHI was found to have a higher value than that of the theoretical competitive HHI value for the same sample limitations or payor count minimums. The difference between the actual and theoretical does not show the behavior of the payors within the U.S. healthcare market, but shows higher market concentration of payors that ACHs face.

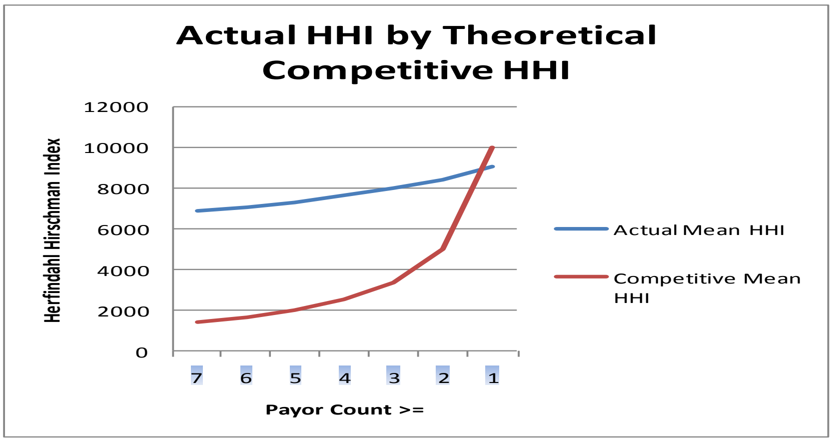


Figure 6.23: Comparison of Actual HHI vs. Theoretical Competitive HHI:

The graph provides a graph of the comparison of the actual HHI found in the study to the theoretical competitive HHI. The sample is limited by the number of payors on the X-axis with the HHI value on the Y-axis. The theoretical competitive HHI is calculated by taking the lowest number of payors possible in the sample and assumes equal market share between the payors. The distance between the two graphed lines shows the disparity between reality of the market concentration and what should be achievable in a perfectly competitive market.

6.5.2.1 HHI correlation with Free Cash Flows (collusion):

Seven panel data regressions were performed with controls as outlined previously in the methodology section, with the addition of a control variable for payor_count. All of the regressions performed were conducted using a random effects panel data regression for an unbalanced data set. All models' standard errors were adjusted for clustering, thus compensating for the assumption that all values for each case are independent of one another. Results are shown in Figure 6.24. All regressions were performed at the 95% confidence level.

Model	1	2	3	4	5	6	7
Description	payor_count>=7	payor_count>=6	payor_count>=5	payor_count>=4	payor_count>=3	payor_count>=2	payor_count>=1
Number of Obs	372	471	632	891	1324	2118	3503
Number of Groups	188	242	322	433	600	847	1243
Min Obs/ Group	1	1	1	1	1	1	1
Avg Obs/Group	2	1.9	2	2.1	2.2	2.5	2.8
Max Obs/ Group	6	6	6	6	7	7	7
Standard Error Adjustment	188 Clusters	242 clusters	322 clusters	433 clusters	600 clusters	847 clusters	1243 clusters
Dependent Variable	Real FCF	Real FCF	Real FCF	Real FCF	Real FCF	Real FCF	Real FCF
Independent Variables							
HHI coefficient	-0.7907834	-0.836686	-1.856242	** -3.68104	** -3.469228	** -2.730321	** -2.819972
HHI p-Value	0.789	0.736	0.396	0.039	0.021	0.036	0.025
CC Proxy	0.8004249	*** 1.05756	*** 1.060866	** 0.840239	* 1.085651	* 0.9500599	0.7571171
Capex	*** -1.21E-07	*** -1.47E-07	*** -1.35E-07	*** -1.28E-07	*** -1.27E-07	*** -1.59E-07	*** -1.74E-07
LnTA	*** -3.185476	*** -3.11706	*** -2.845651	*** -0.236606	*** -2.363778	*** -2.281873	*** -2.102105
Leverage	-1.254144	-1.447085	* -1.853029	* -1.483338	** -1.294987	-0.569505	-0.664492
%Gov_Bus	* -8.725174	** -9.71394	* -8.33088	** -7.498846	* -4.658025	* -4.015043	*** -5.301605
Net Margin	* 9.58404	* 9.47596	* 10.36292	* 12.02302	** 15.42476	*** 22.02755	*** 22.11875
Fiscal Year	0.2224521	0.256113	0.54965	0.442729	* 0.4470001	** 0.419705	* 0.2060823
Rho	0.3534	0.3463	0.3737	0.3412	0.3227	0.3196	0.2553
R^2	0.2104	0.1879	0.1739	0.147	0.1304	0.112	0.1001
Actual Mean HHI	6896	7053	7292	7633	7999	8398	9024
Competitive Mean HHI	1429	1667	2000	2500	3333	5000	10000

Figure 6.24: HHI Unbalanced Panel Data Regression Results:

(using random effects, adjusted for clustering). *denotes significance at 10%, ** at 5%, *** at 1%. GLS regression used.

Four out of the seven models are significant for the primary independent variable HHI. This provides evidence that real free cash flows are affected negatively by higher concentration with the U.S. ACH market. It should be noted that all models provided a negative coefficient for HHI. Higher payor counts improved the explanatory capability of the model. This is despite the case of smaller sample sizes. In addition to the regression results, the deviation of actual mean HHI from that of a competitive mean HHI for each model sample provides additional evidence that the market is far more concentrated than what should be, given the number of payors within the sample for a competitive market. Full statistical software outputs can be found in The Appendix under Chapter 6 Panel Data Regression Models. All regressions scaled by 1,000,000.

All of the models generated a highly negative beta coefficient for the HHI. Models 4, 5, 6, and 7 proved significant for the HHI variable; these models had higher sample sizes and a greater number of ACHs participating. The ACHs are listed as groups in Figure 6.12. All models had R^2 values from 0.21 to 0.10.

Model 1 - which represented cases with payor counts >=7, and HHI was *not significant* with a P-value of 0.789. The coefficient generated for HHI was -0.7907834 Model 1 was constructed so that an efficient competitive market would generate an HHI value below what the DOJ determined to be concentrated. Although the coefficient was negative, the sample size was extremely small for a longitudinal study, with only 372 observations and 188 hospitals participating for the duration of over eight years. It was speculated that the small sample size prohibited the model from being significant, as it was no longer representative of the population of ACHs with a payor count greater than seven. On average, there were only 2 observations per ACH, with a maximum number of observations of 6, and a minimum of 1. Observing the HHI mean for the Model 1 sample showed that the actual mean HHI was high, with a value of 6,896, in comparison to a competitive mean HHI of 1,429, based upon the least payor count within the Model 1 sample.

Model 2 - represented cases with payor counts >= 6, and HHI was *not significant* with a P-value of 0.736. The beta coefficient for the HHI variable was highly negative with a value of -0.836686. Sample size remained small. There were 471 observations in total, with 242 participating ACHs. On average, there were 1.9 observations per ACH, with a maximum of 6 observations and a minimum of 1. The HHI mean for Model 2 was 7,053, compared with a competitive HHI of 1,667, which was based upon the minimum payor count within the sample for Model 2.

Model 3 - represented cases with payor counts >=5, and HHI was *not significant*, with a P-value of 0.396. The beta coefficient for the HHI variable was highly negative with a value of -1.856242. Sample size remained relatively small, with only 632 observations and 322 ACHs participating. On average, there were 2observations per ACH, with a maximum of 6 and a minimum of 1. The actual mean HHI for Model 3 was high, 7,292, in comparison to the competitive HHI value of 2,000. The competitive value was the lowest HHI value that could be attained based upon the minimum payor count within the sample.

Model 4 - represented cases with payor counts >=4, and HHI was *significant* for with a P-value of 0.039. The beta coefficient for the variable HHI was highly negative with a value of -3.68104. The sample size still was relatively small, with 831 observations; however, the number of ACHs participating had increased to 433 separate institutions. On average, there were 2 observations per ACH, with a maximum of 6 and a minimum of 1. The actual mean HHI for Model 4 was 7,633, which was high in comparison to the competitive HHI possible at 2,500. The difference in the most competitive HHI value possible based upon the minimum payor count within the model was large. While 2,500 is considered concentrated by the DOJ, it is not nearly as concentrated as the actual HHI reflected within the sample. This gives evidence of the market concentration of payors faced by ACHs. This provided the first model that allowed us to reject the null hypothesis (there is no correlation or positive correlation between the HHI and Real FCF's) and accept the alternative hypothesis that market buyer concentration provides a significantly negative correlation with Real FCF, thus providing evidence of collusion of buyers/payors in ACH markets with high concentration of payors. Given the actual mean of the HHI in Model 4 of 7,633 suggests that on average the payor market faced by ACHs is highly concentrated. Thus, ACHs on average are facing collusion of payors within those concentrated markets within the sample.

Model 5 - presented cases with payor counts >=3, and HHI was *significant* with a P-value of 0.021. The beta coefficient for the variable HHI was highly negative with a value of -3.469228. The sample size was 59% larger than that of Model 4, with 1,324 observations and 600 individual ACHs participating. On average, there were 2.2 observations for each ACH, with a maximum of 7 and a minimum of 1. The actual mean HHI for Model 5 was 7,999, which was a high value in comparison to the most competitive HHI value possible, 3,333, which was calculated by the minimum payor count allowed in the model sample. Model 5 provided a negative coefficient for HHI, which allowed for the rejection of the null hypothesis and the acceptance of the alternative hypothesis. This significant correlation allowed us to affirm the presence of buyer side or payor collusion in ACH markets with higher concentrations of payors, as concentration of payors was shown to have a negative effect upon Real FCF. Considering the high value of the mean HHI suggest that the average ACH in this market faces highly concentrated markets and therefore on average ACHs face collusion of payors with the ACH's market.

Model 6 - represented cases with payor counts >= 2, and HHI was *significant* with a P-value of 0.036. The beta coefficient for the variable HHI was highly negative with a value of -2.730321. The sample size was 60% larger than that of Model 5, with 2,118 observations and 847 individual ACHs participating. On average, there were 2.5 observations for each ACH, with a maximum of 7 and a minimum of 1. The actual mean HHI for the sample of Model 6 was 8,398, with the mean competitive HHI for the sample at 5,000. The difference between the two confirmed concentration within the market by DOJ standards, as well as the deviation from the most competitive HHI score possible based upon the minimum payor count within the model. Model 6 also confirmed the alternative hypothesis and allowed us to reject the null hypothesis. Concentration via high HHI values had a negative effect upon Real FCFs; therefore, payor collusion is present in markets with higher payor concentration. The high concentration represented by the mean HHI values in the sample suggest on average ACHs in the sample face collusion of payors within the ACHs market.

Model 7 - represented cases with payor counts >=1, and HHI was *significant* with a P-value of 0.025. The beta coefficient for the variable HHI was highly negative with a value of -2.819972. The sample size was 65% larger than that of Model 6, with 3,503 observations representing 1,243 individual ACHs. On average, there were 2.8 observations per ACH participating, with a maximum of 7 and a minimum of 1. The actual mean HHI for the sample was 9,024, with a competitive score of 10,000, based upon the minimum payor count allowed in the sample of 1. Model 7 was unique from the rest of the models created for the HHI in this research, as it was the only one with a greater expected competitive HHI value than actually was found in the sample in the model. The score of 9,024 provided evidence that the market was more competitive than expected; however, it should be noted that 9,024 is still a highly concentrated market. Of all the models created for this research, this model provided the least evidence of collusion, even though it was significant.

6.5.2.2 Payor Concentration, Collusion, and NEIO:

The purpose of this section is to make use of the HHI and the findings of the regressions within the section 6.5.2.1 along with the NEIO model to draw an inference of the market power of payors within the healthcare market. This is important, as no data is available to measure market power directly by calculating Lerner's index for payors within this research. The NEIO provides a methodology, which allows the research to examine, and infer the market power of the payors by inferring values of the payors Lerner's Index. This allows the model to consider not only market power of the ACHs (the consumer) via the previously calculated Lerner's Index for ACH's, but also allows the research to exam market power for the other market participant on the demand side of the transactions the payors.

While market concentration does not directly correlate with market power, we know that cooperative pricing, as suggested via collusive monopsony, is more likely in a concentrated market (Cabral, 2000). In addition, payors within the market are competing with one another for inputs of healthcare services to deliver to their insured. Payors [insurance companies] only can affect demand by their insured for health services slightly via co-pays and deductibles. As payors do not compete for inputs (health services) and cannot readily control demand for inputs (health services), it is more likely that they will try to reduce the amount paid for inputs (health services) to its minimum.

Ordinarily, in a competitive market with many payors, there would be competition for inputs from ACHs. The demand for inputs of health services would lead many payors to increase the prices paid to a more competitive price for the inputs. In a concentrated market this is not so, as the competition for inputs is less.

Now, consider the opposite side of the equation for payors (health insurance companies), in which they compete in a competitive market to supply financing of healthcare services. Their product (healthcare financing) is the combination of price and quality/breadth of coverage provided. In the market for healthcare financing (health insurance), price is elastic to demand; therefore, the pricing of their product (health insurance) has influence on demand and therefore revenues. If prices are lowered to compete with other insurers, some revenues are forgone from the current customer base in order to obtain new customers from competing firms. If payors are to maintain margins, they must reduce their costs of coverage. Their largest expense is the health services that they finance via insurance premiums. The lower they obtain these inputs (health services), the better their margins, or the better they can compete in the competitive market. Payors have tremendous incentive to obtain inputs at the lowest possible price. Given the payor's ability to obtain pricing information from the price leader, Medicare and Medicaid, via public information, payors are able to utilize this information to press ACHs into pricing for health service inputs parallel to those of Medicare and Medicaid. In addition, one must consider that contracts are negotiated with ACHs once a year, which gives payors additional strength in negotiations, due to the renewals and length of contractual time periods. Given the all-or-nothing contractual nature of payors with ACHs, this pricing does not take place on the marginal cost curve, but rather on the average cost curve, as suggested by Taylor (2003).

6.5.2.3 The New Empirical Industrial Organization (NEIO):

It has been suggested when using the NEIO[21] that market power measured by the LI is comprised of three main variables that determine market power: concentration of the market, collusive behavior, and price elasticity of demand (Cabral 2000). The relationship is expressed in Equation 6-8.

In order to show that payor concentration within the market for healthcare services equates to collusion and market power, one must consider two variables that have not been calculated yet within the research: price elasticity of demand and collusive behavior. Evidence provided by previous research suggests that the moral hazard of insurance is strong within the market for healthcare services and that competition for patients is driven by quality of health services, not the price of healthcare services, as patients are not exposed to price due to health insurance (Nahata 2005). Given this characteristic of the market, one must assume that demand for ACH services by patients is strongly inelastic to the price. Any change in price is less likely to cause a large percentage change in demand by patients. Therefore, we

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[21] NEIO or The New Empirical Industrial Organization is an empirical methodology, which seeks to use systematic statistical evidence in the effort to study single industries as opposed to a cross section of industries, utilizing the relationship between demand elasticity, market concentration (as measured by the Herfindahl Hirschman Index) and collusive behavior and market power (as measured by the Lerner's Index), (Cabral 2000). The main principles behind the use of the NEIO model is that price cost margins cannot be observed, therefore an inference can be made from the behavior of industry firms to identify changes in marginal cost (Waldman and Jensen, 1998). The primary focus of the NEIO and most research that utilize this methodology is its use to measure the market power of firms. The NEIO has been especially helpful to researchers seeking to find evidence of collusive behavior and in research, which focuses on analysis of market structure, firm conduct and market performance in oligopolistic markets (Martin 1994; Walden and Jensen 1998 and Cabral 2000). The NEIO is meant to be an improvement on the Structure-Conduct-Performance model or SCP.

assume elasticity of demand for the industry as a constant value within the course of this research. In addition to this, an assumption can be made for the value of elasticity of demand: that it is most likely close to zero (a zero value denotes complete price inelasticity).

The equation for market power (NEIO) shows that a constant value for the elasticity of demand implies a positive correlation between the HHI and the LI. This leaves the calculation of market power (Lerner's Index) reliant on the presence of collusive behavior within the market. If there is collusion, then there is market power, and if no collusion is present, then no market power is present.

Equation 6-8: New Empirical Industrial Organization (NEIO)

$$\boldsymbol{L = \Theta \frac{H}{\varepsilon}}$$

$\boldsymbol{L}$- Lerner's Index (measuring market power of the Payors)
$\boldsymbol{H}$- Herfindahl Hirschman Index (measures market concentration of the Payors)
$\boldsymbol{\Theta}$- Collusive Behavior (measures market collusion of Payors)
$\boldsymbol{\varepsilon}$ – Demand Elasticity (measure percentage change in quantity demanded per 1% change in price)

We now explain why we believe that in Equation 6-8 that $\boldsymbol{\Theta}$ has a value indicating collusion in this industry. If the high concentration measured by the HHI has a negative effect upon real free cash flows of ACHs, then collusion between insurers is likely to exists. It is known from the regression analysis that payor HHI values are correlated negatively with real free cash flows of ACHs. Therefore, a high HHI in the payor market results in low real free cash of the ACH. Hence, collusion must be present within the market. If there were no collusion by payors, then a more concentrated market would not have a negative effect upon the real free cash flows of ACHs.

The ACH market has shown a high concentration of payors within the market. This is reflected in the high actual HHI values calculated in this research. In addition, empirical evidence has shown that a high HHI has a negative effect upon free cash flows of ACHs, resulting in the conclusion that this is the effect of the collusion of payors.

Given the assumption of high inelasticity of demand within the market for healthcare services, the presence of highly concentrated payor markets with clear evidence of collusion reflects that payors within the ACH market wield market power. Market power is manifesting itself in the empirical evidence via high HHI values (measuring concentration) and the negative correlation of free cash flows (measuring collusion) associated with the HHI. The evidence provided by the regression analysis suggests two conditions exist within this U.S. ACH market: 1) There is collusion present among the payors of the U.S. healthcare system in concentrated markets; and 2) There is high market power of insurers in markets with high concentration. If there is no market power, there is no collusion. If there is no collusion, how is it that ACH real free cash flows suffer when there is an increase in the payor concentration?

6.5.2.4 Payor Market Power and Cournot Equilibrium:

If one considers this market in light of the Cournot equilibrium, in which all payors choose how many healthcare services to consume at the same time, Θ[22] in the NEIO model would be valued at one (no collusion). This would allow for a high LI as well, and explain the correlation between the HHI and LI. The dilemma with this inquiry is that in this case, payors do not choose the amount of healthcare services consumed, rather, the individual patients covered by health insurance do. Therefore, a Cournot equilibrium is not possible, as payors cannot choose consumption rates or rather the output of healthcare insurance dollars. Therefore, Θ must represent either collusion (1/H) or a value close to zero.

Assuming collusive behavior and the high inelasticity of demand in Equation 6-8, if the HHI is increased, the LI increases. Therefore, if there is a high HHI, then one can equate the high value of the HHI in this case into a high LI. The high LI for

[22] Definitions for the Possible Values of Theta:

1 = Cournot Equilibrium

0 = Bertrand Competition

1/H=Perfect Collusion

payors represents the market power of the payor, which in this case represents collusive monopsony amongst payors.

The environment, which consists of payor market power, is one that is creating inefficiencies within the market for ACHs. This inefficiency of payor market power is having a negative effect on ACHs' free cash flow, and is affecting capital structure decisions accordingly. The lower the free cash flows, the greater the limitation ACHs have accessing debt markets, and the higher the opportunity cost becomes for the uses of those cash flows. We know that ACHs must compete on quality, as price greatly is removed from the equation due to moral hazard; consequently, patients are choosing ACHs upon perceived quality of care. This great reliance on the perceived quality of care causes hospitals to invest in capital items that allow for increases in perceived quality (Nahata 2005). As discussed in Chapter 4, the limitations placed on access to capital and possibly an increased cost of capital hinder the organization's growth, as well as cause ACHs' management to have higher requirements for the investment of the capital that is available. Therefore, monopsony restricts choices of capital structure, making ACHs more dependent on internal funds.

6.6 Conclusion

The primary goal of the research within this chapter was to provide evidence of collusive monopsony and examine its effect upon decisions of capital structure. This is important, as it has been proposed in previous research that the government allows a collusive monopsony to exist in order to control the costs associated with overinvestment. It also has been suggested that low prices compensating ACHs for healthcare services resulted from a function of collusive monopsony impacting FCFs, which consequently affected decisions of capital structure, as limiting FCF restricts access to debt markets and causes ACHs to be more dependent on internal funds.

While the previously discussed literature of Pauly (1998), Sevilla (2005), and Seth (2006) has suggested the presence of monopsony within the healthcare market, others, such as Feldman and Wholey (2001), have suggested that conditions within the healthcare market were not an effect of monopsony, but rather of monopoly-busting behavior. For the research to proceed, it was prudent to provide evidence of two phenomena: 1) the existence of collusive monopsony and the resulting negatively impacted free cash flows of ACHs; and 2) ACHs do not possess market power and are price takers within the market.

Evidence of monopsony was provided via a three-step process. An HHI value was calculated for each ACH for each year of the study from claim and remittance data. This provided a basis to measure market concentration of the payors within the ACH market. The values calculated then were compared with values of the HHI considered by the U.S. DOJ to be representative of a concentrated market. Concentration was confirmed, as the lowest actual mean HHI of 8,458 compared with the DOJ limit of 1,800 is proof of concentration of the market; however, more remarkable was the actual mean HHI comparison to a value of HHI for equally shared market of 2,288 for the same year.

Evidence of collusion of payors was provided by the panel data regression on the Real FCFs, which shows the negative effects that concentration has upon Real FCFs. The beta for the HHI was highly negative, and the P-value was significant in Models 4-7. While Models 1, 2, and 3 were not significant, this can be construed as the result of the small sample skewing the results. In all cases, the beta for the HHI was highly negative, indicating that the HHI has a negative relationship to the Real FCF. For every 1-unit increase in the HHI, Real FCFs were reduced by a range of $2,730,321 to $3,681,040. Cabral (2000), suggested that collusion is more likely to occur in markets with greater concentration.

The NEIO supports collusive monopsony by combining the concentration and collusion of the payor market faced by ACHs. The NEIO provided a model with which to examine the relationship of payor concentration, collusion, and demand elasticity with market power. In this case, payor market power is interpreted as collusive monopsony. An assumption was provided in the research for demand elasticity of health services consumed by payors, which allowed the NEIO to support market power by payors. The effect of concentrated payor markets on Real FCF was shown to be collusion, as a Cournot equilibrium was ruled out.

The lack of monopoly power by ACHs was supported by the calculation of an LI using payment information provided via the claims data. The LI is a measurement of market power that analyzes the excess return captured by firms. Using nine health procedures that are technologically stable throughout the longitudinal study, akin to Sevilla (2005), LIs were calculated for each procedure. Then, all of the LIs were averaged for each ACH each year. The LIs supported the lack of monopoly power by ACHs, as all mean LI values presented were negative for each year of the study. Each LI then was regressed upon the NISP to confirm price taker status. The regression provided a positive correlation of the LI and NISP, suggesting that market power or the lack thereof affects revenues derived from insurers. As each LI provided low values, this suggested that the lack of market power by ACHs meant the lack of market power was reflected in lower revenues derived from insurers, which supports the price-taking status of ACHs.

The research provided evidence of collusion of payors equating to market power of the payor, or monopsony. In addition, it showed that ACHs lack market power and are price takers. Therefore, the research supported the previous findings of Pauly (1998), Sevilla (2005), and Seth (2006), all of whom suggested that monopsony has effects within the healthcare market. Likewise, the research was able to utilize ACH price-taking status to confirm evidence of impact resulting from the all-or-nothing contractual arrangement with ACHs. There is clear evidence of collusive monopsony by payors in the ACH market. Collusive monopsony has a negative impact on Real FCFs, restraining access to debt markets and increasing borrowing costs. The restriction in access to debt markets limits choices of capital structure by managers of ACHs; thus, ACHs are more reliant upon internal funds for investment. Higher borrowing costs force managers to limit the use of debt. Reliance upon limited internal funds for investment increases opportunity costs of investments, and thus increases the requirements for performance of investments.

The increase in requirements for the performance of investments means managers of ACHs are less likely to invest in questionable projects or projects that might be viewed as over investment by the government. Thus, the government is able to control overinvestment by allowing collusive monopsony to exist within the market. This reduction in overinvestment lowers the costs of providing healthcare to citizens covered by government programs, as costs associated with low return projects usually were supported by increased costs to insurers, including Medicare and Medicaid. Collusive monopsony is an effective tool in controlling ACH behavior.

Capital structure decisions are affected, as a reduction in FCFs limits access to debt markets and leaves ACHs reliant upon internal cash flows in order to finance projects. Given that ACHs compete on quality and must make heavy capital investment in order to remain competitive, this restricts ACHs in their investment opportunities, and as a result, they may be harmed fiscally by an inability to compete.

Because low FCFs limit access to debt markets, any debt taken on by the ACH in such a condition may be burdened by the higher capital cost associated with such debt. In all cases, whether totally reliant on internal funds or borrowing in restrained debt markets, the ACH's management is impacted negatively by the presence of monopsony within the ACH healthcare markets. While some may view the presence of monopsony within the market as a necessary construct to keep costs down, it is unlikely that the true understanding of the impact on ACHs is being realized. It is in the long run that the greatest harm due to exposure to monopsony is realized (Bradfield 1990)

6.7 Contributions to Knowledge

These findings contradict the findings of Feldman and Wholey (2001), who concluded that lower prices for healthcare services were emblematic of a breakup of the ACHs' monopoly power. The ACHs are impacted by collusive monopsony, and combined with the lack of market power of ACHs, this means that ACHs' decisions of capital structure are affected heavily by the construct in the healthcare market. This research concluded, similarly to Pauly (1998), Sevilla (2005), and Seth (2006) that healthcare is affected by monopsony power. Although Sevilla (2005) analyzed the laboratory market for services, the payment mechanisms are similar to the ACH market, and similar behavior is found in both. While Pauly (1998) suggested that the quantities of inputs consumed under lower prices would determine the possible presence of monopsony, the present research added the consideration of the all-or-nothing contractual arrangements, analogous to Sevilla (2005), under which many ACH services are provided. This research showed evidence of monopsony power using the NEIO framework. The research also considered both the market power of the payor and the ACH within the same framework. A clearer understanding of pricing and payor concentration by ACH was provided by a combination of the MCR and claims data provided by the private sector. This combination of methodologies and data was not used by previous research.

7. Thesis Summary and Conclusion

The goal of this research was to provide evidence of market distortions via agency and collusive monopsony and examine the effect of such distortions on decisions of capital structure of ACHs within the U.S. The MCR and a unique proprietary database of electronic healthcare billings and remittances from 2000-2007, allowed for the examination of the U.S. healthcare market and ACHs for these distortions. The ACH financial data was examined for evidence of agency cost via signaling and agency cost of free cash flows. Both were proposed to exist because of the underlying principal-agent relationship created by the inability to form a complete contract between the federal government and ACHs. This was suggested because the U.S. Government covers or provides insurance for citizens via several government programs, namely Medicare and Medicaid.

7.1 Agency Costs

Competition within the ACH market is driven by quality or the perception of quality due to the moral hazard of insurance for patients. Previous research has shown that competition on quality leads to overinvestment by ACHs in cutting-edge technologies and services as well as facilities (Newhouse, 1981; Glied, 2003; Nahata, 2005). The excess cost of healthcare derived from overinvestment is of concern to government, as it consumed 65% of health services delivered during the term of this study (1995-2007). The government, concerned with overinvestment, seeks to control free cash flows of ACHs, thereby limiting the overinvestment behavior and reducing agency costs. Because the government does not provide healthcare services directly, and must contract for these services, this research theorized that agency cost exists and affects acute care hospitals financially. This is similar in structure to the way that agency affects the traditional firms, as was proposed by Jensen and Meckling (1976) and Jensen (1986), with an expansion of the principal agency relationship akin to Milgram and Roberts (1992) and Ross (1973).

Two linear regression models were created to seek the existence of both phenomena of the agency relationship. Signaling was tested via the regression of debt on the percentage of government business, using an alternative hypothesis of positive correlation of debt and government business. The model was designed to show whether ACHs signaled efficiency via debt in order to obtain greater government business. The ACHs signaled efficiency with the use of debt, thus incorporating third-party monitoring, which reduces agency cost.

Agency cost of free cash flows was tested via a linear regression of the percentage of government business on free cash flows of ACHs using an alternative hypothesis: the higher the percentage of government, the lower the free cash flows. While no evidence of signaling was found, there was significant evidence of agency cost of free cash flows. For a one percent change in government business, free cash flows of ACHs were reduced by a range of $953,518.00 to $1,166,087.00. The presence of agency cost of free cash flows helps explain the lack of signaling present within the market, as the reduction in free cash flows restricts access to debt markets, thereby limiting ACHs' ability to signal. In addition, the restriction in debt markets limited via agency cost of free cash flow limits decisions of capital structure by ACHs, as they are dependent upon internal funds for access to debt markets (Calem & Rizzo 1995). As ACHs are more dependent on internal funds due to lower free cash flows, the opportunity cost of investment increases, changing the performance requirements for future projects and thereby reducing overinvestment.

7.2 Collusive Monopsony

Previous research by Pauly (1998), Sevilla (2005), and Seth (2006) suggested that monopsony was or could be present in the U.S. healthcare market. The research hypothesized a collusive monopsony to exist within the U.S. healthcare market, as the U.S. Government via Medicare and Medicaid consumed, on average, 65% of health services during the years of 1995-2007. In addition, the fee schedule and policies of Medicare and Medicaid are made public, allowing other payors to obtain this information. It was proposed that the use of this information by other payors allowed them to change the prices paid for procedures in correlation with Medicare and Medicaid, thus creating collusion and market power by allowing them to internalize additional market rents above the competitive norm. Similar to Seth (2006), in order to capture the concentration of the payor market relative to each ACH individually, using unique claims data, an HHI was created for the payor market faced by each ACH. This effectively measured the concentration of payors in each geographic healthcare market. In addition, using the unique claims/remittance data for nine patient procedures, a modified LI using average total cost was calculated for each hospital, thereby allowing an examination of market power and price taker status of the ACHs.

In order to provide evidence of collusion within the market, a regression was conducted using panel data regression of the concentration of the payor (HHI) on the real free cash flows of the hospital. This provided significant evidence of collusion, as the concentration of payors was shown to have negative effects upon ACHs' real free cash flows. For every increase of one in the value of the HHI, real free cash flows decreased, ranging from $2,730,321 to $3,681,040. This suggested that collusion manifests in markets with higher payor concentration, as was expected (Cabral 2000; Lipczynski et al 2009). An additional inference of the market power of payors was made, as prior research had shown a high inelasticity of demand within the market due to the moral hazard, which insulated patients from price (Maynard 2001; Gaynor et al. 1999; Glied 2003; and Pauly 2004). While ruling out Cournot equilibrium, the research was able to show via the New Empirical Industrial Organization NEIO model that high concentration and collusion equates to market power of payors; thus, a collusive monopsony is present in the U.S. ACH market.

The numerical value of the modified LI provided evidence of a lack of market power, as the average modified LI for each year was negative. The low value of the LI confirmed that ACHs have negative margins on the procedures rendered to patients of payors. This suggested that ACHs have little market power. In order to provide additional evidence of this, two models for the LI were proposed. First, a regression of the LI on real free cash flows of the ACH that used panel data regression to understand better the lack of market power of hospitals effect on decisions of capital structure via free cash flows. The second, a regression of the LI on the NISP, which provided support of ACHs as price takers. The use of both models provided an alternative viewpoint to the results of the HHI.

The LI regression provided evidence that suggested that the FCFs were not affected by the lack of market power of ACHs. The results did not match expected outcomes as components within free cash flows were thought to be distorting the effects of the lack of market power of ACHs. Namely revenues derived from other income as defined by the MCR was thought to be skewing results as they are counter balancing negative margins received by ACHs on services rendered to patients. This intellection is supported by the evidence comparing the net income margin and operating margin for ACHs. Net income margin, which comprised both Net Income from Service to Patients and Other Income, was positive, while Operating Margins, which comprised only revenues from services to patients, was negative during this longitudinal study. Therefore, a further regression of the LI on the NISP was conducted to show that market power as measured by the LI did significantly support price taking within the ACH market for the NISP. This provided better results, as the net income from patient services is income primarily received from insurers, and therefore delivered a better indication of price taking. The result of the HHI and the LI regressions supports the existence of collusive monopsony and the price-taker status of the ACHs. In addition, collusive monopsony had a large negative influence on free cash flows. Thus, collusive monopsony had negative consequences for decisions of capital structure by reducing or limiting free cash flows.

7.3 Implications

The implications of these results require us to consider how the research may effect, agency research, monopsony research , constructs in market that cause distortional effects upon market participants and future research directions.

7.3.1 Agency Research

The research presented here has implications for future agency research. This contends that agency costs are present in a principal-agent relationship which is not considered amongst the traditional agency relationships. As such, this research considers the agency problem more in line with Milgrom and Roberts (1992) and therefore views agency relationships as more widespread in society than perhaps that considered in the mainstream finance literature or as expressed by Jensen and Meckling (1976). The presence of agency costs of free cash flows suggests that researchers should look at markets and relationships where agency might not be thought to exist and to realize that the implications of these agency costs could be more detrimental to non-parties to the agency relationship, in this case patients.

7.3.2 Monopsony Research

The implications for monopsony research are not quite as obvious as those for agency theory. The research presented evidence of collusive monopsony as proposed by Taylor (2003) under the all or nothing contract. This presents a slight deviation from the traditional monopsony approach, and the one in which the previous literature had sought, unsuccessfully, for evidence of monopsony in healthcare, due to the approach of examining the market for a reduction in consumption along with price. This research, on the other hand, suggests that monopsony may in fact be present in markets where previous empirical studies had suggested there was none, leaving one to consider the validity or need to readdress current views as exppressed in prior research on this topic. The contractual arrangements inherent within a market can change how market power should be analysed and how a researcher might seek evidence thereof. Likewise this research undertaken in this thesis may suggest that more consideration be given to the detrimental effects of monopsony when regulating a market for antitrust behaviour and policy determination. The findings presented here suggests that monopsony's presence while initially apparently a good outcome for the payor and a benefit for the end consumer, ultimately may not be in the long run as the distortions created by its presence take time to manifest.

7.3.3 Research Structure and Methodologies

The research presented novel ways of seeking evidence of both agency and monopsony. Both the methodologies used were structured to analyse the data and seek evidence of the primary theory along with an alternative, namley a mirror image phenomena which would give negative results. In the case of the research on agency, both a theory of signalling and agency cost of free cash flows were considered. No evidence of signalling was found and yet evidence was found for the agency cost of free cash flows. Combined these results provide evidence that a reduction in free cash flows was effected by agency. It should come as no surprise that lower free cash flows would reduce the ability of ACHs to signal via debt. So a lack of evidence of one condition helps to support the evidence that another condition was present.

Likewise, when seeking evidence of monopsony, market power for both sides of the market was considered (buyer and seller). This allowed the research to provide evidence that collusive monopsony was present for buyers (payors) but lacking for sellers (ACHs). This dual approach allowed the findings of a lack of market power on the part of ACHs to support the findings that the payors have collusive monopsony power. This is important as these twin approaches to the research may provide an alternative method for finance and econometric research going forward to address similar questions as to those covered in this thesis. In addition, the combination and use of the Lerner's Index, Herfindahl-Hirschman Index and the NEIO model in a combined approach presents a possible consideration to move forward monopsony research, especially in the area of healthcare. Finally, suitably adapted, the combined approach used here might have implications for other areas of research in economics and finance.

7.3.4 Market Implications

While agency cost of free cash flows was found to affect free cash flows of ACHs, the influence of monopsony on real free cash flows of ACHs is much more profound. In either case, managers of ACHs are placed under constraints in managing capital structure, as free cash flows are limited by both distortions in the market. [23] The ACHs' access to debt markets is limited, as they must promise future free cash flows in order to obtain debt. Without access to or constraints on debt, ACHs find themselves squeezed as they compete in a market that requires large capital

[23] While some may suggest that reductions in free cash flows do not constrain decisions of capital structure, let us consider if a reduction in free cash flows actually constrains the ability to obtain debt. Lending institutions have lending limits, which usually encompass covenants, which require firms to stay within a given ratio during the term of the financing. Likewise, firms falling below given financial ratio requirements will not be able to raise debt. Further, let us consider moreover that lenders have a maximum multiple of free cash flows they are willing to lend, for example a coverage ratio. Now let us assume that hospitals always borrow at the maximum allowed by the lender. If the ACH experiences a reduction in free cash flow then the lending limits allowed by the lender will be reduced by the multiple of the reduction in free cash flows multiplied by the lenders maximum lending ratio. This therefore limits the amount of debt that a lender is willing to consider providing to ACHs. This reduction in debt capacity places a constraint on capital structure as it reduces that ability of ACHs to take on additional projects, which would cause the ACH to exceed its debt capacity.

investments. In addition, moral hazard within the market insulates their consumers from payment, so that ACHs compete more readily on quality or perceived quality (Newhouse 1981; Nahata 2005). Therefore, if ACHs cannot take on projects that enhance perceived quality, their competitiveness within the market is hindered. The possibility of ACHs being marginalized financially in the presence of agency and monopsony is possible, thus pushing already troubled ACHs into the margin or into insolvency.

These findings are troubling for an industry that already is having financial difficulties. Management of the ACHs in this current environment is challenging at best, and at worst, impossible. The real concerns of these distortions, especially monopsony, are that it is not the short-run effects that harm the industry, but rather the long-run consequences [24](Bradfield 1990). The ACHs deliver healthcare in a very difficult market in which consumers seek the most advanced healthcare provider covered by their insurance. Moving forward, because of the lack of free cash flows and consequently limited or lacking access to debt markets, ACHs may choose not to invest in additional capital projects, but to maximize utilization on older technologies. While at first this may seem to be an excellent management choice for a firm's survival, given the healthcare market and the moral hazard, the quality of services will ultimately suffer, as ACHs cannot afford to modernize, therefore perhaps leaving better treatments for ACHs with better cash flows. This alludes to a reduction in

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[24] The long run consequences presented by both agency costs of free cash flows and collusive monopsony are that cash flows of ACHs are negatively impacted. Mean net margins for ACHs over the study range from 1% to 3%. Any slight decrease in free cash flows affects the ability of ACHs to invest in future capital projects and/or services, as it limits both investment via internal funds, but also reduces access to debt as ACHs have less cash flow to promise for debt repayment. As reimbursement increases have not kept up with inflation in healthcare costs, this leads to an erosive effect in on two fronts. One that free cash flows are reduced by increasing business with the federal government and/or through negotiations with payors via collusive monopsony. This may lead to a scenario where margins are squeezed as ACHs can only cut so much cost and efficiency before they affect quality of care. Two is that if reimbursement scheme are kept low and increases do not match inflation then ACHs will be losing revenues in real dollar terms. Neither of these facts immediately present themselves as a problem in the short term, but rather in the long term become detrimental to ACHs financial wellbeing.

quality or breadth of healthcare services provided, which brings light to the concern over long-term consumer harm. This is cause for concern as antitrust legislation, as it is currently enforced, ignores consequences to consumer harm via indirect means. Previous research has recognized the gaps between small, rural hospitals and large, urban medical centers; these gaps only will widen under this scenario, making equal access to healthcare difficult. The continuation of these market distortions is not healthy for the ACH market or for the patients. This research may suggest that better methods for controlling cost may need to be found as price paid by the payors has little control over healthcare cost. Perhaps a more relevant strategy would be to increase cost sharing by patients, thereby leaving a margin on which ACHs may depend to remain valid providers of quality healthcare and relying on greater control of consumption by the end consumer.

7.3.5 Policy Implications

The findings of this research presents a difficult problem for policy makers. The U.S. Government has been under pressure by some in American society to expand its role in supplying healthcare to its citizens. There are currently approximately 43 million uninsured in the U.S., which many say have little or no access to healthcare (Jonas 2007). Additionally the U.S. has experienced significant rises in the costs of healthcare as a percentage of GDP, which have been rising faster than inflation caused by rising prices and demand distorted by the moral hazard of insurance. Theselead to overconsumption of health resources (Glied 2003; Nahata 2005). This is complicated by enormous waste due to the overtreatment of patients, failure to coordinate care, administrative complexities of the healthcare system, high regulation of the system and outright fraud, which accounts for 20% to 30% of health expenditures every year (Khan 2011). These market phenomena have led to high healthcare costs and even higher insurance premiums (White 2004).

Government efforts to manage these problems have led to legislation being passed, which tries to provide a resolution via changes in policy and pricing methodologies or by creating market constructs and/or participants. The research conducted here suggest that the government’s efforts to manage its relationships with ACHs via pricing methodologies meant to curb costs and abhorrent behavior, may be creating a negative environment for ACHs moving forward as ACH cash flows are reduced by both agency costs and monopsony costs within the market. This will likely reduce some ACHs access to debt markets and thereby make them more dependent on their own internal cash flows, as suggested by Calem and Rizzo (1995). As discussed previously this may lead to a reduction in investment by ACHs perhaps leading to lower quality of services or a lack of services in areas where ACHs are unable to invest in new capital equipment and services. This makes the government's need to address equal access for all difficult, as the long run effects of both agency and monopsony would seem to undermine processes and market constructs put in place to solve these dilemmas. The government has recently passed The Affordable Care Act, which institutes new market participants called Consumer Operated and Oriented Plans. These effectively are a modern version of the MCO's (Managed Care Organizations). The Act seeks to reduce the premium cost for health insurance by ensuring that consumers get most of the health insurance premiums back in the form of services by limiting the use of insurance profits to covers certain expenses. This likely means that insurers will seek to obtain their profit in different ways. Hence not necessarily back from the consumer but by lowering reimbursement for health services provided by ACHs. Thus creating a vicious cycle that is likely to continue for some time to come until the long-term effects of these policies are fully understood and a better understanding of the market drivers of demand are realized by policy makers.

For now, policy makers will continue to try to manage healthcare delivery and costs through improper methodologies that do more harm than good. This is compounded by the further goal of The Act, which is to cover every American with some form of health insurance either purchased by the individual or through government programs. While at first this seems a noble goal however, the mechanisms put in place only exacerbate problems already in existing in the market. Government plans, which cover citizens, will continue to use market power to control agency problems that arise due to lack of monitoring, fraud, over consumptions of healthcare services and failures to coordinate care, by changing incentives for ACHs via pricing. It is unlikely that prices paid to ACHs will go up in real terms and due to the additional volume and limited dollars will mean the government will have to care for more people with not a proportional increase in funding. This means that government will seek to lower the average price per procedure. It is simple math.

Given the findings from this research, this suggests that ACHs will be worse off financially under the new government programs. This is complicated by the fact that all individuals, which are not covered by the government programs, will be required to purchase insurance on their own. This means that consumers will purchase health insurance based upon price and quality. However due to a promise of greater consumer awareness of insurance products through the new insurance exchanges to be set up in each state, plans will most likely be very similar in price and breadth of coverage. This is not a problem. On the other hand, a problem exists on the other side of the market between insurers and ACHs where ACHs are required under the act to meet certain quality measures for patient care. Ensuring a minimum quality level would seem like a good thing. It is for the patient, but these new regulations mean that ACHs cannot vary quality with price and neither can the insurer. So if ACHs are marginally profitable under the best rates and quality delivered, they cannot lower quality delivered to match lower reimbursement and therefore will be straddled with the costs of generating a certain level of quality product while not being able to compensate via lower costs. This means profit margins will most likely go down under this scenario. From the perspective of this research, this will have implications on free cash flows and once again will have the potential to influence ACHs ability to continue to invest in capital equipment and services. Thus current changes to healthcare provision take us right back to where we started with these research findings. Policy makers must understand the long run consequences of their regulations and created market structures and participants. Until they fully comprehend what the outcome will be, they will continue to make similar mistakes in trying to manage the U.S. healthcare market.

7.4 Contributions of the Research

The research provided an excellent opportunity to examine the financial and economic theories of agency and monopsony and their effects upon free cash flows of ACHs and the consequences these effects have upon decisions of capital structure. ACHs offered a unique subject with which to study impacts on capital structure. Prior research indicated that the ownership structure (for-profit or non-for-profit) of the ACHs considered within this study has no effects on their capital structure (Wedig et al, 1988). By utilizing data on a single industry, this has allowed the present research to avoid problems of systematic structural differences between industries, similar to Calem and Rizzo(1995). The complementary approaches adopted in this thesis allowed the present research to proceed under the recommendation made by Eisenhart (1989) for agency research to include of secondary complementary theories which may also explain possible outcomes. Furthermore, the analyses presented here were able to take advantage of new data which had never been utilized for the study of agency and monopsony by using the Medicare Cost Report data for ACHs and a proprietary database of 12 million insurance claim records.

The research expanded the consideration of agency as expressed initially by Jensen and Meckling (1976) and Meckling (1986), to included agency in line of thought as expressed by Milgrom and Roberts (1992) and Ross (1973), which considered principal agent relationship to exist at any place, organization, contract or society where an agent acted on behalf of a principal, as in between employer and employee or the state and the governed, essentially all contractual arrangements (Ross1973; Milgrom and Roberts 1992). The agency research was able to consider a slightly altered form of agency relationship than that which might be studied in corporate finance. In this case the principal and agents primary communication methodology was price as monitoring for quality and delivery of service remain difficult during the period of time considered within this research.

The complementary theory of Monopsony (collusive) via the all or nothing contractual arrangement akin to Taylor (2003) was considered, expanding upon the previous research of Sevilla (2005), Pauly (1988 and 1998), The research was able to examine a similar scenario to that of Sevilla (2005), where he studied reimbursement for laboratory services for evidence of collusion amongst payors in the market for lab services. This expansion of previous research is important as there is little previous empirical evidence regarding monopsony in the U.S. healthcare market and none found in regards to the impact such distortions caused by the market constructs presented here have on decisions of capital structure.

Overall, the research provides an in-depth examination of the consequential effects of both agency and monopsony on firms' decisions of capital structure within the same market utilizing the same data. The evidence provided in this research is important as it may be used as a basis for understanding the consequence of theoretical relationships and market constructs. This gives us new insights with which to make future policy decisions regarding some of the problems of which have been discussed previously.

The thesis contributed to knowledge by utilizing a novel approach to both agency and monopsony research methodologies by seeking evidence of opposing theories of explanation within the same research. In agency, this involved the combined use of both signalling and agency cost of free cash flows theories. In monopsony, the consideration of looking at market power for both sides of the healthcare services market, buyer and seller, analysing both their effects on free cash flows.

7.5 Limitations of the Research

The research presented within this thesis employs a sound structure, organization and methodology to provide evidence of agency and collusive monopsony and their effect on capital structure via free cash flows. On the other hand, no research is without its limitations. There are several limitations to this research and they primarily fall into two categories: data and methodology.

7.5.1 Data

The limitations inherent in the data primarily presented themselves in the Medicare Cost Report (MCR). The MCR is a non GAAP based presentation of financial statements provided to CMS annually by all hospitals that accept payment from CMS. Criticism by Kane (2001), suggested that the MCR was unreliable, unauditable and vaguely defined. While the information provided in the MCR allowed the present researcher to reconstruct an income statement and balance sheet there is no statement of cash flows provided. The absence of a cash flow sheet is a major deficiency (Largay and Stickney 1980; Sloan 1996; Magnus 2001). This meant that the research had to create a statement of cash flows in order to calculate free cash flows, which was one of the primary variables included within all regressions performed in this research. In doing so, this presented certain problems, which were that underlying variables used to create free cash flows were missing for some cases and had to be excluded for those cases. This data problem was primarily driven by a lack of information on capital expenditures and total depreciation, two of the primary variables in calculating free cash flows. Consequently, this may have led to the cash flows being slightly understated or overstated. This might mean that the regressions where free cash flows was a variable suffer from being over or understated. However, in the absence of evidence in the data and from other researchers that there are systematic biases in the data, the large number of cases that were used, give some comfort that while a problem this does not affect the validity of the results.

Problems also exist within the data for the creation of the Lerner's Index utilizing nine procedures. It potentially creates a problem as cases were included where a claim or bill and a remit or payment could be matched together. This limited the number of ACHs which could participate as well as the number of cases and types of procedures which could be included. Additional parameters regarding the types of services which could be included presented a limitation as they may not have been representable of all the procedures rendered by a hospital. Likewise the procedures included in calculating the Lerner's Index were primarily of an inpatient basis and therefore may not be able to represent any market power or marginal profit on outpatient services. Likewise it may not have been representable of ACHs where their volumes frequency of procedures or procedure types differed from those in the sample. That said, the use of multiple procedures and different models for the number of claims provides a robust structure for the approach used.

7.5.2 Methodologies

The methodologies contained within the research provided an excellent basis to study both agency and monopsony as considered within this thesis. However there were several areas where limitations may have affected the research. The concerns primarily come from the use of the Lerner's Index, the Herfindahl-Hirschman Index and the New Empirical Industrial Organization (NEIO). The Lerner's Index provided an excellent measurement of market power for the ACH; however the lack of marginal costs on hospital services is a limitation. The research used a way of calculating the Lerner's Index using an average Lerner's Index which utilized average total costs instead of marginal costs. In doing so, the models made the assumption that ATC was equal to AVC and that AVC (average fixed costs were close to zero) and that average variable costs were constant with respect to output (patient days) at output ranges observed in practice and therefore ATC equalled MC over the long run. This may have caused the value of the Lerner's Index to be skewed.

The Herfindahl-Hirschman Index provided a well tried and tested approach to calculate concentration of payors in the ACH market place. The regression utilizing this along with free cash flows allowed the research to gain insight into the effects of payor concentration on the free cash flows of ACHs. However, the HHI calculation was sensitive to the variable payor count which was the number of payors which consumed hospital services. Where the payor count approached one it created a value within the HHI representing one buyer. The value of the HHI could be skewed if the electronic claims data was missing payors or if the ACH filed claims with payors electronically. This meant that the methodology was limited by the number of payors electronically billed for by ACHs. This meant that as the payor count approached one, the value of the HHI could be skewed as the use of electronically submitted claims could not account for missing payors, which might have filed via paper. This might have caused the HHI to be overstated. Where the HHI was overstated there may have been a weaker positive correlation than that presented in the results.

The research made use of the New Empirical Industrial Organization model to infer market power of the payors and consequently collusive monopsony via the combination of the concentration of the payor market faced by ACHs, the effect of concentrations effect on free cash flows (evidence of collusion) and an assumption of price inelasticity within the healthcare market. While Milgrom and Roberts (1992), Pauly (1986), Gaynor (2000), Smet (2002) and Glied (2003) all support the price inelasticity in the market for healthcare services, no value was actually calculated nor was price inelasticity measured directly. Therefore the assumption of price inelasticity and value for this variable in the NEIO presents a limitation of the research insofar as the underlying elasticity of demand differs from the values present in the market place. To the extent that the actual values differ from assumed values, then the NEIO would overstate market power on the part of the payor.

7.6 Recommendations for Further Research

The research presented within this thesis expanded our understanding and knowledge of both agency and monopsony Costs inherent in the market for healthcare services during the timeframe of this study. However, further research is suggested in this area as many questions still remain. Additional questions remain regarding both agency and monopsony and how they affect the quality of healthcare delivered. This is important as this research suggests that presence of both of these costs manifesting itself in the market place limit cash flows and therefore have a negative influence on the ability of ACHs to access debt markets, akin to Calem and Rizzo (1995). The question still remains as to whether this reduction in free cash flows and limitations in access to debt markets actually affect the quality of care provided to patients or whether it limits possible services, better quality and new equipment to hospitals with better cash flows. As suggested by this research, the limitations of free cash flows caused by both agency and monopsony may cause ACHs to be financially marginalized or, ultimately, insolvent.

Additional research is recommended to see if agency and monopsony can explain the volume and frequency of ACH bankruptcies. This would be important as current policy and future policy still contemplate reimbursement strategies similar to those that existed during the course of this research. If these strategies do indeed partially explain bankruptcies then it might provide impetus for policy and market changes. One may also suggest repeating the research contained herein with better data on marginal costs. This would allow further research to have an accurate representation of the Lerner's Index. The researcher can also recommend a broader range of procedures than just nine; however additional data may be required for this to be possible. So one might encourage proprietary owners of relevant data to make these available for such research purposes. In addition, one may also suggest seeking data which might allow one to accurately measure the price inelasticity in healthcare, so that it might not be an assumption in the calculation of market power presented within the NEIO model.

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Appendix

Chapter 3 Definitions, Ratios and Equations

Ratio Type	Sub Chapter	Description	Equation	Equation using Data Variables
Profitability	3.5.2.1	Return on Equity	Net Income/ Equity	net_income/(balance_sheet_accts_G0_P0_L27_C1-balance_sheet_accts+G0_P0_L43_C1)
	3.5.2.2	Return on Assets	Net Income/Total Assets	net income/ balance_sheet_accts_G0_P0_L27_C1
	3.5.2.3	Net Income Margin	Net Income/ Sales	net_income / total_patient_revenues
	3.5.2.4	Operating Income Margin	Operating Income/ Net Sales	net_income_from_svc_to_patients / net_patient_revenues
Leverage	3.5.2.5	Debt Ratio	Total Debt/ Total Assets	balance_sheet_accts_G0_P0_L43_C1 / balance_sheet_accts+G0_P0_L27_C1
	3.5.2.6	Debt to Equity ratio	Long-Term Debt/Equity	total debt/total liabilities- total assets)
Cash Position	3.5.2.7	Days Cash on Hand	COH/ (operating expenses/365)	balance_sheet_accts_G0_P0_L1_C1/ (total_operating_expenses_G3 / 365)
	3.5.2.8	Cash Ratio	(Cash+Temp Inventory+AR)/Current Liabilities	(balance_sheet_accts_G0_P0_L1_C1 + balance_sheet_accts_G0_P0_L2_C1 + balance_sheet_accts_G0_P0_L4_C1) / balance_sheet_accts_G0_P0_L36_C1
Liquidity	3.5.2.9	Current Ratio	Current Assets / Current Liabilities	balance_sheet_accts_G0_P0_L11_C1/ balance_sheet_accts_G0_P0_L36_C1
	3.5.2.10	Quick Ratio	CurrentAssets-Inventories/Current Liabilites	(balance_sheet_accts_G0_P0_L11_C1-balance_sheet_accts_G0_P0_L7_C1)/ balance_sheet_accts_G0_P0_L36_C1
Efficiency	3.5.2.11	Days Sales Outstanding	(Gross Receivables/Net Sales) x 365	(balance_sheet_accts_G0_P0_L4_C1/ net_patient_revenues) x fiscal days
	3.5.2.12	Fixed Assest Turnover	Sales/Fixed Assets	total_patient_revenues / balance_sheet_accts_G0_P0_L21_C1

3.5.1 Profitability Ratios

3.5.1.1 ROE (RETURN ON EQUITY)

Return on Equity is defined as per Table 3.4. RoE (N) = 54,619 with 963 missing from the original data of 55,582. The missing data was due to either a blank value in one or both of the variables, or was created with a divide by zero error, which created a system missing or undefined value. Statistically, the RoE (N) represents a large sample size. From the histogram in Figure 3.1A, the RoE had a non-normal distribution; the distribution was Leptokurtic with a kurtosis of 19,801.25. Also seen in Figure 3.1A and Figure 3.2A, the mean RoE (N) value was not realistic, presenting a value of 41.98. Standard error in the statistical descriptives was high at 316.91. The confidence interval at 95% was large in size, with a range of 1,242.30. The distribution was skewed positively, with a skewness of 56.88.

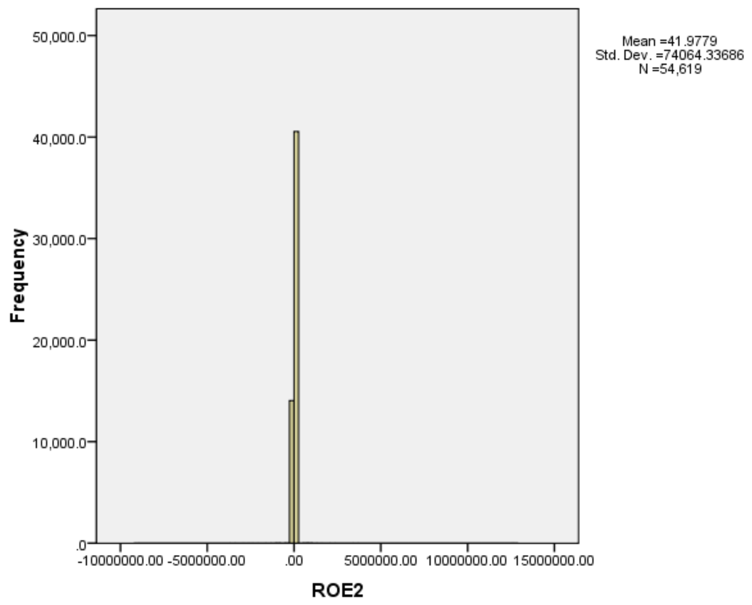


Figure 3.1A: Histogram ROE no limitations

The box plot in Figure 3.2A shows that the distribution was non-normal, with population density and a mean RoE around the 0 value. Outliers and extremes existed in the Tukey (1977) definition. The scale represented in the box plot shows that values spread widely throughout a large range.

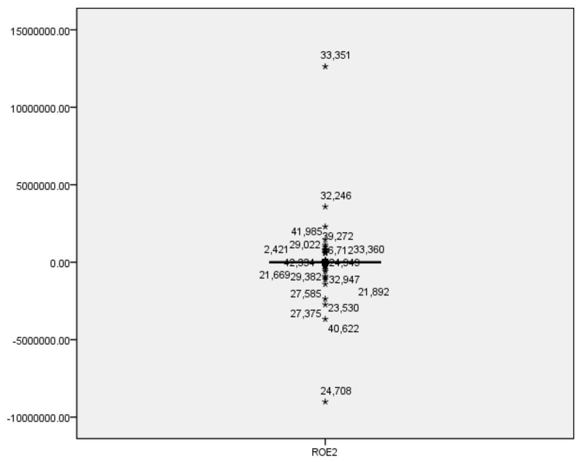


Figure 3.2A: ROE box plot, no limitation

Outliers were identified using the box plot and stem and leaf plot as those values below or equal to -0.26, and those greater than or equal to 0.42. The population was adjusted using these variables and a new subset or sample of RoE (N) was created. The new sample was named RoE (n). A histogram of RoE (n) was created, as shown in Figure 3.3A. While the histogram reflects a leptokurtic distribution, the overall distribution was closer to that of a normal distribution curve. The limitations on RoE (N) to create RoE (n) reduced the number of cases in the sample to that of 44,629. This reflected a loss of 9,990 cases from RoE (N), or a reduction of 18.3%.

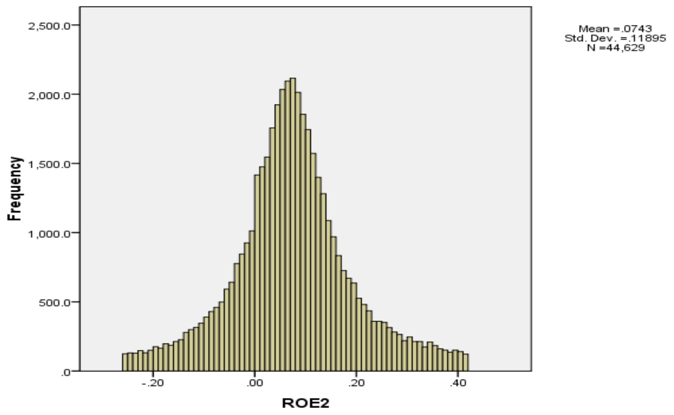


Figure 3.3A: Histogram ROE w/limitation (-0.26, 0.42)

This adjustment to create RoE (n) provided us with a new standard error of 0.00056 with a mean RoE (n) of 7.43%, which is in the expected range for RoE. The range provided in the descriptives gave us a smaller value range for the mean RoE (n) of 7.4%. The sample distribution was slightly positively skewed, with a skewness of 0.125, and is still considered somewhat leptokurtic, with a kurtosis value of 0.624.

Looking at the box plot in Figure 3.4A, it shows that RoE (n) presented us with a closer approximation to that of a normal distribution. Both whiskers and boxes are noticeable in comparison to RoE (N)'s box plot. Fifty percent of the population represented by the boxes was between 0 and 0.20. Whiskers extend below zero in Figure 3.4A. While outliers were still present, it was thought that these were not significant enough to distort the research in RoE, due to the sample size of RoE (n), the size of the standard error, and the range of both the confidence interval and the range of values overall.

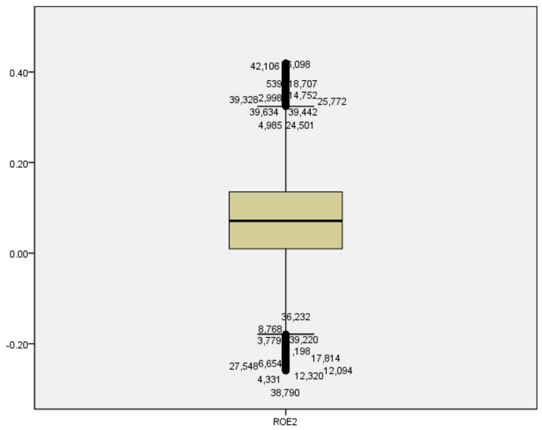


Figure 3.4A: Boxplot ROE w/limitation (-0.26, 0.42)

In Figure 3.2A, we have taken the mean RoE (n) and viewed the mean by fiscal year reported. RoE (n) = 44,629 in this comparison. The data shows that ACHs experienced lower years of mean RoE in the years 1998 to 2002, with a mean RoE (n) of 5.7%, 5.5%, 5.8%, 6.2% and 5.7%. No mean RoE (n) was presented by fiscal year above 10%.

Table 3.2A: Descriptive statistics for Return on Equity by year w/limitation (-0.26, 0.42)

		RoE				
		Mean	Valid N	Range	Median	Mode
FiscalYear	1995	.090	941	.680	.090	.050
	1996	.095	3944	.680	.090	.080
	1997	.073	3805	.680	.070	.070
	1998	.057	3743	.680	.060	.070
	1999	.055	3624	.680	.060	.070
	2000	.058	3583	.680	.060	.050
	2001	.062	3520	.680	.060	.060
	2002	.057	3496	.680	.050	.030
	2003	.070	3441	.680	.070	.060
	2004	.078	3446	.680	.080	.070
	2005	.084	2870	.680	.080	.090
	2006	.090	3657	.680	.090	.080
	2007	.088	910	.680	.085	.070

A histogram was created to verify case distribution throughout the sample of mean RoE (n) by fiscal year. Table 3.2A shows that the number of cases spread throughout the sample was approximately the same, except for the years 1995 and 2007. These years,1995 and 2007, each represent approximately 25% of the number of cases in each of the other years in the sample. A comparison of mean RoE (n) to hospital size was conducted to see what effect hospital size had on the mean. In this comparison, (n) = 44,599. According to the data presented in Table 3.3A, hospital size had an effect on mean RoE (n), with larger hospitals having a greater mean RoE. Category 1 remained the underperformer of the group. The underperformance was possibly due to the lack of volume or reimbursement in comparison to the other sizes of ACHs.

Table 3.3A: Descriptives of Return on Equity by Hospital Size w/limitation (-0.26, 0.42)

		RoE				
		Mean	Valid N	Range	Median	Mode
Hospital Size	1.000	.062	20212	.680	.060	.050
	2.000	.079	12700	.680	.080	.080
	3.000	.084	6406	.680	.080	.070
	4.000	.085	1508	.680	.080	.080
	5.000	.088	132	.570	.080	.070

A greater proportion of (n) ACHs were under 100 beds, which is represented by Category 1. This was consistent with previous research that shows that smaller ACHs struggle financially due to size, geography, demographics, and patient volume. Also, we see that more beds equated to a larger mean RoE (n). Therefore, a larger ACH would generate a larger RoE. Table 3.3A shows the distribution of the ROE (n) sample by bed size. Category 5 remained small in comparison to the other categories. The results of Category 5 may be subject to bias because of its size.

3.5.1.2 ROA (RETURN ON ASSETS)

Return on Assets is defined as Net Income/Total Assets. The RoA (N) = 54,047 with 1,535 cases missing from the original data set of 55,582. The missing cases were due to missing variables in the original data or divide by zero errors, which resulted in variables being classified as system missing. The RoA (N) represents a large statistical sample size.

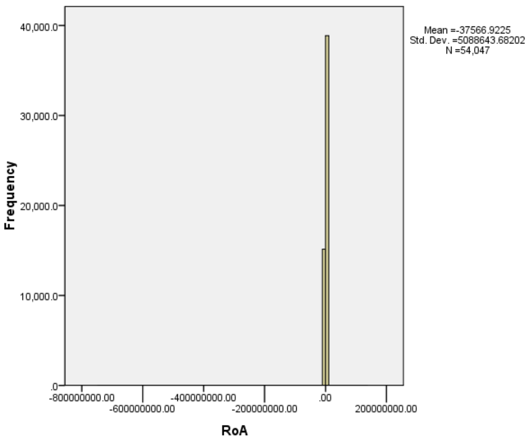


Figure 3.5A: Histogram RoA (N) with no limiters

The histogram provided in Figure 3.5A of RoA (N) shows that the distribution is non-normal with a leptokurtic distribution. The large standard error represented in the statistical descriptives for RoA (n) was large, which indicates that the mean RoA (N) presented at 37,566 was skewed with outliers and extremes, and thus was inaccurate. This is confirmed by Table 3.4A. In it, the mean RoA (N) was also a non-realistic value for RoA. The range of values for the mean RoA (N) was extremely large, which is indicative of outliers and extreme values. The distribution was skewed negatively, with a skewness value of -121.52. The leptokurtic description was validated with a kurtosis value of 16,973.44.

Table 3.4A: Descriptive Statistics Return on Assets (RoA -X, denotes removal of outliers)

Chapter 3

Descriptives of Variables

Variable	n	Mean	Median	Std. Deviation	Range	Skewness	Kurtosis	Outliers
RoA	54047	37566.92	0.03	5088640	8.81E+08	-121.52	16973.44	x<= -0.150 & x>= 0.220
RoA - X	45634	0.0334	0.03	0.06655	0.35	-0.057	0.249	

Outliers were identified using Tukey's (1977) definition of outliers via box plot and stem and leaf plot. The outliers identified were those values less than or equal to -0.15, and greater than or equal to 0.22. All cases that were identified as outliers were removed from the RoA (N) population and then used to create a subsample, RoA (n). RoA (n) = 45,634 cases, representing a reduction of 8,413 or 15.6% from the original RoA (N) of 54,047. The histogram representing RoA (n) is shown in Figure 3.5A**,** which shows a more normalized distribution. The mean RoA (n) was a realistic value of 3.34%.

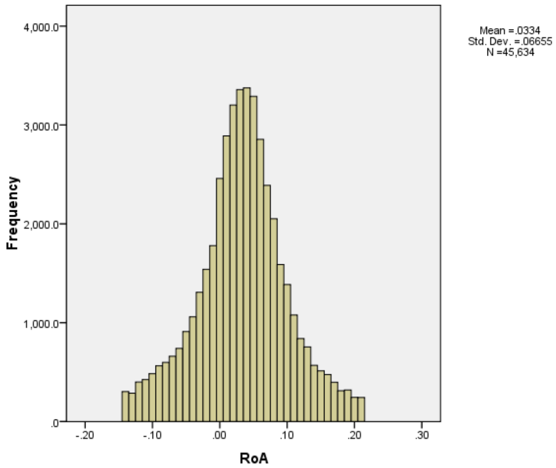


Figure 3.6A: Histogram RoA (n) with limitation @ (-0.15, 0.22)

The RoA (n) was slightly negatively skewed, as is reflected in a skewness value of -0.057. The sample distribution remained leptokurtic, with a kurtosis of 0.249; however, this was acceptable, given the previous kurtosis value of 16,973.43.

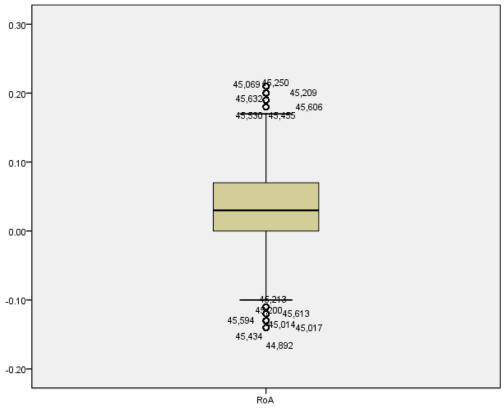


Figure 3.7A: Box plot RoA (n) with limitation @ (-0.15,0.22)

A box plot of RoA (n) was created to look at the distribution of the sample. Figure 3.7A illustrates that the distribution of RoA with the sample had a more normalized distribution. While outliers can be seen in the box plot of RoA(n), these should not affect research conducted with this sample, due to the standard error presented as well as the number of outlier and outlier values in comparison to the sample size and sample values of RoA. The values for mean RoA presented in RoA (n) were within acceptable limits.

The case distribution by year, as seen in Table 3.5A, was similar to the previous ratio distributions, as well as to the overall population of the study. The only exception was that of 2005. This was most likely due to missing total asset values within the sample. No exact reason for the reduction in cases presented in 2005 has been found. The years 1995 and 2007 represent 25% of the number of cases presented in other years within RoA (n). Values presented for 1995 and 2007 could be skewed by a smaller representation of the overall population within those years.

		RoA				
		Mean	Valid N	Range	Median	Mode
FiscalYear	1995	.0471	1001	.3500	.0500	.0400
	1996	.0472	4264	.3500	.0500	.0500
	1997	.0374	4156	.3500	.0400	.0500
	1998	.0255	4112	.3500	.0300	.0400
	1999	.0247	4039	.3500	.0300	.0100
	2000	.0263	3984	.3500	.0300	.0300
	2001	.0276	3958	.3500	.0300	.0200
	2002	.0248	3967	.3500	.0200	.0200
	2003	.0324	3908	.3500	.0300	.0300
	2004	.0356	3909	.3500	.0400	.0500
	2005	.0388	3238	.3500	.0400	.0500
	2006	.0418	4058	.3500	.0400	.0500
	2007	.0387	1040	.3500	.0400	.0500

Table 3.5A: Descriptive statistics for Return on Assets by year limited @ (-0.15, 0.22).

Mean RoA (n) by fiscal year is presented in in Table 3.5A, and for the sample (n) = 45,634. All years presented in the study generated a positive mean RoA. Years 1998 through 2002 were years of lower mean RoA (n). The mean RoA was (n) = 2.55%, 2.47%, 2.63%, 2.78%, and 2.48% for the years 1998 through 2002, respectively. These years coincided with the underperformance recognized in the mean RoE by fiscal year that was presented in the previous section. Also noted is that no mean RoA (n) was above 0.05 or 5%.

		RoA				
		Mean	Valid N	Range	Median	Mode
Num Bed Cat	1.00	.0299	22852	.3500	.0300	.0400
	2.00	.0347	14171	.3500	.0400	.0300
	3.00	.0406	6826	.3500	.0400	.0200
	4.00	.0400	1625	.3500	.0400	.0400
	5.00	.0419	132	.3200	.0400	.0200

Table 3.6A: Descripritives for Return on Assets by hospital size limit @ (-0.15, 0.22).

When mean RoA by hospital size was analyzed in Table 3.6A, it showed that again, hospital size affects return. In this case, RoA (n) = 55,526. While a complete linear relationship did not exist, we can see that as the size of the ACH increases, so too does its mean RoA (n). The overall range of the mean RoA when compared to the RoE was smaller. This was most likely due to the larger total asset values presented in comparison to the equity values presented in the RoE. Again, underperformance was characterized in Category 1. The entities representing larger returns had more beds. Both of these findings are consistent with previous research.

3.5.1.3 Net Margin

Net Margin (NM) is defined as Net Income/Sales. Net Margin (NM), N= 54,078, with 1,504 cases missing from the total population of 55,582 cases. The histogram of NM (N) in Figure 3.8A gives us some indication that the distribution of NM (N) was abnormal and leptokurtic.

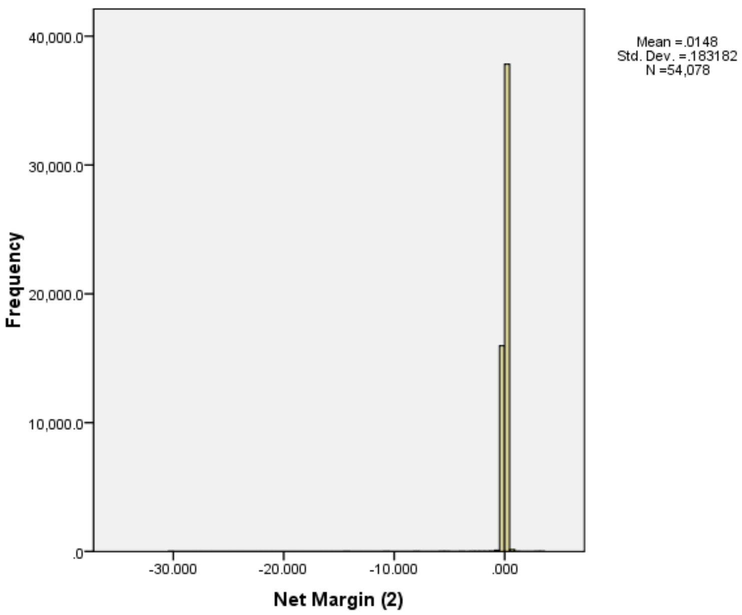


Figure 3.8A: Histogram Net Margin with no limitation

The descriptives of NM (N) in Table 3.7A show a mean NM (N) of 1.48% with a standard error of 0.000788. The range was 33.87, which was large, and provided evidence of the existence of outliers and extremes within the population. The distribution was skewed negatively, with a skewness of -99.12. The leptokurtic distribution was confirmed with a kurtosis value of 14,886.32.

A box plot of NM (N) confirmed an abnormal distribution of the population. Boxes and whiskers are not visible in the plot, which indicates a very condensed population, the result of the presence of outliers and extreme values compressing the plot. Extremes and outliers were evident within the plot as stars and circles beyond the central population core.

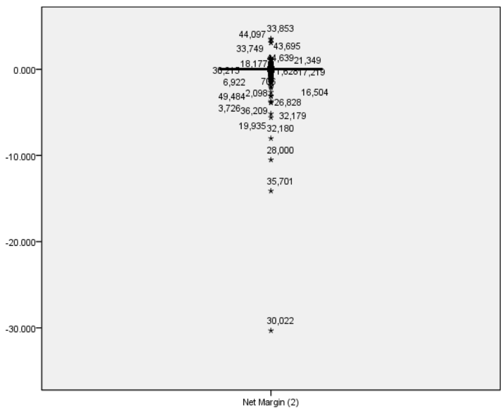


Figure 3.9A: Box plot Net Margin with no limitation

Using Tukey's (1977) definition of outliers and extremes, and utilizing box plot and stem and leaf plot for identification, outliers and extremes were identified as NM (N) values of less than or equal to -0.08, and values greater than or equal to 0.118. Limiting NM (N) at these values presented us with the sample NM (n). The NM (n) = 49,699 was a reduction of 4,379 cases, or 8% of the 54,078 cases present in NM (N).

Chapter 3

Descriptives of Variables

Variable	n	Mean	Median	Std. Deviation	Range	Skewness	Kurtosis	Outliers
Net Margin	54078	0.0148	0.01742	0.183182	33.872	-99.124	14886.324	X<= -0.80 X>=0.118
Net Margin - X	49699							

Table 3.7A: Descriptive statistics for Net Margin (Net Margin -X, denotes removal of outliers).

The histogram of NM (n) in Figure 3.10A reveals a normalized distribution that is leptokurtic and contains symmetrical tails. Both tails were truncated in the limitation.

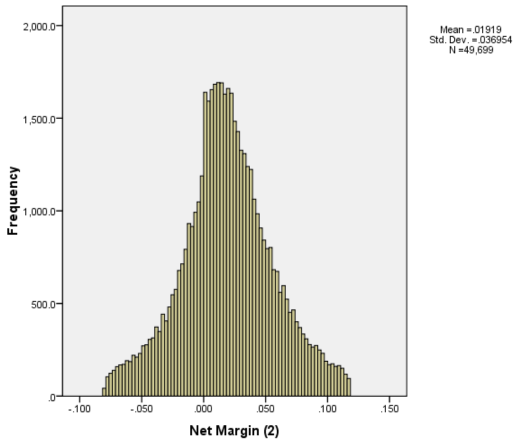


Figure 3.10A: Histogram Net Margin w/limits (-0.80, 0.118)

The box plot of NM (n) in Figure 3.11A confirmed normalization of the distribution, with both boxes and whiskers present and symmetrical. Outliers were present, but were not necessary to remove as values, and the number of outlier cases were insignificant in comparison to the overall sample size and values.

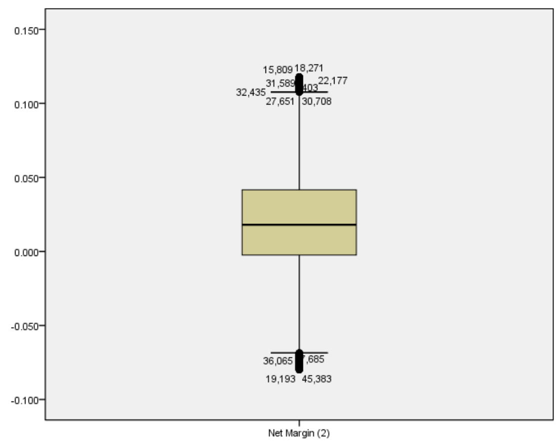


Figure 3.11A: Box plot Net Margin w/limits (-0.80, 0.118)

Mean NM (n) by fiscal year reported (n) = 49,699. Table 3.8A provides a view of mean NM (n) by fiscal year reported. The best performing years within the longitudinal study were prior to 1996, followed by the years 1998-2003, which were the worst performers. The lowest performing year was 2002. The years 2002-2005 saw a positive trend in mean NM (n), with the years 2006 and 2007 retreating.

The distribution of mean NM (n) by fiscal year, as indicated in Table 3.8A, was similar in character to the overall population, with 1995 and 2005 having lower case counts in comparison to other years in the study.

FiscalYear BY Net Margin (2)]

		Net Margin (2)				
		Mean	Valid N	Range	Median	Mode
FiscalYear	1995	.0303	1020	.196	.029	.009
	1996	.0298	4321	.197	.029	.023
	1997	.0232	4215	.198	.023	.001
	1998	.0173	4227	.198	.017	-.024
	1999	.0150	4196	.198	.015	-.014
	2000	.0155	4217	.198	.015	-.046
	2001	.0153	4265	.197	.015	-.033
	2002	.0140	4309	.197	.013	-.019
	2003	.0174	4334	.197	.016	.000
	2004	.0192	4413	.197	.018	-.028
	2005	.0209	4461	.198	.019	-.043
	2006	.0207	4537	.197	.019	.035
	2007	.0192	1184	.197	.018	.029

Table 3.8A: Descriptives for Net Margin by fiscal year w/limits (-0.80, 0.118)

The mean NM (n) by hospital bed size, provided in Table 3.9A**,** identifies Category 3 and 4 as the best performers of NM. Category 1 is the lowest performer, with Category 2 and 5 having similar mean NM (n).

The distribution for mean NM (n) by hospital size is provided in Table 3.9A, and was similar to the distribution of cases by bed size within the overall population in the longitudinal study, where for the NM (n), n = 49,671 cases. Missing values were due to missing bed size variables within the NM (n) sample.

Hospital Size BY Net Margin (2)]

		Net Margin (2)				
		Mean	Valid N	Range	Median	Mode
Hospital Size	1.000	.0178	25060	.198	.017	-.046
	2.000	.0195	15434	.198	.017	-.007
	3.000	.0224	7307	.198	.020	.012
	4.000	.0228	1726	.197	.021	-.079
	5.000	.0188	144	.166	.020	-.071

Table 3.9A: Descriptives for Net Margin by hospital size w/limits (-0.80, 0.118).

3.5.1.4 Operating Margin

The Operating Margin (OM) is defined as Operating Income/Net Sales. The OM was (N) = 54,019 cases, with 1,563 missing from the original population of 55,582. The distribution of OM (N) had an abnormal distribution and was leptokurtic. This is evident in the histogram in Figure 3.12A.

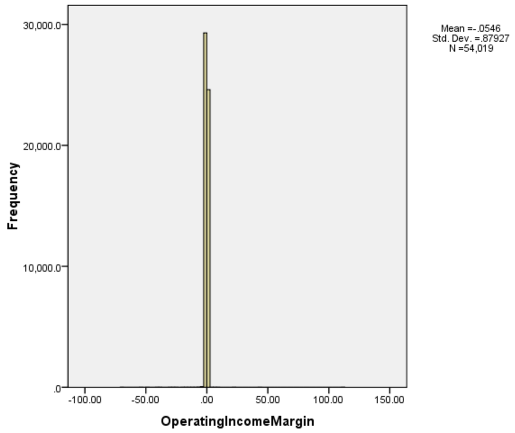


Figure 3.12A: Histogram Operating Margin (N) with no limitation

Statistical descriptives for OM (N) in Table 3.10A provided a mean OM (N) of -0.0546, with a standard error of .00378. The 95% confidence interval was small: 0.148. The range was large for OM(N), 182.67. The distribution was skewed positively, with a skewness of 16.029. Leptokurtic was confirmed, with a kurtosis of 6,679.60.

The box plot in Figure 3.13A confirmed the abnormal distribution of OM (N). Boxes or whiskers were not visible, with a line representing the core population at approximately zero on the Y-axis. Outliers and extremes were evident.

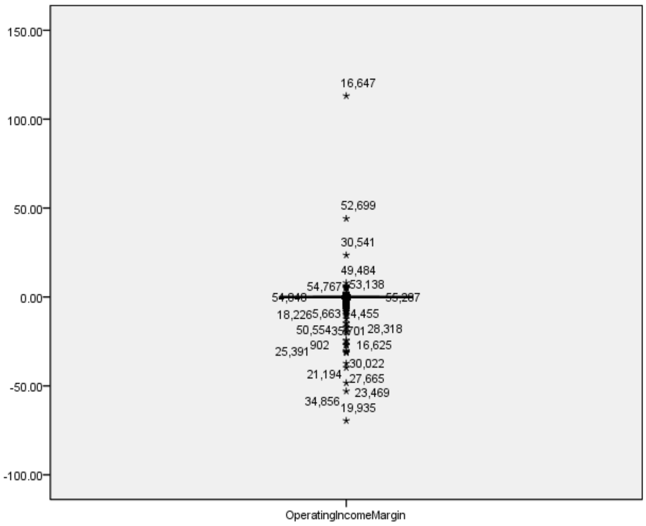


Figure 3.13A: Box Plot Operating Margin (N) with no limitation

Outliers and extremes are defined using Tukey's (1977) definition of outliers and extremes. Both box plot and stem and leaf plot were used to identify the outliers and extremes at values less than or equal to -0.26 and greater than or equal to 0.23.

Operating Margin

Descriptives of Variable

Variable	n	Mean	Median	Std. Deviation	Range	Skewness	Kurtosis	Outliers
Oper Margin	54019	-0.0546	-0.01	0.87927	182.67	16.029	6679.606	x<= -0.26 & x>=0.23
Oper Margin -X	48615	-0.0136	-0.1	0.09045	0.47	-0.112	0.146	

Table 3.10A: Descriptives for Operating Margin (Oper Margin-X, denotes removal of outliers).

Limiting the population to omit these values provides us with OM (n). The OM (n) = 48,615, which is a reduction of 5,404 cases, or 10% of the OM (N) of 54,019 cases. The OM (n) was a statistically significant sample. The sample distribution was normalized via the omission of the outliers and extremes, as evident in Figure 3.14A. While remaining leptokurtic, the distribution was symmetrical, with both right and left tails truncated in the removal of outliers.

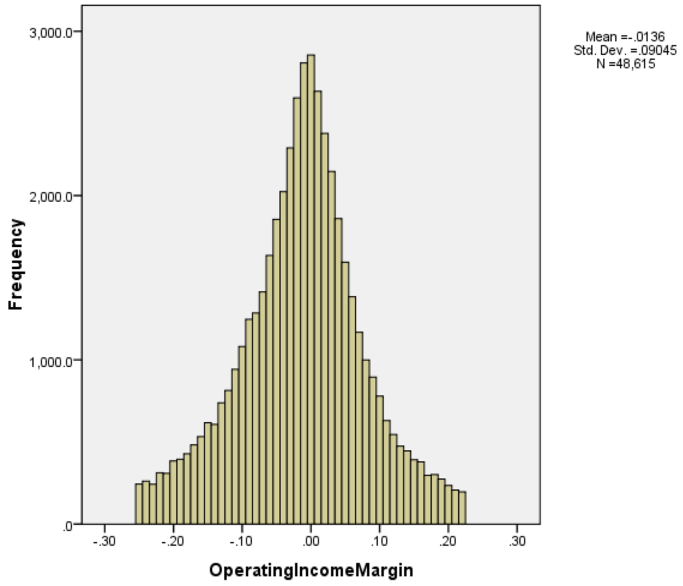


Figure3.14A: Histogram Operating Margin w/limitation (-0.26, 0.23)

The descriptives of OM (n) in Table 3.10A calculated the mean OM (n) to be -0.136 with a standard error of .00041. The 95% confidence interval was reduced, with an interval of 0.016. The range for the sample was decreased significantly, with a value of 0.47. The OM(n) was skewed negatively in the sample, with a skewness of -0.112, and slightly leptokurtic, with a kurtosis of 0.146. The box plot in Figure 3.15A confirmed the normalization of the sample distribution. Boxes and whiskers were visible. The mean OM (n) was visible at approximately zero on the Y-axis, with the lower box and whisker extending below the zero value on the Y-axis.

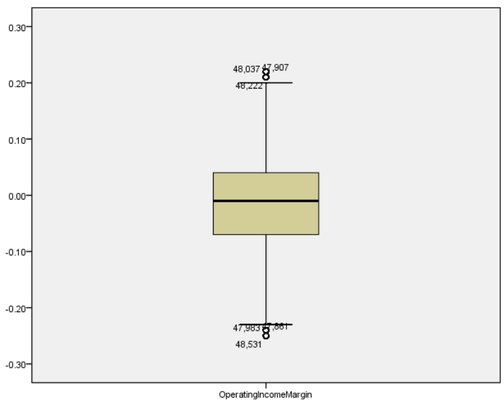


Figure 3.15A: Box plot Operating Margin w/limitation (-0.26, 0.23)

The OM (n) by Fiscal Year Reported was n = 48,615. The years 1997 through 2002 were the worst performing years for the mean OM, with the lowest OM value presented in year 1999. These coordinated with underperformance in previous ratios within this same time frame. All years presented had a negative OM.

The distribution for mean OP (n) by Fiscal Year Reported as shown in Table 3.11A was similar to the distribution of cases by year presented in the population. The exception is the year 2005, which had approximately 500 fewer cases.

		Operating Income Margin				
		Mean	Valid N	Range	Median	Mode
Fiscal Year	1995	.0001	1036	.4700	.0100	.0000
	1996	-.0026	4440	.4700	.0000	.0000
	1997	-.0158	4325	.4700	-.0100	.0100
	1998	-.0270	4270	.4700	-.0200	-.0100
	1999	-.0290	4185	.4700	-.0200	.0000
	2000	-.0226	4210	.4700	-.0200	-.0100
	2001	-.0136	4215	.4700	-.0100	-.0100
	2002	-.0147	4249	.4700	-.0100	-.0100
	2003	-.0106	4255	.4700	-.0100	.0000
	2004	-.0078	4300	.4700	.0000	-.0100
	2005	-.0052	3544	.4700	.0000	-.0100
	2006	-.0061	4419	.4700	.0000	.0100
	2007	-.0059	1167	.4700	.0000	.0000

Table 3.11A: Descriptive statistics for Operating Margin by fiscal year w/limitation (-0.26, 0.23).

When mean OM (n) is observed by hospital bed size, we see in Table 3.12A that Categories 1, 4, and 5 were the lesser performers, and Category 1 was the worst.

		Operating Income Margin				
		Mean	Valid N	Range	Median	Mode
Num Bed Cat	1.00	-.0224	24811	.4700	-.0200	.0000
	2.00	-.0019	15053	.4700	.0000	.0000
	3.00	-.0060	7018	.4700	.0000	.0000
	4.00	-.0207	1577	.4700	-.0100	.0000
	5.00	-.0149	125	.4100	-.0100	-.0100

Table 3.12A: Descriptives for Operating Margin by hospital size.

3.5.2 Leverage Ratios

3.5.2.1 Debt Ratio

Debt Ratio is defined as (Total Debt to Total Assets). The Debt Ratio (DR), N = 53,904, with 1,678 missing from the total population of 55,582. All missing data was defined as system missing, due to one or both variables missing that were used in the calculation of the debt ratio. There were some null values due to the missing variables, either total assets or total liabilities. The distribution for DR (N) was abnormal, as illustrated in Figure 3.16A. The DR (N) was leptokurtic, with a large range of values for the debt ratio, as evidenced by the scale on the histogram created via SPSS.

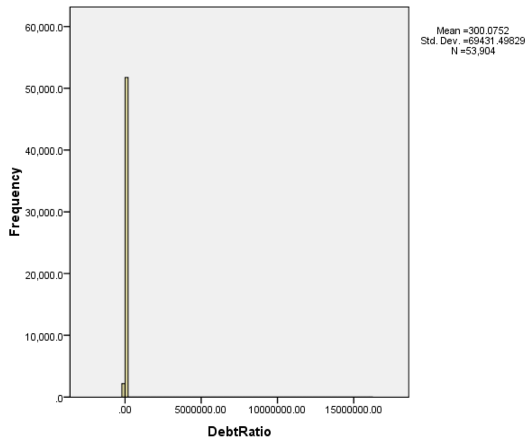


Figure 3.16A: Histogram Debt Ratio with no limitations

The mean DR (N) in Table 3.13A was 300.08, with a standard error of 299.05. The 95% confidence interval for mean DR (N) was large, with a -286.07 lower bound and an 886.22 upper bound. The range of values in DR (N) was large, with a range value of 16,120,298.12. The distribution was skewed positively, with a skewness of 232.17. Leptokurtic distribution characteristics were confirmed, with a kurtosis of 53,903.80.

The box plot in Figure 3.17A confirmed an abnormal distribution with extremes and outliers present. The range of outliers was extreme; however, fewer extremes existed than in previous ratio populations. No boxes or whiskers were visible. Whiskers and boxes have been compressed to a line representing the core of the population at zero on the Y-axis.

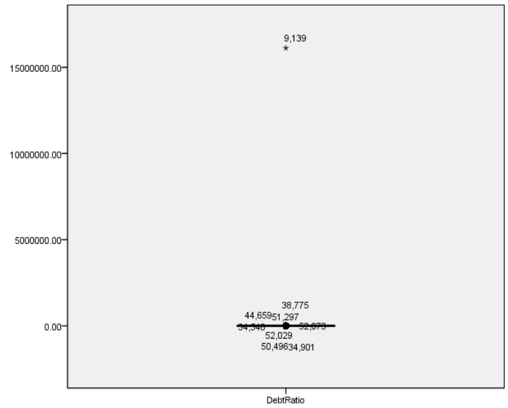


Figure 3.17A: Box plot Debt Ratio with no limitations

Using Tukey's (1977) definition of outliers and extremes, box and stem and leaf plots were used to identify outliers and extremes. Outliers and extremes were determined to be those values of DR (N) less than or equal to -0.39, and those values greater than or equal to 1.34. Using these limitations upon DR (N) provided the sample DR (n). For DR (n), (n) = 49,996, a reduction of 3,908 cases, or 7% of DR (N) at 53,904 cases. In Figure 3.18A, a histogram of DR (n) provides a normalized distribution. The distribution remained slightly leptokurtic. The distribution was observed to be slightly positively skewed, with an outlying frequency of cases at approximately 0.25 on the X-axis. The left tail was distorted in comparison to the right. The most likely reason for this distortion was the probability of having a negative debt ratio, which is minimal and shifts dramatically at zero. When creating the new sample DR (n), the right tail was truncated in the limitation.

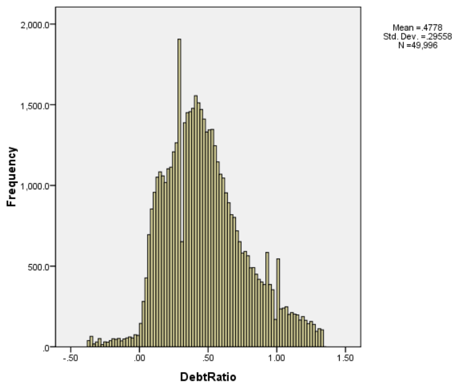


Figure 3.18A: Histogram Debt Ratio w/limits (-0.39, 1.34)

The mean DR (n) was reduced to 0.4778, along with the standard error with a value of 0.00132. The 95% confidence interval also was reduced, showing a lower bound of 0.4753 and an upper bound of 0.4804. The range of values in DR (n) was decreased to 1.71. The distribution remains positively skewed, and was confirmed with a skewness of 0.5. A reduction in the leptokurtic characteristic was confirmed, with a kurtosis of .084, in comparison to the previous kurtosis value presented in DR (N) of 53,908.80.

Debt Ratio

Descriptives of Variable

Variable	n	Mean	Median	Std. Deviation	Range	Skewness	Kurtosis	Outliers
Debt Ratio	53904	300.075	0.45	69431.498	16120298	232.172	53903.798	X<=-0.39& X>=1.34
Debt Ratio - X	49996	0.4778	0.44	0.29558	1.71	0.5	0.084	

Table 3.13A: Descriptive statistics for Debt Ratio (Debt Ratio-X, denotes removal of outliers).

The box plot in Figure 3.19A of DR (n) confirmed normalization of the distribution of the sample. Boxes and whiskers were visible in comparison to the box plot presented of DR (N). Outliers were present beyond the upper and lower whiskers. The outliers in this sample should not affect the calculation of mean DR (n).

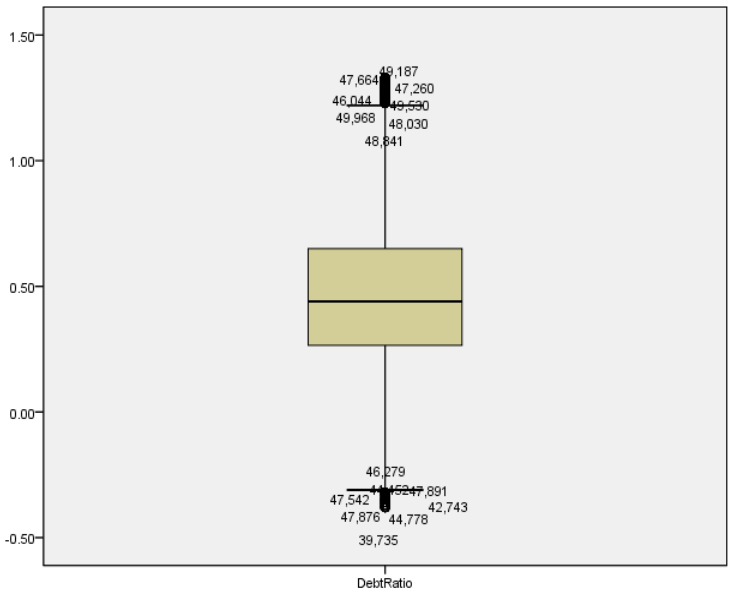


Figure 3.19A: Box plot Debt Ratio w/limits (-0.39, 1.34)

The mean DR (n) by Fiscal Year Reported in Table 3.14A gave evidence of an increasing mean DR (n) from the years 1995-2002, with a reduction from that time until 2007. No mean DR(n) for any Fiscal Year was less than 0.45, with the greatest value presented in 2007, with a Debt Ratio of approximately 0.5. The years 1995 through 2002 matched previous time frames for poorer values of financial ratios.

DR (n) by Fiscal Year Reported, n = 49,996, is presented in Table 3.14A, below. The distribution matches all years in frequency of cases except for 2005, which had fewer cases than presented in the overall population presented in the longitudinal study.

		DebtRatio				
		Mean	Valid N	Range	Median	Mode
FiscalYear	1995	.4504	1087	1.66	.43	.43
	1996	.4559	4628	1.71	.42	.41
	1997	.4658	4576	1.70	.43	.40
	1998	.4660	4506	1.71	.43	.33
	1999	.4715	4440	1.71	.43	.41
	2000	.4784	4367	1.71	.44	.42
	2001	.4858	4321	1.71	.45	.41
	2002	.4952	4366	1.71	.46	.40
	2003	.4923	4309	1.71	.46	.43
	2004	.4859	4278	1.71	.45	.43
	2005	.4847	3558	1.71	.45	.38
	2006	.4795	4407	1.71	.44	.29
	2007	.5017	1153	1.68	.47	.33

Table 3.14A: Descriptive statistics for Debt Ratio by fiscal year w/limits (-0.39, 1.34).

Mean DR (n) by hospital size, as presented in Table 3.15A, clearly indicated that no linear relationship exists between Hospital Size and mean DR (n). Categories 2 and 4 were shown to carry high debt in comparison to other sized hospitals. Categories 1 and 5 had the smaller mean DR (n), and Category 5 had the lowest. No hospital size had a mean DR (n) less than 0.44.

		DebtRatio				
		Mean	Valid N	Range	Median	Mode
Hospital Size	1.000	.4580	25783	1.71	.41	.40
	2.000	.5035	15171	1.71	.47	.41
	3.000	.4871	7157	1.71	.47	.40
	4.000	.5102	1698	1.64	.50	.39
	5.000	.4432	142	1.36	.51	.58

Table 3.15A: Descriptives for Debt Ratio by hospital size w/limits (-0.39, 1.34).

When one observed the DR (n) by Hospital Size, the distribution was similar in characteristics to that of the overall population. Category 5 remained a very small proportion of the sample. This small proportion could lead to some distortion within calculations for that size ACH. The distribution by hospital size was similar to previous ratios discussed, with Category 5 having the lowest representation in the sample.

3.5.2.2 Debt/Equity Ratio

Debt/Equity ratio is defined as Total Debt/Total Equity. One of the deficiencies with the MCR is that it has no entry for equity. Therefore, a value for equity was calculated (Total Liabilities-Total Assets). Observations where Total Assets or Total Liabilities were equal to zero or had a NULL value were excluded.

The D/E (N) = 47,850, with 7,732 missing from a total population of 55,582 cases. The distribution of D/E (N) was abnormal and leptokurtic, as evidenced in Figure 3.20A. The scale of the histogram revealed the presence of outliers and extremes within the data, although the data points were visible.

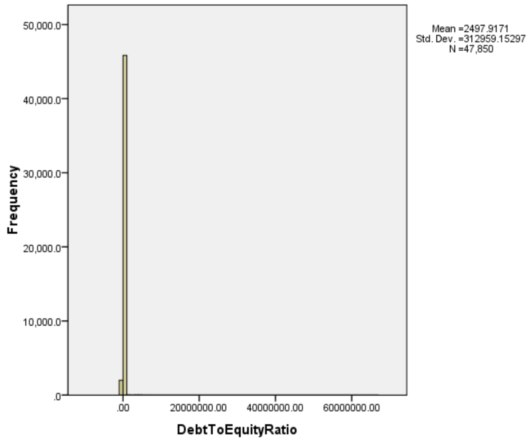


Figure 3.20: Histogram Debt to Equity with no limitations

Statistical descriptives for D/E (N) in Table 3.16A gave a mean D/E (N) of 2,497.92 with a large standard error of 1,430.69. The 95% confidence interval also was significantly large. This value for the mean was not considered to be within acceptable limits for the D/E ratio. The range was significantly large, with a value of 66,817,239.12. The distribution was skewed, with a skewness of 204.22. Leptokuric distribution was confirmed, with a kurtosis value of 43,436.85.

The box plot in Figure 3.21A confirmed the abnormality with the distribution of D/E (N). Boxes and whiskers were not visible, giving evidence to the presence of extreme outliers. Outliers and extremes were evident themselves in the plot. A line representing the core of the population was visible at approximately zero on the Y-axis.

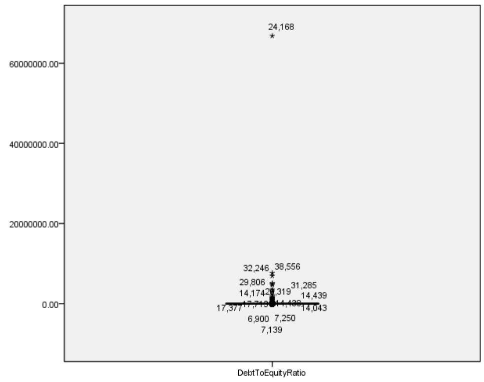


Figure 3.21A: Box plot Debt to Equity with no limitations

Tukey's (1977) definition of outliers and extremes was used in combination with the box plot and stem and leaf plot of D/E (N) to determine the outliers and extremes. Outliers and extremes were identified as those D/E values less than or equal to -1.5, and those values greater than or equal to 3.2.

Using the outliers defined previously, we created a new sample D/E (n), with n = 42,651 a reduction of 5,199 cases, or 10.8% of the 47,850 cases in D/E (N). The histogram in Figure 3.42 provided evidence of a more normalized distribution. The distribution curve was leptokurtic. The left tail was distorted beginning at zero on the X-axis. This was due to the small probability of D/E value being negative.

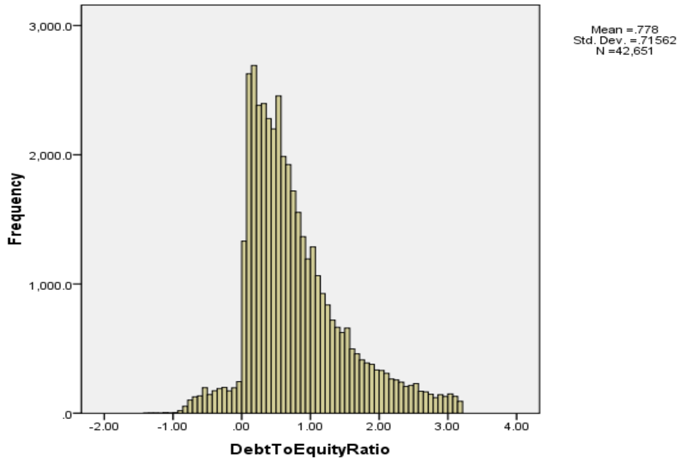


Figure 3.22A: Histogram Debt to Equity w/limits (-1.5,3.2)

The mean D/E (n) = 0.778, with a standard error of 0.00347. The confidence interval was smaller. The range was reduced to 4.55 within D/E (n). The distribution still was skewed positively, with a skewness of 1.02, and a leptokurtic characteristic was confirmed, with a kurtosis of 1.03.

Debt to Equity Ratio								
Descriptives of Variable								
Variable	**n**	**Mean**	**Median**	**Std. Deviation**	**Range**	**Skewness**	**Kurtosis**	**Outliers**
Debt /Equity	47850	2497.917	0.7	3.12959	66817193	204.22	43436.85	X<= -1.5 & X >= 3.2
Debt /Equity - X	42651	0.778	0.61	0.71562	4.55	1.024	1.03	

Table 3.16A: Descriptives for Debt/Equity Ratio (Debt/Equity-X, denotes removal of outliers).

A box plot of D/E (n) confirmed normalization of the distribution in Figure 3.23A. Both boxes and whiskers were present in comparison to D/E (N). Outliers were still present in the box plot; however, these were not significant due the D/E value and quantity of cases in comparison to the sample size.

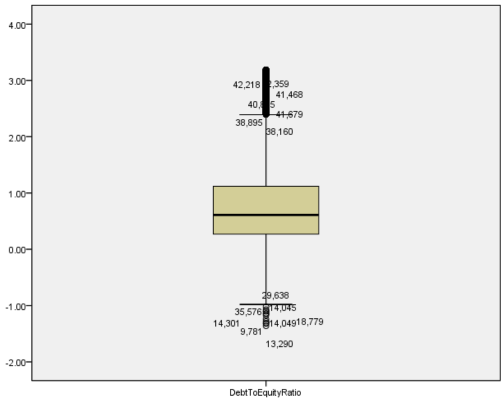


Figure 3.23A: Box plot Debt to Equity w/limits (-1.5, 3.2)

The D/E (n) by Fiscal Year Reported, (n) =42,651 is represented in Table 3.17A. The years of 1997, 2001, and 2007 were the years with the highest mean D/E (n), with 2004 providing the lowest. No mean D/E (n) fell below 0.75. No trends were evident in the bar chart; however, 2007 seems to be unusually large, and further review of this year will be necessary to determine its significance.

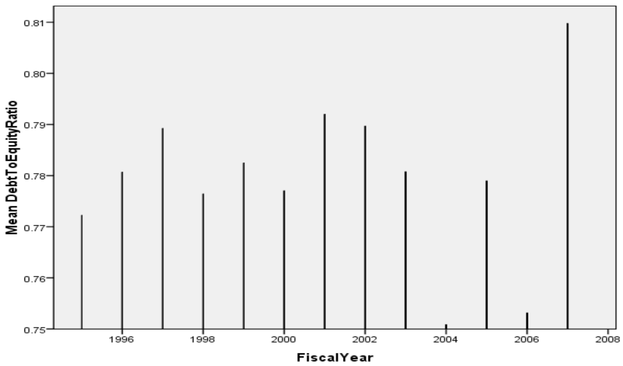


Figure 3.24A: Mean Debt to Equity by Fiscal Year Reported w/limits (-1.5, 3.2)

The D/E distribution of cases by fiscal year is presented in Table 3.17A, which shows us that the distribution is similar to that of the overall population of MCR. The years 1995 and 2007 represented approximately 25% of the cases that all other years in the study provided. In comparison to the other years of 1996 -2006, the year 2005 had a reduction of cases. No reason was noted for this reduction in cases. However, this may be due to an abnormal amount of one or both fields used in the calculation of equity to have a missing value or a value of zero. In this instance, those cases would have been removed in previous steps.

		DebtToEquityRatio				
		Mean	Valid N	Range	Median	Mode
FiscalYear	1995	.7722	969	3.98	.64	.14
	1996	.7807	4027	4.43	.61	.15
	1997	.7892	3932	4.50	.62	.14
	1998	.7764	3858	4.29	.60	.11
	1999	.7825	3800	4.54	.60	.14
	2000	.7770	3679	3.98	.60	.14
	2001	.7920	3661	4.03	.61	.17
	2002	.7897	3649	4.26	.62	.11
	2003	.7808	3644	4.45	.63	.12
	2004	.7509	3639	4.33	.60	.15
	2005	.7790	3037	4.09	.62	.15
	2006	.7532	3794	4.07	.59	.40
	2007	.8098	962	4.05	.62	.49

Table 3.17A: Descriptives for Debt to Equity Ratio by fiscal year w/limits (-1.5.3.2).

The mean D/E (n) by hospital size (n = 42,627) provided in Table 3.18A provided us with evidence that hospital size contributes to a larger debt to equity ratio. There was evidence of a linear relationship between greater D/E and hospital bed size. Consequently, Category 1 had the lowest D/E values, while Category 5 had the largest D/E values. No size hospital had a mean D/E (n) below 0.70 for any one size. This was consistent with the previous findings on Net Margin, as small or Category 1 entities presented with the lowest value. The lack of revenue expressed in this category likely is limiting access to debt markets. Likewise, the facilities that are larger can afford more debt and are not constrained in their access to debt markets.

The population of cases in D/E (n) by hospital size had distribution characteristics similar to that of the overall population, as evidenced in Table 3.18A. Category 5 had very few cases within the sample, but appeared to be in line with the overall population. The smaller count of cases for this size hospital may distort evidence from the Category 5 groupings.

		DebtToEquityRatio				
		Mean	Valid N	Range	Median	Mode
Hospital Size	1.000	.7160	21867	4.55	.53	.14
	2.000	.8221	12774	4.51	.67	.55
	3.000	.8586	6385	4.06	.73	.66
	4.000	.9455	1461	4.00	.78	.63
	5.000	1.0362	135	3.28	.88	.11

Table 3.18A: Descriptives for Debt to Equity Ratio by hospital size w/limits (-1.5.3.2).

3.5.3 Cash Position Ratios

3.5.3.1 Days Cash on Hand

Days Cash on Hand is defined as (Cash on Hand /(Operating Expenses/365 Days Cash on Hand (DCOH)) N =55,564, with 18 cases missing from an original population of 55,582. The distribution of DCOH (N) was non-normal and leptokurtic, as reflected in Figure 3.25A.

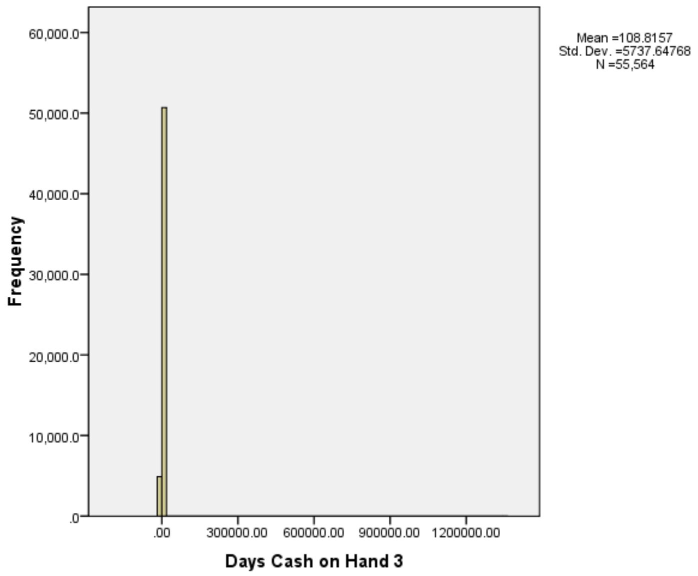


Figure 3.25A: Histogram Days Cash on Hand with no limitation

The statistical descriptives of DCOH (N) confirmed the leptokurtic nature of the distribution, with a kurtosis value of 55,399.03, and the distribution was skewed positively, with a skewness value of 235.20. The mean DCOH (N) of 109 provided in Table 3.19A was a realistic value for the mean; however, there was a high standard error of 24.34, which provides evidence of its inaccuracy. This was further confirmed by the 95% confidence interval, which was large. The range of values for DCOH present in DCOH (N) also was large, with a value of 1,356,148.85.

The box plot in Figure 3.26A confirmed the abnormal distribution within the population DCOH (N). The box plot highlighted the presence of extreme values, although they were few in comparison to previous ratio samples. No whiskers or boxes were visible, with only a line to represent the population's core cases.

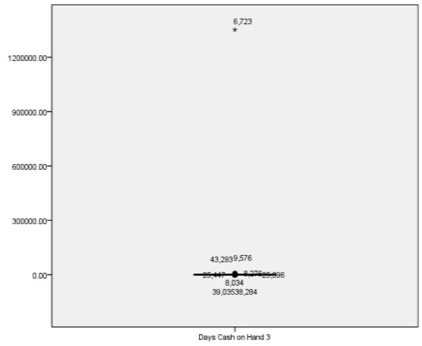


Figure 3.26A: Box plot Days Cash on Hand with no limitation

Tukey's (1977) definition of outliers and extremes was utilized with the box plot and a stem and leaf plot to identify outliers with values of less than or equal to -160, and values greater than or equal to 275. Provided with these limitations, the DCOH (n) was created.

The DCOH (n) = 52,050 cases, a reduction of 3,514 cases, or 6.75% of the original population of 55,582. A histogram of DCOH (n), Figure 3.27A, revealed an abnormal distribution with a long right tail and relatively little left tail. The small left tail, due to the negative DCOH values, was thought to be unlikely. The distribution was leptokurtic and was not symmetrical.

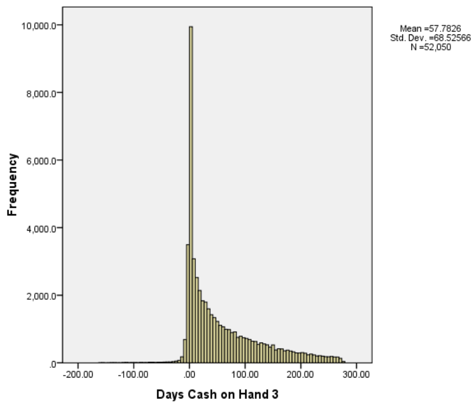


Figure 3.27A: Histogram Days Cash on Hand w/limitation (-160,275)

Although visually abnormal, the statistical descriptives for DCOH (n) presented evidence that the leptokurtic nature of the sample was not as great and was similar in range to other previous samples constructed. The mean DCOH (n) of 57.78 in Table 3.19A was a realistic value, with a standard error of 0.30. The confidence interval was relatively large. The range for DCOH within the DCOH (n) sample was reduced to 434.61, but remained large in comparison to previous ratio samples.

Days Cash on Hand Ratio

Descriptives of Variable

Variable	n	Mean	Median	Std. Deviation	Range	Skewness	Kurtosis	Outliers
DCOH	55564	108.81	36.768	5737.647	1356149	235.197	55399.032	x<= -160 & x>= 275
DCOH -X	52050	57.7826	31.296	68.525	434.61	1.18	0.668	

Table 3.19A: Descriptives for Days Cash on Hand (DCOH -X, denotes removal of outliers).

A box plot of DCOH (n) in Figure 3.51 reflected a normal distribution that was slightly skewed towards the zero value for DCOH. The lower whisker extended below zero, revealing that the lower 25% of the sample exists below zero. This was of concern, as a negative DCOH is most likely an unrealistic value.

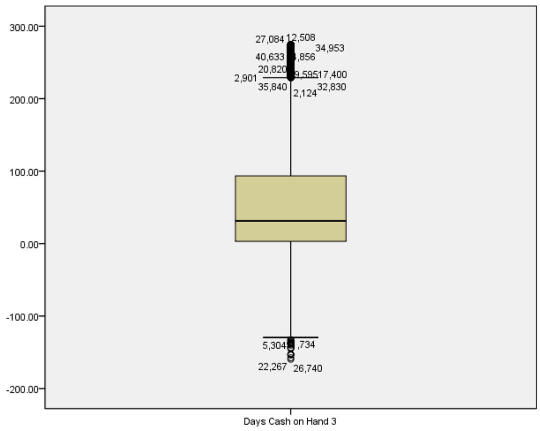


Figure 3.28A: Box plot Days Cash on Hand w/limitation (-160,275)

The DCOH (n) by fiscal year reported, (n) = 52,050 cases. A table of mean DCOH (n) by Fiscal Year Reported in Table 3.20A revealed a decrease in DCOH in the years 1995 through 2000, while roughly flattening out until 2006, where DCOH took another large decrease from 2006 to 2007. This large decrease may be distorted due to a lower sample size in the year 2007. The delta in mean DCOH (n) was roughly 20 days over the longitudinal study. The years of 1995 and 2007 represented approximately 25% each of an average year's cases in this sample DCOH (n).

		Days Cash on Hand 3				
		Mean	Valid N	Range	Median	Mode
FiscalYear	1995	69.81	1055	390.59	47.82	.00
	1996	64.35	4544	427.93	40.25	.00
	1997	63.05	4498	415.31	37.20	.00
	1998	58.49	4511	417.63	32.00	.00
	1999	56.85	4462	408.95	30.02	.00
	2000	54.96	4491	418.87	28.43	.00
	2001	56.10	4492	432.23	30.02	.00
	2002	55.53	4547	433.86	30.42	.00
	2003	56.36	4507	413.30	31.07	.00
	2004	56.35	4538	427.07	29.65	.00
	2005	56.93	4593	411.23	28.64	.00
	2006	55.85	4601	394.42	26.72	.00
	2007	50.36	1211	427.80	19.94	.00

Table 3.20A: Descriptives for Days Cash on Hand by fiscal year w/limitation (-160, 275)

The DCOH (n) by Hospital Size for this sample (n) = 51,996. Hospital size affects DCOH. The larger the ACH, the greater the DCOH, as exhibited in Table 3.20A. The only exception was Category 5, which was not in line with the trend lines of Categories 1 through 4. The largest DCOH was presented by Category 4 with a DCOH of approximately 70, and the lowest value was 47 in Category 5.

The distribution of DCOH (n) by Hospital Size as observed in Table 3.21A was similar to the total population and other samples presented. Category 5 still represented a very small proportion of the overall sample. This raised concern, as the Category 5 mean DCOH value given in Table 3.19A could be skewed by this lower case count.

		Days Cash on Hand 3				
		Mean	Valid N	Range	Median	Mode
Hospital Size	1.000	54.55	27280	434.61	31.56	.00
	2.000	57.71	15697	428.78	27.40	.00
	3.000	67.55	7224	427.70	37.94	.00
	4.000	70.53	1652	302.86	39.73	.00
	5.000	47.63	143	381.79	20.56	-137.04

Table 3.21A: Descriptives for Days Cash on Hand by hospital size w/limitation (-160, 275).

3.5.3.2 Cash Ratio

Cash Ratio is defined as (Cash Equivalents + Temporary Inventory+ Account Receivable)/Current Liabilities). Missing variables within the longitudinal data used to calculate the Cash Ratio were assigned a zero value in order to limit sample reduction. Balance sheet variables not reported in the MCR had a missing value in the field. In order not to create system missing data fields within the Cash Ratio, an overall population zero was used instead of a missing field. This minimized the loss from missing and system missing fields. The sample remained a larger sample size than what previously was available with missing fields.

Cash Ratio (N) = 53,946, with 1,636 missing cases from the original sample of 55,582. A histogram of Cash Ratio (N) provided in Figure 3.29A revealed that distribution was abnormal and extremely leptokurtic. The shape of the sample distribution was due to outlier and extremes present in the population of Cash Ratio (N).

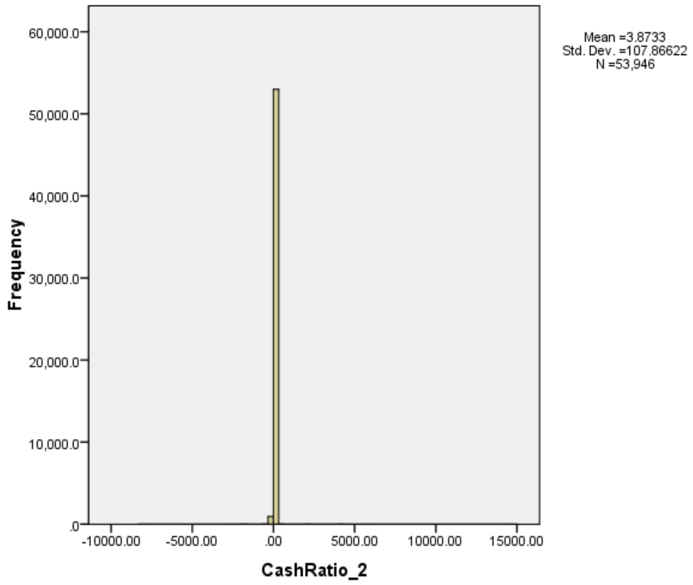


Figure 3.29A: Histogram Cash Ratio with no limitation

The mean Cash Ratio (N), as provided in Table 3.22A, was calculated as 3.87. A standard error was provided at a value of 0.4644. The 95% confidence interval was narrow, and the distribution was skewed positively, with a skewness of 92.926. Leptokurtic distribution was confirmed, with a large kurtosis of 13,875.72. The range of Cash Ratio (N) was 23,005.77.

The box plot of Cash Ratio (N) in Figure 3.30A again confirmed the abnormal distribution, with neither boxes nor whiskers visible. Evidence was present of large extremes and outliers. The majority of the population was visible in the line at approximately zero on the Y-axis.

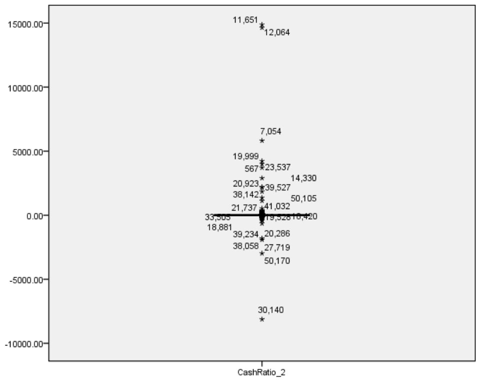


Figure 3.30A: Box plot Cash Ratio with no limitation

Using Tukey's (1977) definition of outliers and extremes, box plot and stem and leaf plot outliers and extremes were identified at less than or equal to -2.1, and those values greater than or equal to 7.1. Limiting the data to rule out the extremes and outliers, Cash Ratio (n) was created. For Cash Ratio (n), n = 50,168 cases, a reduction of 3,778 cases, or 7% from the Cash Ratio (N) of 53,946.

Cash Ratio

Descriptives of Variable

Variable	n	Mean	Median	Std. Deviation	Range	Skewness	Kurtosis	Outliers
Cash Ratio	53946	3.87	2.27	107.866	23005.77	92.93	13875.72	x<=-2.1 & x>=7.1
Cash Ratio - X	50168	2.47	2.164	1.533	9.2	0.725	0.229	

Table 3.23A: Descriptives of the Cash Ratio (Cash Ratio-X, denotes removal of outliers).

As evident from Figure 3.31A, a histogram of Cash Ratio (n), the distribution was normalized and showed a slightly leptokurtic shape, and was skewed slightly positive. The left tail was distorted due to negative Cash Ratio values that were calculated as unlikely.

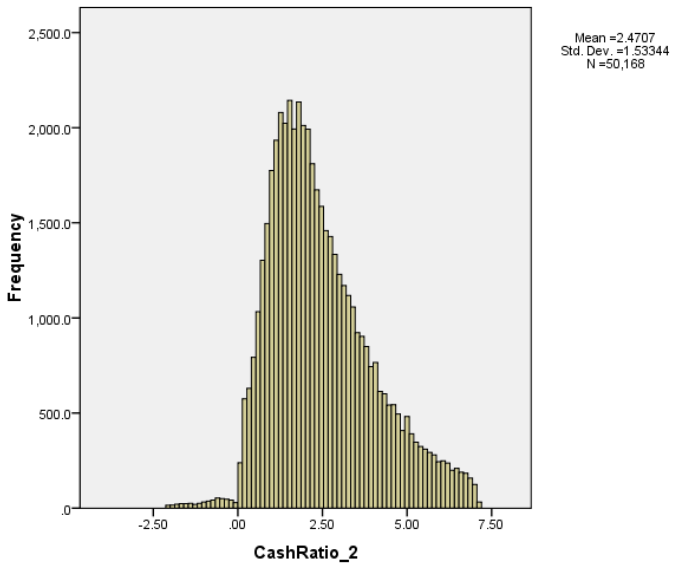


Figure 3.31A: Histogram Cash Ratio w/limitation (-2.1, 7.1)

Analyzing the statistical descriptives for Cash Ratio (n), it was evident that the mean Cash Ratio (n) was reduced to 2.47, with a standard error of 0.00685. The 95% confidence interval also was reduced. Overall, the accuracy of the mean increased. The range was reduced significantly, to 9.20. The distribution remained slightly positively skewed, with a skewness of 0.725, and leptokurtic, with a kurtosis of 0.229.

A box plot of Cash Ratio (n) in Figure 3.32A confirmed the normalization of the distribution within the sample via exclusion of the outliers and extremes. Both boxes and whiskers became visible, in comparison to the box plot on Cash Ratio (N). Of the sample, 50% remains around the 2.50 value on the Y-axis. While outliers were still present within the sample, these were not omitted, as the mean was calculated within acceptable accuracy limits, and the value of the cases and number of cases in comparison to the sample size was unlikely to skew the results further that were calculated with Cash Ratio (n).

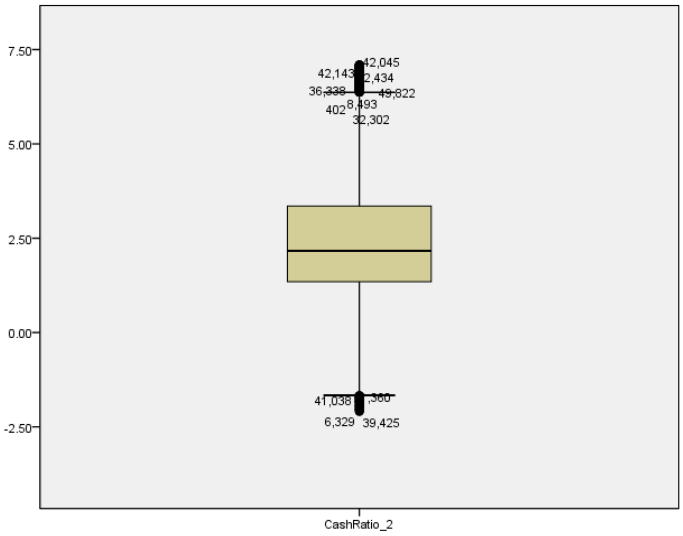


Figure 3.32A: Box plot Cash Ratio w/limits (-2.1, 7.1)

Cash Ratio (n) by Fiscal Year Reported (n) =50,168 cases. Revealed in Table 3.24A, Cash Ratios increased over the length of the study. The year 1995 was relatively high, with a value of approximately 2.2, with a sharp decrease in 1996. The years of 1996-1997 remain low, with 1998-2007 increasing in the cash ratio. The mean for Cash Ratio (n) remained above 2.4 for the entire length of the study. The years 1995 and 2007 remained relatively large in comparison with all other years in the longitudinal study.

The distribution for Cash Ratio (n) by Fiscal Year Reported was similar in character to that of the overall population. The years of 1995 and 2007 remained low case years, with approximately 25% of the cases of any other year in the longitudinal study. It is possible that the variance in the mean value of Cash Ratio (n) in 1995 and 2007 in comparison to all other years could be explained by the low case volume in those years.

		CashRatio 2				
		Mean	Valid N	Range	Median	Mode
FiscalYear	1995	2.51	1035	7.96	2.19	1.09
	1996	2.43	4518	8.99	2.13	.95
	1997	2.41	4474	9.16	2.13	.87
	1998	2.46	4373	9.13	2.15	1.21
	1999	2.46	4290	9.14	2.17	1.47
	2000	2.47	4313	9.18	2.17	1.00
	2001	2.49	4272	8.94	2.18	1.27
	2002	2.48	4361	9.16	2.16	1.16
	2003	2.49	4310	8.95	2.17	3.40
	2004	2.48	4298	9.17	2.18	3.17
	2005	2.49	4343	9.10	2.18	1.42
	2006	2.50	4431	9.15	2.18	6.16
	2007	2.57	1150	8.86	2.27	.66

Table 3.24A: Descriptives for the Cash Ratio by fiscal year w/limitation (-2.1, 7.1)

Cash Ratio (n) by Hospital Bed Size for the sample was (n) = 50,123. The reduced presence of Category 5 within the sample remained low in comparison to other hospital categories; however, this was similar to this categories' presence in the overall population.

From Table 3.25A, it is evident that smaller hospitals in Categories 1 and 2 had the best mean Cash Ratio (n), with Cash Ratio decreasing as size increases.

		CashRatio 2				
		Mean	Valid N	Range	Median	Mode
Hospital Size	1.000	2.50	25828	9.20	2.21	1.15
	2.000	2.47	15302	9.18	2.16	3.43
	3.000	2.43	7216	9.00	2.11	1.29
	4.000	2.20	1640	8.16	1.82	2.07
	5.000	2.24	137	7.54	1.89	-1.51

Table 3.25A: Descriptives for the Cash Ratio by hospital size w/limits (-2.1, 7.1).

3.5.4 Liquidity Ratios

3.5.4.1 Current Ratio

Current Ratio is defined as (Current Assets/Current Liabilities) Current Ratio (CR) N= 53,761 cases, with 1,821 missing from the total population of 55,582. Figure 3.33A shows that CR (N) had a non-normal distribution, which was leptokurtic. Combining this with the statistical descriptives for CR (N) in Figure 3.26A, we see that there was a standard error of 0.379, with a mean CR (N) of 3.242. A confidence interval was relatively small in comparison to previous ratios; however, a range of 19,898, along with unrealistic minimum and maximum values for CR (N), showed that outliers and extremes were present and were distorting the mean. The distribution was skewed positively, with a skewness of 83.43, and leptokurtic was confirmed, with a kurtosis value of 13,976.81.

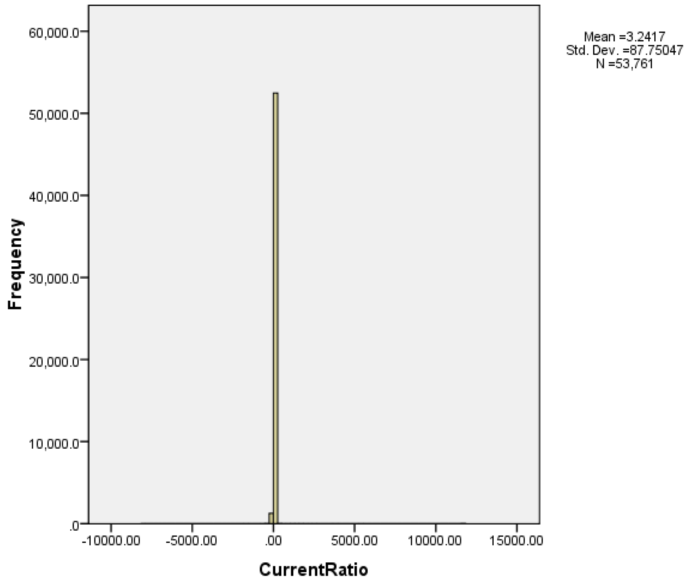


Figure 3.33A: Histogram Current Ratio with no limitations

The box plot in Figure 3.34A confirmed a non-normal distribution, with no boxes or whiskers visible. Outliers and extremes were identified as extending above and below the line present at the 0 mark, which represents 50% of the total population.

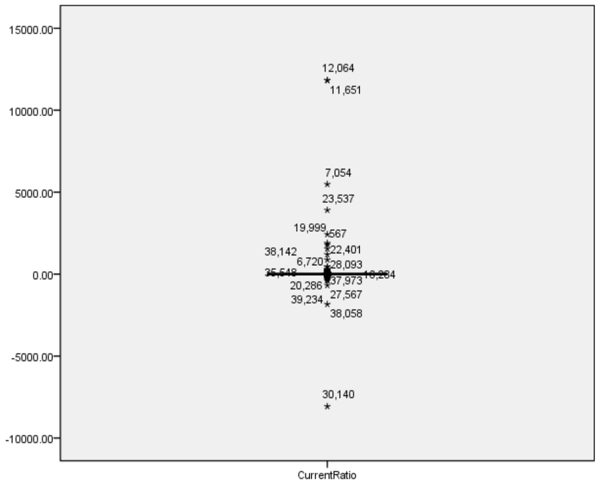


Figure 3.34A: Box plot Current Ratio with no limitations

Outliers were identified using both the box plot in Figure 3.34A and the stem and leaf plot at values less than or equal to -1.4, and values greater than or equal to 5.8. Using these values, a new sample was created CR (n). Descriptives were run to observe the new mean and characteristics of this new sample mean.

The mean CR (n) was reduced to 2.14, a realistic value for the current ratio. The standard error was reduced to a value of 0.00547, indicating the increased accuracy of the mean value. The 95% confidence interval also was reduced significantly, with the upper and lower bounds approximately .02 apart. The range was reduced from 19,898 to 7.18. The distribution was skewed positively, with a skewness value of 0.639. As noted from the kurtosis value of 0.292, the distribution still was slightly leptokurtic.

Current Ratio								
Descriptives of Variable								
Variable	n	Mean	Median	Std. Deviation	Range	Skewness	Kurtosis	Outliers
Current Ratio	53761	3.24	2.03	87.75	19898.78	83.43	13976.81	x<= -1.4 & x>= 5.8
Current Ratio -X		2.14	1.95	1.217	7.18	0.639	0.292	

Table 3.26A: Descriptives for the Current Ratio (Current Ratio-X, denotes removal of outliers).

The histogram in Figure 3.35A gives a better indication of the overall picture of distribution in CR (n). The distribution was normalized, with a leptokurtic presence still visible in the histogram. The left tail was disfigured slightly, most likely due to negative values being an abnormal event in calculating the current ratio.

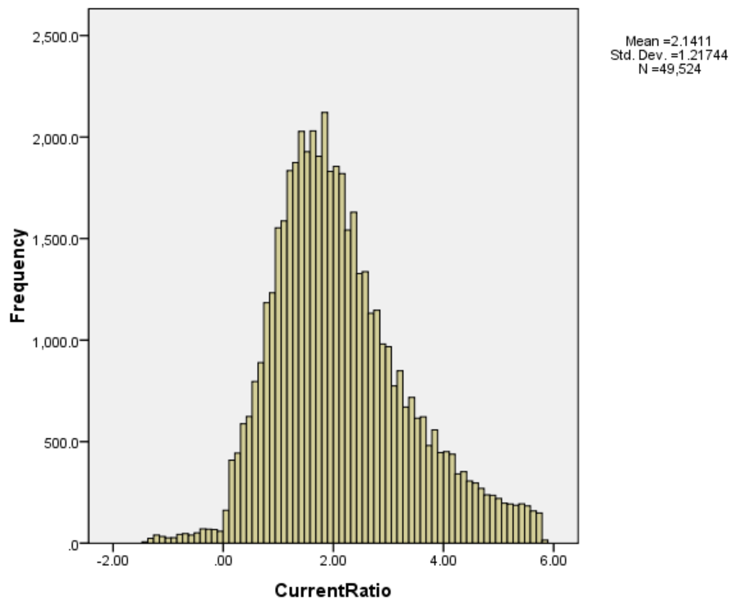


Figure 3.35A: Histogram Current Ratio with Limitation (-1.4, 5.8)

The box plot in Figure 3.36A confirmed normalization of the data, with boxes and whiskers fully visible. It was noted that the lower whisker extends below the zero value, indicating that more than outliers and extremes were present below zero. Outliers were still visible in the box plot; however, these should not affect further research using this sample, due to the values of the CR or the number of outliers present in comparison to the overall CR (n) case count. Standard error confirmed accuracy in the mean CR (n) as well.

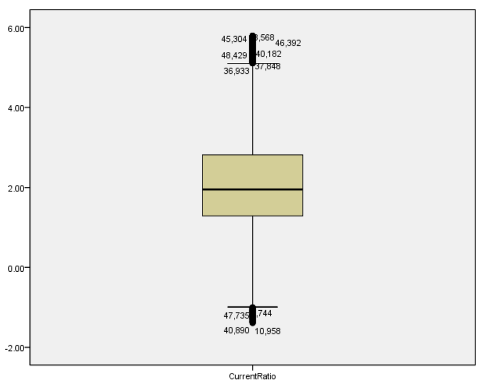


Figure 0.1.36A: Box plot of Current Ratio w/limitations (-1.4, 5.8)

Analyzing the mean CR (n) by Fiscal Year Reported in Table 3.27A (n =49,524), the mean was reduced from the year 1995 with a value of 2.20, finishing in 2007 with a value of 2.12. While there was not a complete linear decline, the overall effect was a reduction in the mean CR (n). The mean CR (n) retreated from an initial value in 1995 of approximately 2.2 through to a mean CR (n) value of approximately 2.12 in 2007.

		Current Ratio				
		Mean	Valid N	Range	Median	Mode
FiscalYear	1995	2.20	1044	6.94	1.98	1.93
	1996	2.16	4503	7.15	1.96	1.27
	1997	2.14	4496	7.16	1.95	1.35
	1998	2.16	4399	7.10	1.97	1.81
	1999	2.15	4328	7.18	1.97	1.27
	2000	2.15	4308	7.14	1.96	1.71
	2001	2.17	4286	7.14	1.96	1.63
	2002	2.13	4361	7.16	1.93	1.58
	2003	2.12	4330	7.16	1.93	1.71
	2004	2.13	4312	7.14	1.94	1.41
	2005	2.11	3555	7.16	1.91	1.51
	2006	2.12	4445	7.18	1.93	1.43
	2007	2.12	1157	7.06	1.90	1.40

Table 3.27A: Descriptives for the Current Ratio by fiscal year w/limitations (-1.4, 5.8).

Note: The same years that underperformed on the RoA and RoE were not affected in the current ratio. Table 3.28A illustrates the distribution of the mean CR (n) by fiscal year. It closely matches that of the overall population, with the exception of 2005, which had a reduced case count in comparison.

As shown in Table 3.28A, hospital size was not correlated directly to the current ratio. However, the smaller ACHs in Category 1 performed the best. Larger hospitals (Category 5) were penalized by their size; however, Category 5 could be distorted by the small number within the sample.

		Current Ratio				
		Mean	Valid N	Range	Median	Mode
Num Bed Cat	1.00	2.19	25403	7.18	2.00	1.62
	2.00	2.10	15286	7.18	1.90	1.96
	3.00	2.09	7047	7.08	1.89	1.27
	4.00	2.10	1601	7.03	1.87	1.37
	5.00	2.04	140	6.96	1.74	1.12

Table 3.28A: Descriptives for the Current Ratio by hospital bed size w/limits (-1.4, 5.8)

The CR (n) distribution of ACHs by size category is shown in Table 3.28A. While n= 49,477 and was a large statistical sample, the distribution by size was similar to previous ratios within this chapter, including the low representation of Category 5 within the sample.

3.5.4.2 Quick Ratio

The Quick Ratio is defined as (Current Assets-Inventories/Current Liabilities). The Quick Ratio (QR) N= 50,043, with 5,539 missing from the original population of 55,582. A histogram of QR (N) provided in Figure 3.37A shows the distribution of QR (N) to be non-normal and leptokurtic.

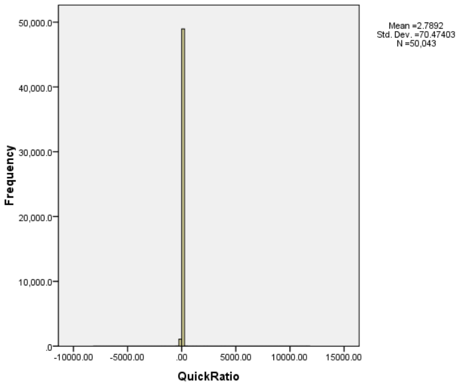


Figure 3.37A: Histogram Quick Ratio w/no limitations

The Mean QR (N) was calculated to be 2.789 with a standard error of 0.315. The 95% confidence interval was relatively small in comparison to other ratio populations. The mean QR (N) was a realistic value for the quick ratio. The range of QR (N) values was large, 19,642.78, which led to the possibility of outliers present in the sample. The distribution was skewed positively, with a skewness value of 69.16. Leptokurtic distribution was confirmed with a kurtosis value of 18,666.36. A box plot of QR (N), Figure 3.38A, confirmed a non- normal distribution. Outliers and extremes were evident in the population. No whiskers or boxes were present, representing a very condensed population around the line present at the zero value line. Using Tukey's (1977) definition of outliers and extremes, in Figure 3.38A the box plot and the stem and leaf plot identified outliers and extremes at values less than or equal to -1.3, and values greater than or equal to 5.4. Creating a sample using these limitations gave us the sample QR (n).

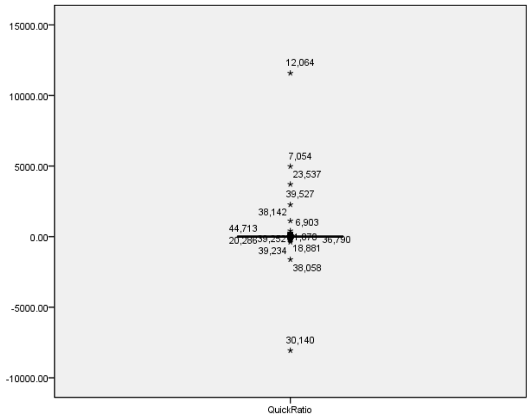


Figure 3.38A: Box plot Quick Ratio w/no limitations

The QR (N) = 50,043, while QR (n) = 45,991 cases, a reduction of 4,052 cases, or 8% from the population. The mean QR (n) presented at 2.00 with a standard error of .00527. The 95% confidence interval also was reduced when the sample was limited, in comparison to the interval expressed in QR (N). The range was reduced significantly in comparison with QR (N) at a value of 6.68. The distribution still was skewed positively, with a skewness of 0.65, and slightly leptokurtic, with a kurtosis of 0.298.

Quick Ratio

Descriptives of Variable

Variable	n	Mean	Median	Std. Deviation	Range	Skewness	Kurtosis	Outliers
Quick Ratio	50043	2.78	1.9	70.47	19642.78	69.163	18666.36	X<= -1.3 & X>= 5.4
Quick Ratio - X	45991	2	1.82	1.13	6.68	0.65	0.298	

Table 3.29A: Descriptives for the Quick Ratio (Quick Ratio-X, denotes removal of outliers).

A histogram of QR (n) was reflected in Figure 3.39A. This histogram confirmed that the distribution was normalized. The left tail present in the histogram was distorted in comparison to the right tail. This distortion was caused by a negative QR present in the population. The distortion occurred at the zero value for QR (n).

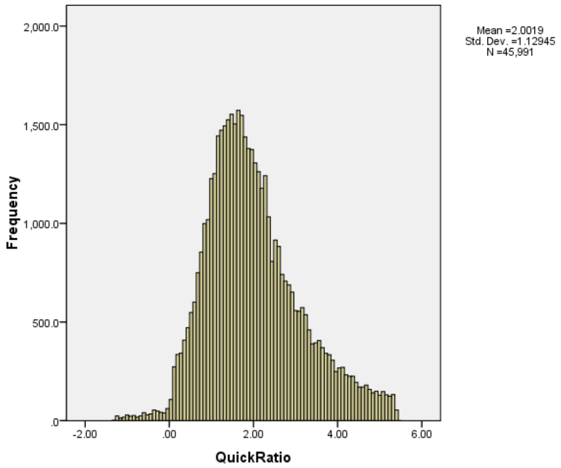


Figure 3.39A: Histogram Quick Ratio w/limitations (-1.3, 5.4)

A box plot of QR (n) in Figure 3.40A confirmed normalization of the distribution. Boxes and whiskers were present, along with outliers. The lower whisker protrudes below the QR (n) value of zero, indicating the part of the sample that was not considered an outlier or extremes exists below zero. This was of concern, as a QR with a negative value was less likely to be calculated. The mean QR (n) was evident at approximately 2.00, which was confirmed by the mean QR (n) given in the descriptives.

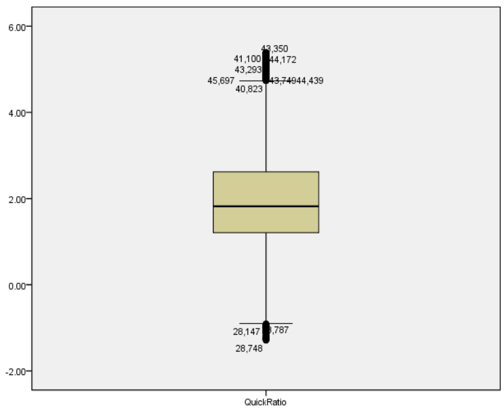


Figure3.40A: Box plot Quick Ratio w/limits (-1.3, 5.4)

The quick ratio and the current ratio were very similar, but the quick ratio did not include inventories. Evidence did not support that ACH working capital was affected by inventories. Observing the mean QR (n) by fiscal year reported provided us with a bar chart in Table 3.30A that is very similar to the table created for CR (n), Table 3.27A. The QR (n) = 45,991 cases for QR (n) by fiscal year reported. The mean QR (n) declined in four successive three-year trends, with a mean QR (n) increasing slightly before continuing its trend in declining value of mean QR (n). There was a reduction of approximately one unit of value between 1995 and 2007. While both the years 1995 and 2007 had fewer cases in comparison to the rest of the sample, as confirmed by Table 3.30A, the values presented should not be distorted, as a statistical sample still was present for those years.

The histogram for QR (n) by Fiscal Year Reported confirmed similar distribution to the population, with the exception of the year 2005. The reduction in cases for this year was unexplained, but this did not statistically impact the calculations for this year, as the number of cases was still above what is a statistically large sample.

		QuickRatio				
		Mean	Valid N	Range	Median	Mode
FiscalYear	1995	2.04	996	6.62	1.85	1.03
	1996	2.02	4287	6.59	1.82	1.48
	1997	2.00	4233	6.63	1.82	1.23
	1998	2.02	4122	6.67	1.85	1.42
	1999	2.01	4015	6.65	1.84	1.65
	2000	2.00	3991	6.58	1.84	1.86
	2001	2.02	3966	6.65	1.84	1.37
	2002	1.99	4043	6.68	1.80	1.37
	2003	1.98	3983	6.65	1.80	1.66
	2004	2.00	3962	6.67	1.81	1.54
	2005	1.98	3269	6.66	1.79	1.70
	2006	1.98	4065	6.64	1.81	1.60
	2007	1.98	1059	6.25	1.77	1.71

Table 3.30A: Descriptives for the Quick Ratio by fiscal year w/limits (-1.3, 5.4)

The Table of QR (n) by Fiscal Year Reported in Table 3.30A indicated that the mean remains near two for all years within the study, with a slight downward trend present, and 50% of the population remains around two for the entirety of the duration.

The Mean QR (n) by Hospital Size (n) = 45,954. The table in 3.31A reflected the mean QR (n) by Hospital Bed Size. Category 2 provided us with the lowest mean QR (n) value. This could be due to higher inventories kept at this ACH size. Mean QR (n) values were most significant for Category 1, followed by Category 4 and 5, respectively. The value for Category 5 could be skewed in the sample because of the minimal amount of cases.

		QuickRatio				
		Mean	Valid N	Range	Median	Mode
Hospital Size Category	1.00	2.05	23434	6.68	1.87	1.61
	2.00	1.94	14429	6.67	1.77	1.78
	3.00	1.97	6608	6.67	1.78	1.46
	4.00	2.04	1370	6.52	1.81	1.32
	5.00	2.02	113	4.47	1.68	1.15

Table 3.31A: Descriptives for the Quick Ratio by hospital size w/limits (-1.3, 5.4)

The distribution of QR (n) by Hospital Bed Size was similar in shape to that of the population as a whole and was not distorted from what was shown previously for the population.

3.5.6 Efficiency Ratios

3.5.6.1 Days Sales Outstanding (DSO)

Days Sales Outstanding is defined as ((Gross Receivables/Net Sales) x 365). The DSO (N) = 53,931 cases, with 1,651 missing from the overall population of 55,582 cases. The distribution for DSO (N) was leptokurtic and abnormal in shape. The scale on the histogram in Figure 3.41A indicated that outliers and extremes were present. No problems existed with any variables in any of the years.

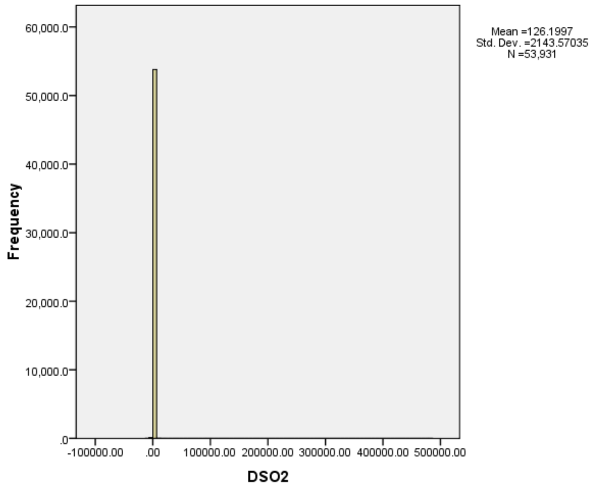


Figure 3.41A: Histogram DSO with no limitations

The mean DSO (N) was defined as 126.1997 with a standard error of 9.23. A relatively large 95% confidence interval was revealed, combined with the standard error. This indicated the inaccuracy of the mean DSO (N) calculation. The range, as reflected in Figure 3.32A was 496,653.99, which was an excessively large range, indicating the presence of extremes and outliers. The min and max of the range were unrealistic DSO values; therefore, they were classified as possible outliers. The leptokurtic nature of the distribution was confirmed, with a kurtosis value of 49,005.71.

The box plot of DSO (n) in Figure 3.42A confirmed an abnormal distribution. Neither boxes nor whiskers were visible, and outliers and extremes were shown to exist within the population. A line representing the core population was found at approximately 0 on the Y-axis. The population in this box plot was compressed by the scale on the Y-axis as a result of the presence of the extremes and outliers.

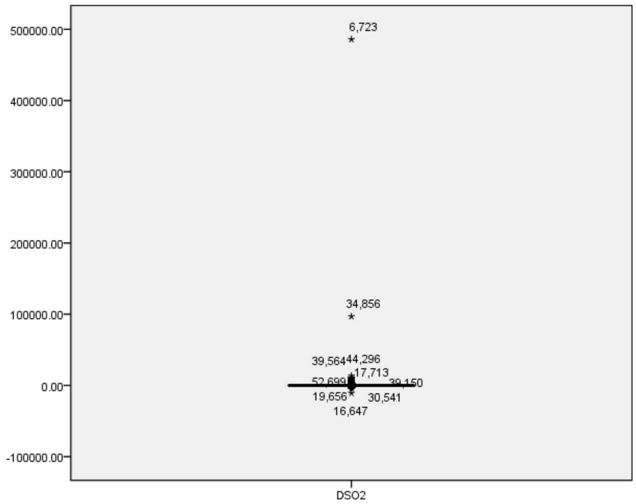


Figure 3.42A: Box plot DSO with no limitations

Combining the box plot for DSO (N) in Figure 3.42A, and the stem and leaf plot, outliers were identified using Tukey's (1977) definition of extremes and outliers. Outliers were identified as those values of DSO (N) less than or equal to -27, and values greater than or equal to 222. Using these limitations on DSO (N), we created the sample DSO (n).

Days Sales Outstanding Ratio

Descriptives of Variable

Variable	n	Mean	Median	Std. Deviation	Range	Skewness	Kurtosis	Outliers
DSO	53931	126.199	92.64	2143.57	496654	217.61	49005.71	x<=-27 & x>=222
DSO - X	51138	96.813	89.88	41.905	245.87	0.655	0.097	

Table 3.32A: Descriptive statistics for Days Sales Outstanding (DSO-X, denotes removal of outliers)

The DSO (n), n = 51,138, was a reduction of 2,793 cases, or 5% of DSO (N) of 53,931 cases. A histogram of DSO (n), as visible in Figure 3.43A, provided us with evidence that the sample had a more normalized distribution. Both a left and right tail were visible, with the left tail slightly distorted and truncated at zero on the X-axis. Case quantities were visible below zero. The distribution was leptokurtic in nature.

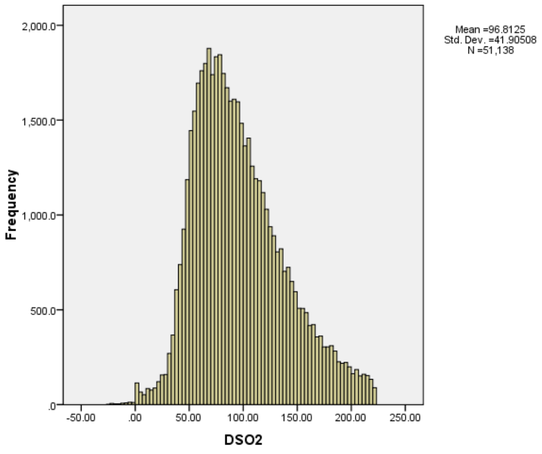


Figure 3.43A: Histogram DSO w/limits (-27,222)

A realistic mean DSO (n) was presented in the descriptives in Table 3.32A of 96.81, with a standard error of 0.1853. The 95% confidence interval was reduced, with the upper and lower boundary spread much closer together. The range was reduced to 245.87 through the removal of outliers. This was an acceptable range for the DSO. The distribution remained positively skewed, with a skewness of 0.665, and leptokurtic characteristics were confirmed, with a kurtosis of 0.097. Both of these values were reduced significantly.

A box plot of the DSO (n) in Figure 3.44A provided further evidence that the sample distribution was normalized. Both boxes and whiskers were visible, with outliers present as well. The boxes were roughly even in shape and size. It was noted that the lower whisker extends slightly below zero on the Y-axis. The DSO is not characteristically a negative number, which presented some concern over the values in this range. The outliers present were not considered to be a problem, as they were few in number, and their values were not extreme enough to affect the research calculations using this sample going forward.

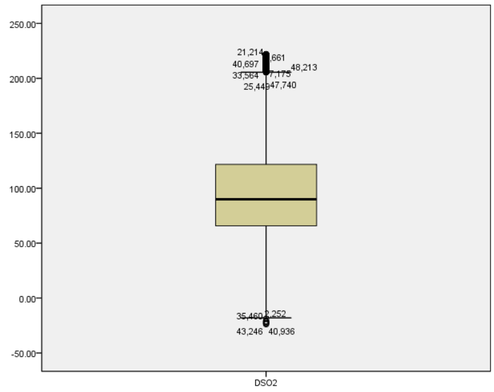


Figure 3.44A: Box plot DSO w/limits (-27,222)

Analyzing the mean DSO (n) by Fiscal Year Reported showed that the DSO spiked in the years 1996 -2001. The mean DSO (n) never fell below 90 days. In comparison to the previous years, the year 2004 onward had a relatively low mean DSO. Note that the time frame in this spike also matched troublesome time frames in other key financial ratios.

The mean DSO (n) by fiscal year reported was n = 51,138. The distribution of cases of the DSO (n) by fiscal year reported in Table 3.36 shows that cases reflected similar characteristics to that of the overall population. Again, 1995 and 2007 represented approximately 25% of the number of cases in any other year in the longitudinal study.

		DSO2				
		Mean	Valid N	Range	Median	Mode
FiscalYear	1995	96.07	1053	227.14	89.75	63.93
	1996	96.17	4586	243.36	90.01	55.85
	1997	99.23	4523	231.42	93.38	52.73
	1998	104.84	4431	236.66	98.19	49.12
	1999	105.93	4345	244.76	99.42	52.22
	2000	103.48	4359	233.91	96.83	49.83
	2001	97.93	4362	231.01	90.38	54.77
	2002	94.05	4416	230.02	85.78	38.74
	2003	93.57	4393	231.20	84.25	43.90
	2004	90.46	4443	244.56	81.47	37.26
	2005	90.00	4495	245.57	80.90	45.12
	2006	91.29	4559	240.89	82.13	57.55
	2007	91.76	1173	235.92	84.60	-14.79

Table 3.33A: Descriptives for Days Sales Outstanding by fiscal year w/limits (-27,222).

Mean DSO (n) by Hospitals Bed Size revealed in Table 3.34A that no linear relationship between size and DSO existed. The smaller hospitals had a higher mean

DSO (n), and Category 2 was the highest with a value of 98. Category 4 had the lowest mean DSO (n), with a value of 93.

The distribution of mean DSO by Hospital Bed Size was similar to the overall population, as is visible in Table 3.34A. Note that Category 5 remained a very small proportion of the overall sample as well as the population.

		DSO2				
		Mean	Valid N	Range	Median	Mode
Hospital Size	1.000	96.79	26725	245.87	90.19	7.25
	2.000	97.63	15339	243.33	90.59	35.37
	3.000	96.26	7177	230.99	88.38	33.32
	4.000	92.61	1707	223.95	83.92	-1.98
	5.000	96.09	143	204.37	86.77	17.06

Table 3.34A: Descriptives for Days Sales Outstanding by hospital size w/limits (-27,222).

3.5.6.2 FATRR (FIXED ASSET TURNOVER RATIO)

Fixed Asset Turnover Ratio is defined as (Sales/Fixed Assets). The FATR (N) =53,179, with 2,403 cases missing from the original data set of 55,582. The missing cases were most likely due to missing variables in the original data, or divide by zero errors that resulted in variables being classified as system missing within the dataset. The FATR (N) represented a large statistical sample size.

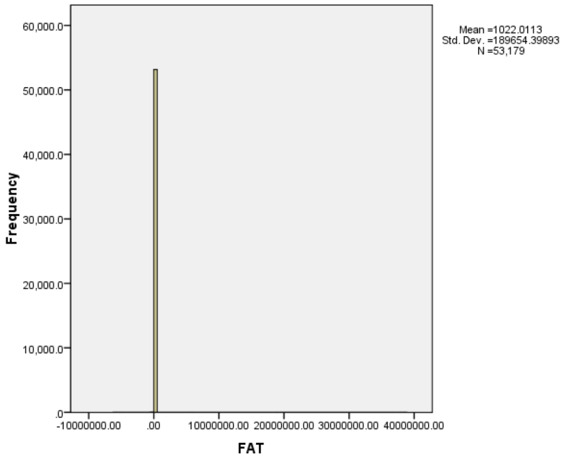


Figure 3.45A: FATR (N) histogram prior to limitations

A histogram of the FATR (N) is provided in Figure 3.45A. The distribution of the FATR (N) was not a normal distribution, and was extremely leptokurtic. These attributes were confirmed when looking at the statistical descriptives of FATR (N) in Table 3.35A. The mean FATR (N) was not realistic, and a large standard error value was presented at 822.42. The confidence interval given was large, with an interval of roughly 3,100. This confirmed that the mean was not accurate, and was influenced by outliers and extremes within the FATR (N). The range of values for FATR (N) was extremely large, with a value of 44,280,143.30. The distribution was skewed positively, with a skewness value of 170.26, and was confirmed as leptokurtic, with a kurtosis value of 32,447.82.

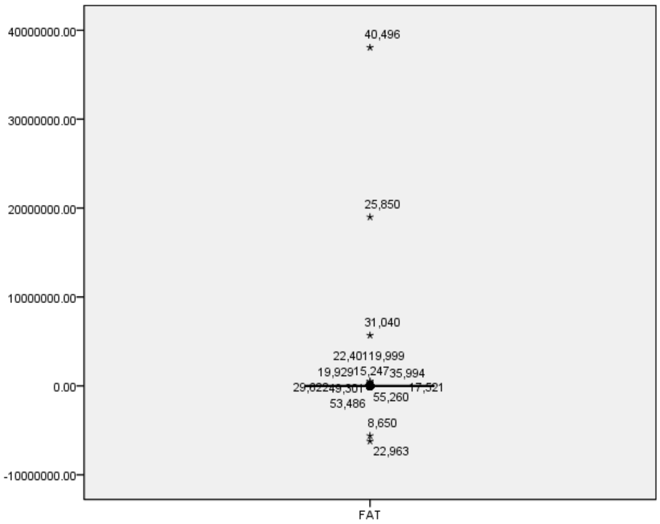


Figure 3.46A: FATR (N) Box plot prior to limitations

A further confirmation of non-normalized distribution is presented in the box plot of the FATR (N), presented in Figure 3.46A. The box plot shows that outliers and extremes were present within the population. Neither boxes nor whiskers were present, indicating that the population would need to be refined to reach an accurate, normally distributed sample. Using the box plot, Tukey's (1977) definition of outliers and stem and leaf plot outliers were identified at FATR values less than or equal to -3.6, and values greater than or equal to 13.7. Using these outliers, a sample FATR (n) was refined from FATR (N).

The FATR (N) = 53,179, while FATR (n) =47,943, a reduction of 5,236 cases, or 9.8% of FATR (N). Using the histogram provided in Figure 3.45A, we can see that the FATR (n) had a more normalized distribution, although still leptokurtic. A realistic mean FATR (n) of 4.8 was presented.

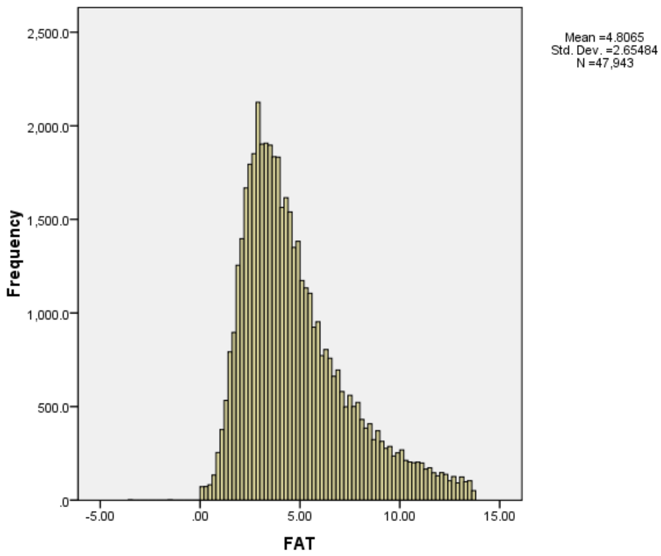


Figure 3.47A: FATR (n) histogram with limitations (-3.6, 13.7)

Using the statistical descriptives of the FATR (n) in Table 3.35A, a standard error of 0.01212 confirmed the accuracy of the 4.8 mean value that presented at a 95% confidence level. The confidence interval confirmed the above with its reduction in range of values presented for the mean. The range in values presented for FATR within FATR (n) was reduced to 17.26. The distribution was skewed positively, with a skewness value of 1.06.

Fixed Asset Turnover Ratio								
Descriptives of Variable								
Variable	n	Mean	Median	Std. Deviation	Range	Skewness	Kurtosis	Outliers
FAT	53179	1022.01	4.49	189654	44280143	170.26	32447.82	X<= -3.6 & X>= 13.7
FAT - X	47943	4.8	4.16	2.65	17.26	1.06	0.764	

Table 3.35A: Descriptives for the Fixed Asset Turnover Ratio (FAT-X denotes removal of outliers).

The box plot presented in Figure 3.48A shows a normalized distribution within the FATR (n). Both whiskers and boxes were noticeable, with the bottom whisker extending below the 0 value for FATR. Fifty percent of the FATR (N) remained around the 5.00 value range. Outliers were still present within the sample. Due to the standard error presented, and the number of outliers and their values in comparison to the sample size and values of cases within the sample, it was determined that the presence of these outliers would not distort any research or evidence obtained from this sample.

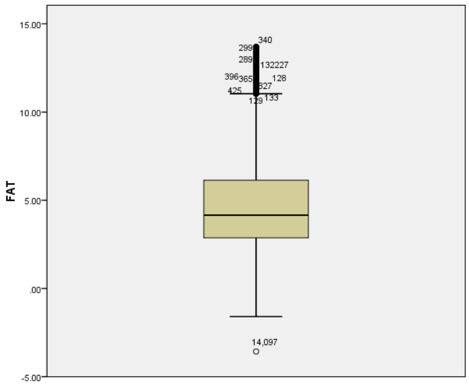


Figure 3.48A: Box plot FATR (n) with limitations (-3.6, 13.7)

Looking at the data presented in Table 3.36A, a table of FATR by fiscal year reported, the distribution of cases was similar to that of the overall population with the exception of 2005, as well as a reduction in cases year after year from 1996 through 2005. This observance was most likely due to greater extremes or outliers being present in later years as opposed to prior years, or fewer ACHs reporting fixed assets.

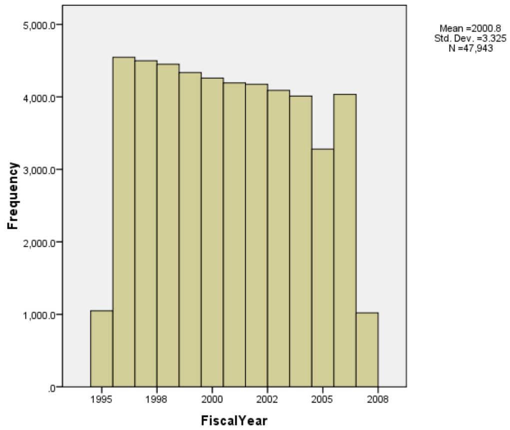


Figure 3.49A: Histogram FATR (n) cases by Fiscal Year Reported limitation (-3.6, 13.7)

When Table 3.36A is used to observe the mean FATR (n) by Fiscal Year, we can see that ACHs became more efficient in the use of their fixed assets over time. From 1995 onward, there was an increasing value in the mean FATR (n) by year. The lowest value presented was in the year 1995, with a mean FATR (n) of 3.82, and ending in year 2007, with a value of 5.73. This reflected incentives and pressures upon ACHs to increase efficiencies within their organization, boosting the utilization of fixed assets.

		FAT				
		Mean	Valid N	Range	Median	Mode
FiscalYear	1995	4.00	1049	13.29	3.57	2.52
	1996	4.09	4547	17.22	3.56	3.10
	1997	4.13	4498	13.57	3.55	2.35
	1998	4.17	4451	13.62	3.62	3.52
	1999	4.33	4336	13.60	3.75	3.00
	2000	4.55	4259	13.63	3.97	3.89
	2001	4.81	4193	15.27	4.22	2.77
	2002	5.09	4174	13.62	4.51	3.00
	2003	5.31	4090	13.68	4.78	3.40
	2004	5.50	4011	13.80	4.96	5.02
	2005	5.67	3280	13.50	5.09	4.48
	2006	5.65	4034	13.56	5.11	4.20
	2007	5.73	1021	13.37	5.18	4.48

Table 3.36A: Descriptive statistics for the Fixed Asset Turnover Ratio by fiscal year w/limitation (-3.6, 13.7)

Table 3.37A represents the Mean FATR (n) by Hospital Size. The sample FATR (n) by Hospital Size was equal to 47,905. Maximum efficiency was realized in Category 3. Category 1 underperformed in comparison to the other sizes represented, which was confirmed by prior research that shows the underutilization of fixed assets to be a problem, mainly because of lower patient volumes within that category. Category 5 values could be biased due to lower representation in the overall sample.

		FAT				
		Mean	Valid N	Range	Median	Mode
Num Bed Cat	1.00	4.59	24316	13.68	3.89	3.11
	2.00	4.96	14859	17.26	4.29	3.03
	3.00	5.17	6959	13.28	4.59	2.85
	4.00	5.12	1632	12.68	4.59	3.89
	5.00	5.03	139	11.10	4.71	4.16

Table 3.37A: Descriptives for Fixed Asset Turnover Ratio by hospital size w/limitation (-3.6, 13.7)

The distribution in the sample used to view the mean FATR by Hospital Size matches that of the overall population viewed previously.

Chapter 3 Variable Nomenclature and Definitions

		Chapter 3						
		Descriptives of Variables						
Variable	n	Mean	Median	Std. Deviation	Range	Skewness	Kurtosis	Outliers
RoE	54619	41.98	0.0747	74064	21643214	56.875	19.801	x<= -0.26 & x>= 0.42
RoE -X	44629	0.0743	0.0713	0.11895	0.68	0.125	0.624	
RoA	54047	37566.92	0.03	5088640	8.81E+08	-121.52	16973.44	x<= -0.150 & x>= 0.220
RoA - X	45634	0.0334	0.03	0.06655	0.35	-0.057	0.249	
FAT	53179	1022.01	4.49	189654	44280143	170.26	32447.82	X<= -3.6 & X>= 13.7
FAT - X	47943	4.8	4.16	2.65	17.26	1.06	0.764	
Current Ratio	53761	3.24	2.03	87.75	19898.78	83.43	13976.81	x<= -1.4 & x>= 5.8
Current Ratio -X		2.14	1.95	1.217	7.18	0.639	0.292	
Quick Ratio	50043	2.78	1.9	70.47	19642.78	69.163	18666.36	X<= -1.3 & X>= 5.4
Quick Ratio - X	45991	2	1.82	1.13	6.68	0.65	0.298	
DCOH	55564	108.81	36.768	5737.647	1356149	235.197	55399.032	x<= -160 & x>= 275
DCOH -X	52050	57.7826	31.296	68.525	434.61	1.18	0.668	
Cash Ratio	53946	3.87	2.27	107.866	23005.77	92.93	13875.72	x<= -2.1 & x>= 7.1
Cash Ratio - X	50168	2.47	2.164	1.533	9.2	0.725	0.229	
Oper Margin	54019	-0.0546	-0.01	0.87927	182.67	16.029	6679.606	x<= -0.26 & x>=0.23
Oper Margin -X	48615	-0.0136	-0.1	0.09045	0.47	-0.112	0.146	
Net Margin	54078	0.0148	0.01742	0.183182	33.872	-99.124	14886.324	X<= -0.80 X>=0.118
Net Margin - X	49699							
Debt Ratio	53904	300.075	0.45	69431.498	16120298	232.172	53903.798	X<=-0.39& X>=1.34
Debt Ratio - X	49996	0.4778	0.44	0.29558	1.71	0.5	0.084	
Debt /Equity	47850	2497.917	0.7	3.12959	66817193	204.22	43436.85	X<= -1.5 & X >= 3.2
Debt /Equity - X	42651	0.778	0.61	0.71562	4.55	1.024	1.03	
DSO	53931	126.199	92.64	2143.57	496654	217.61	49005.71	x<= -27 & x>=222
DSO - X	51138	96.813	89.88	41.905	245.87	0.655	0.097	

In the above table, X represents outliers. Variable – X represents that variable with outliers removed.

Chapter 4 Variable Nomenclature and Definitions

Variable	Variable Nomenclature	Provided	Calculated	Outliers	Definition
hospital size	Num_Bed	X			Hospital size denoted by number of beds
hospital size	Hospital Size		X		Hospital size catergorized by the number of beds (5 categories)
Percent Government Business	% Gov_Bus		X	X<=0.25	(TitleXVII +Title XIX)patient days/ (total In/Outpatient Days)
Debt to Equity Ratio	D/E		X	X<= -1.5&X>=3.2	Total Debt /Equity
Cash Position	cash position		X		Total Cash/Total Assets
Leverage	Leverage		X	X<= -0.37 & X>=0.96	Total Longterm Liabilities/Total Assets
Leverage 2	Leverage_2		X	X >= 0.99	Leverage (non-negative value)
Current Ratio	Current Ratio		X	x<= -1.4 & x>= 5.8	Current Assets/Current Liabilities
Quick Ratio	Quick Ratio		X	X<= -1.3 & X>= 5.4	(Current Assets- Inventories)/ Current Liabilities
Liquidity	Liquidity		X	X<= -0.11 & X >=0.79	Current Assets/ Total Assets
Debt Ratio	debt_ratio		X	X<=-0.39& X>=1.34	Total Liabilities/ Total Assets
Debt Ratio 2	debt_ratio_2		X	X >= 1.34	Debt Ratio (non- negative values)
Total Assets	TA	X			
Natural Log Total Assets	LnTA		X		natural log of Total Assets
fiscal year	Fiscal Year	X			Fiscal Year
Net Margin	net_marg		X	X<= -0.80 X>=0.118	Net Income/ Sales
Capital Cost Proxy	CCProxy		X		Total Interest Expense/ Total Liabilities
Operating Cash Flows	OCF		X	X<= -27,995,730 & X > 40,069,436	FCF + CAPEX
Free Cash Flows	FCF		X	X<= -32,186,314 & X > 36,290,518	net income+(amortization,depreciation)-delta working capital- capex
Change in Free Cash Flows	Delta_FCF		x	X<=-70227629 & X>=63609001	FCF - Prev_Yr_FCF
% Change in Free Cash Flows	%_Delta_FCF		x	X<=-5.1 & X>=2.3	(FCF - Prev_Yr_FCF)/Prev_Yr_FCF
Capital Expenditures	CAPEX		X	X <= 0 & X >= 38209778	
Capital Expenditures 2	CAPEX 2		X	X<= 0 & X >= 12,375,048	CAPEX (non- negative values)
Change in Fixed Assets	Delta FA		X	X<= -23 & X>= 27	FA- Prev_Yr_FA
Change in Fixed Assets 2	Delta FA2		X	X<= 0 & X>= 27	Delta FA (non-negative values)
Depreciation	Depreciation	X			Depreciation
Depreciation 2			X	X>=9509812	Depreciation (non-negative values)
RoE	RoE2		X	x<= -0.26 & x>=0.42	Net Income/ Shareholders Equity
RoA	RoA		X	x<= -0.150 & x>=0.220	Net Income/ Total Assets
FAT	FAT		X	X<= -3.6 & X>= 13.7	Sales / Fixed Assets
Days Cash on Hand	Days Cash on Hand 3		X	x<= -160 & x>=275	(Cash on Hand+investments+temp investments)/ operating expenses/365
Working Capital			X		current assets - current liabilities
Cash Ratio	CashRatio_2		X	x<= -2.1 &x>=7.1	(cash equilvilents+temp investments+AR)/ Current Liabilities
Operating Income Margin	OperatingIncomeMargin		X	x<= -0.26 & x>=0.23	operating income/ net sales
Cash Turnover	Cash Turnover		X		Net Sales/ Cash
Total Asset Turnover	TA_turnover		X		Net Sales/Avg Total Assets
DSO	DSO2		X	x<= -27 & x>=222	Gross Recievables/ net sales/365

X denotes outliers beyond three standard deviations.

Note: Not all ratios listed were used in the final study... Some ratios were removed due to reduced sample size due to missing values or could not be computed due to lack of information. They are listed to better understand the scope of research performed.

Chapter 4 Regression Results

Chapter 4 Signalling Model Results

Signaling Regressions: Model 1

```
. xtreg Percent_Gov_Business2 Leverage Net_Marg Liquidity LnTA FiscalYear_Reported, re vce(cluster PRVD
> R_NUM)

Random-effects GLS regression                   Number of obs      =     38761
Group variable: PRVDR_NUM                       Number of groups   =      6006

R-sq:  within  = 0.0028                         Obs per group: min =         1
       between = 0.1774                                        avg =       6.5
       overall = 0.1972                                        max =        12

Random effects u_i ~ Gaussian                   Wald chi2(4)       =         .
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =         .

                           (Std. Err. adjusted for 6006 clusters in PRVDR_NUM)
------------------------------------------------------------------------------
             |               Robust
Percent_Go~2 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    Leverage |  -5.09e-09   3.68e-09    -1.38   0.167    -1.23e-08    2.13e-09
    Net_Marg |   1.63e-08   1.24e-08     1.31   0.189    -8.02e-09    4.07e-08
   Liquidity |  -1.48e-08   5.49e-09    -2.70   0.007    -2.56e-08   -4.04e-09
        LnTA |  -2.10e-08   1.27e-09   -16.53   0.000    -2.35e-08   -1.85e-08
FiscalYear~d |  -7.15e-10   2.08e-10    -3.44   0.001    -1.12e-09   -3.07e-10
       _cons |   2.46e-06   4.07e-07     6.04   0.000     1.66e-06    3.26e-06
-------------+----------------------------------------------------------------
     sigma_u |  1.369e-07
     sigma_e |  5.916e-08
         rho |  .8426335   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Signaling Regressions: Model 2

```
. xtreg Percent_Gov_Business2     Leverage Net_Marg       Operating_Cash_Flows LnTA FiscalYear_Reported
> , re vce(cluster PRVDR_NUM)

Random-effects GLS regression                   Number of obs      =     31888
Group variable: PRVDR_NUM                       Number of groups   =      5995

R-sq:  within  = 0.0011                         Obs per group: min =         1
       between = 0.1729                                        avg =       5.3
       overall = 0.1662                                        max =        11

Random effects u_i ~ Gaussian                   Wald chi2(3)       =         .
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =         .

                           (Std. Err. adjusted for 5995 clusters in PRVDR_NUM)
------------------------------------------------------------------------------
             |               Robust
Percent_Go~2 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    Leverage |  -1.25e-09   3.83e-09    -0.33   0.745    -8.76e-09    6.26e-09
    Net_Marg |   3.53e-08   1.58e-08     2.24   0.025     4.41e-09    6.63e-08
Operating_~s |  -1.72e-17   3.33e-17    -0.52   0.606    -8.26e-17    4.81e-17
        LnTA |  -2.33e-08   1.31e-09   -17.78   0.000    -2.59e-08   -2.07e-08
FiscalYear~d |  -4.88e-10   2.25e-10    -2.17   0.030    -9.28e-10   -4.80e-11
       _cons |   2.04e-06   4.41e-07     4.62   0.000     1.17e-06    2.90e-06
-------------+----------------------------------------------------------------
     sigma_u |  1.375e-07
     sigma_e |  6.110e-08
         rho |  .83516489   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Signaling Regressions: Model 3

```
. xtreg Percent_Gov_Business2     Leverage2 Net_Marg       Liquidity LnTA FiscalYear_Reported, re vce(
> cluster PRVDR_NUM)

Random-effects GLS regression                   Number of obs      =     38273
Group variable: PRVDR_NUM                       Number of groups   =      5985

R-sq:  within  = 0.0033                         Obs per group: min =         1
       between = 0.1783                                        avg =       6.4
       overall = 0.1969                                        max =        12

Random effects u_i ~ Gaussian                   Wald chi2(4)       =         .
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =         .

                           (Std. Err. adjusted for 5985 clusters in PRVDR_NUM)
------------------------------------------------------------------------------
             |               Robust
Percent_Go~2 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   Leverage2 |  -6.80e-09   4.04e-09    -1.68   0.092    -1.47e-08    1.11e-09
    Net_Marg |   1.84e-08   1.26e-08     1.46   0.144    -6.25e-09    4.30e-08
   Liquidity |  -1.45e-08   5.60e-09    -2.58   0.010    -2.54e-08   -3.49e-09
        LnTA |  -2.12e-08   1.28e-09   -16.52   0.000    -2.37e-08   -1.87e-08
FiscalYear~d |  -7.60e-10   2.11e-10    -3.61   0.000    -1.17e-09   -3.47e-10
       _cons |   2.55e-06   4.12e-07     6.19   0.000     1.74e-06    3.36e-06
-------------+----------------------------------------------------------------
     sigma_u |  1.370e-07
     sigma_e |  5.929e-08
         rho |  .84232586   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Signaling Regressions: Model 4

```
. xtreg Percent_Gov_Business2 Leverage2 Net_Marg Operating_Cash_Flows LnTA FiscalYear_Reported, re vce(
> cluster PRVDR_NUM)

Random-effects GLS regression                   Number of obs      =     31462
Group variable: PRVDR_NUM                       Number of groups   =      5960

R-sq:  within  = 0.0015                         Obs per group: min =         1
       between = 0.1749                                        avg =       5.3
       overall = 0.1660                                        max =        11

Random effects u_i ~ Gaussian                   Wald chi2(3)       =         .
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =         .

                           (Std. Err. adjusted for 5960 clusters in PRVDR_NUM)
------------------------------------------------------------------------------
             |               Robust
Percent_Go~2 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   Leverage2 |  -2.59e-09   4.24e-09    -0.61   0.542    -1.09e-08    5.73e-09
    Net_Marg |   3.82e-08   1.60e-08     2.39   0.017     6.93e-09    6.95e-08
Operating_~s |  -9.96e-18   3.35e-17    -0.30   0.767    -7.57e-17    5.58e-17
        LnTA |  -2.37e-08   1.32e-09   -17.93   0.000    -2.63e-08   -2.11e-08
FiscalYear~d |  -5.53e-10   2.27e-10    -2.44   0.015    -9.97e-10   -1.08e-10
       _cons |   2.17e-06   4.46e-07     4.88   0.000     1.30e-06    3.05e-06
-------------+----------------------------------------------------------------
     sigma_u |  1.366e-07
     sigma_e |  6.128e-08
         rho |  .83257314   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Signaling Regressions: Model 5

```
. xtreg Percent_Gov_Business2  DebtRatio Net_Marg Liquidity LnTA FiscalYear_Reported, re vce(cluster PR
> VDR_NUM)

Random-effects GLS regression                   Number of obs      =     43909
Group variable: PRVDR_NUM                       Number of groups   =      6420

R-sq:  within  = 0.0024                         Obs per group: min =         1
       between = 0.1734                                        avg =       6.8
       overall = 0.1853                                        max =        11

Random effects u_i ~ Gaussian                   Wald chi2(4)       =         .
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =         .

                           (Std. Err. adjusted for 6420 clusters in PRVDR_NUM)
------------------------------------------------------------------------------
             |               Robust
Percent_Go~2 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   DebtRatio |  -8.62e-09   2.29e-09    -3.76   0.000    -1.31e-08   -4.12e-09
    Net_Marg |   2.25e-08   1.10e-08     2.05   0.040     1.02e-09    4.39e-08
   Liquidity |  -1.60e-08   4.96e-09    -3.23   0.001    -2.57e-08   -6.29e-09
        LnTA |  -2.04e-08   1.17e-09   -17.42   0.000    -2.27e-08   -1.81e-08
FiscalYear~d |  -5.77e-10   1.98e-10    -2.91   0.004    -9.66e-10   -1.88e-10
       _cons |   2.17e-06   3.89e-07     5.59   0.000     1.41e-06    2.94e-06
-------------+----------------------------------------------------------------
     sigma_u |  1.391e-07
     sigma_e |  6.101e-08
         rho |  .83861042   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Signaling Regressions: Model 6

```
. xtreg Percent_Gov_Business2  DebtRatio Net_Marg  Operating_Cash_Flows LnTA FiscalYear_Reported, re vc
> e(cluster PRVDR_NUM)

Random-effects GLS regression                   Number of obs      =     37052
Group variable: PRVDR_NUM                       Number of groups   =      6455

R-sq:  within  = 0.0009                         Obs per group: min =         1
       between = 0.1616                                        avg =       5.7
       overall = 0.1492                                        max =        11

Random effects u_i ~ Gaussian                   Wald chi2(3)       =         .
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =         .

                           (Std. Err. adjusted for 6455 clusters in PRVDR_NUM)
------------------------------------------------------------------------------
             |               Robust
Percent_Go~2 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   DebtRatio |  -5.84e-09   2.40e-09    -2.43   0.015    -1.05e-08   -1.14e-09
    Net_Marg |   2.65e-08   1.31e-08     2.02   0.043     7.88e-10    5.22e-08
Operating_~s |  -5.31e-18   3.18e-17    -0.17   0.867    -6.76e-17    5.70e-17
        LnTA |  -1.68e-08   1.90e-09    -8.83   0.000    -2.05e-08   -1.31e-08
FiscalYear~d |  -6.74e-10   2.28e-10    -2.96   0.003    -1.12e-09   -2.27e-10
       _cons |   2.30e-06   4.42e-07     5.21   0.000     1.44e-06    3.17e-06
-------------+----------------------------------------------------------------
     sigma_u |  1.403e-07
     sigma_e |  6.335e-08
         rho |  .83071742   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Signaling Regressions: Model 7

```
. xtreg Percent_Gov_Business2   DebtToEquityRatio Net_Marg  Liquidity LnTA FiscalYear_Reported, re vce(
> cluster PRVDR_NUM)

Random-effects GLS regression                   Number of obs      =     36145
Group variable: PRVDR_NUM                       Number of groups   =      5694

R-sq:  within  = 0.0006                         Obs per group: min =         1
       between = 0.1738                                        avg =       6.3
       overall = 0.1933                                        max =        11

Random effects u_i ~ Gaussian                   Wald chi2(4)       =         .
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =         .

                           (Std. Err. adjusted for 5694 clusters in PRVDR_NUM)
------------------------------------------------------------------------------
             |               Robust
Percent_Go~2 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
DebtToEqui~o |   3.27e-10   1.18e-09     0.28   0.781    -1.98e-09    2.64e-09
    Net_Marg |   1.78e-08   1.14e-08     1.55   0.121    -4.67e-09    4.02e-08
   Liquidity |  -1.47e-08   5.42e-09    -2.71   0.007    -2.53e-08   -4.05e-09
        LnTA |  -2.22e-08   1.32e-09   -16.84   0.000    -2.48e-08   -1.97e-08
FiscalYear~d |  -2.54e-11   2.13e-10    -0.12   0.905    -4.43e-10    3.92e-10
       _cons |   1.10e-06   4.17e-07     2.63   0.008     2.80e-07    1.91e-06
-------------+----------------------------------------------------------------
     sigma_u |  1.376e-07
     sigma_e |  5.843e-08
         rho |  .84712878   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Signaling Regressions: Model 8

```
. xtreg Percent_Gov_Business2    DebtToEquityRatio Net_Marg       Operating_Cash_Flows LnTA FiscalYear_
> Reported, re vce(cluster PRVDR_NUM)

Random-effects GLS regression                   Number of obs      =     30229
Group variable: PRVDR_NUM                       Number of groups   =      5690

R-sq:  within  = 0.0001                         Obs per group: min =         1
       between = 0.1620                                        avg =       5.3
       overall = 0.1558                                        max =        11

Random effects u_i ~ Gaussian                   Wald chi2(3)       =         .
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =         .

                           (Std. Err. adjusted for 5690 clusters in PRVDR_NUM)
------------------------------------------------------------------------------
             |               Robust
Percent_Go~2 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
DebtToEqui~o |   5.03e-10   1.28e-09     0.39   0.694    -2.00e-09    3.00e-09
    Net_Marg |   2.48e-08   1.46e-08     1.70   0.089    -3.78e-09    5.34e-08
Operating_~s |   7.38e-18   3.36e-17     0.22   0.826    -5.85e-17    7.33e-17
        LnTA |  -2.22e-08   1.35e-09   -16.44   0.000    -2.49e-08   -1.96e-08
FiscalYear~d |   1.15e-10   2.33e-10     0.49   0.621    -3.42e-10    5.73e-10
       _cons |   8.10e-07   4.59e-07     1.77   0.077    -8.86e-08    1.71e-06
-------------+----------------------------------------------------------------
     sigma_u |  1.389e-07
     sigma_e |  6.072e-08
         rho |  .83946899   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Chapter 4 Agency Cost of Free Cash Flows Model Results

Agency Cost of FCF Regressions: Model 1

```
. xtreg  Free_Cash_Flow2 Percent_Gov_Business LnTA FiscalYear_Reported, re vce(cluster   PRVDR_NUM)

Random-effects GLS regression                   Number of obs      =     38860
Group variable: PRVDR_NUM                       Number of groups   =      6546

R-sq:  within  = 0.0042                         Obs per group: min =         1
       between = 0.0625                                        avg =       5.9
       overall = 0.0259                                        max =        11

Random effects u_i ~ Gaussian                   Wald chi2(3)       =    488.29
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000

                             (Std. Err. adjusted for 6546 clusters in PRVDR_NUM)
------------------------------------------------------------------------------
             |               Robust
Free_Cash_~2 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
Percent_Go~s |   .2230525   .5025535     0.44   0.657    -.7619342    1.208039
        LnTA |  -1.245335   .0640517   -19.44   0.000    -1.370874   -1.119796
FiscalYear~d |    .196422   .0215627     9.11   0.000       .15416    .2386841
       _cons |  -370.4847   43.07192    -8.60   0.000    -454.9041   -286.0653
-------------+----------------------------------------------------------------
     sigma_u |  4.4345646
     sigma_e |  11.315011
         rho |  .13314861   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Agency Cost of FCF Regressions: Model 2

```
. xtreg  Free_Cash_Flow2 Percent_Gov_Business LnTA FiscalYear_Reported CPI_96_07, re vce(cluster PRVDR_
> NUM)

Random-effects GLS regression                   Number of obs      =     37906
Group variable: PRVDR_NUM                       Number of groups   =      6522

R-sq:  within  = 0.0044                         Obs per group: min =         1
       between = 0.0628                                        avg =       5.8
       overall = 0.0259                                        max =        11

Random effects u_i ~ Gaussian                   Wald chi2(4)       =    489.85
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000

                             (Std. Err. adjusted for 6522 clusters in PRVDR_NUM)
------------------------------------------------------------------------------
             |               Robust
Free_Cash_~2 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
Percent_Go~s |   .0919471   .5086959     0.18   0.857    -.9050786    1.088973
        LnTA |  -1.246793    .064398   -19.36   0.000    -1.373011   -1.120575
FiscalYear~d |  -.0046852   .1034005    -0.05   0.964    -.2073466    .1979761
   CPI_96_07 |   .0285551   .0140265     2.04   0.042     .0010638    .0560465
       _cons |   28.33714    205.124     0.14   0.890    -373.6985    430.3728
-------------+----------------------------------------------------------------
     sigma_u |  4.3712692
     sigma_e |  11.355774
         rho |  .12905436   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Agency Cost of FCF Regressions: Model 3

```
. xtreg  Free_Cash_Flow2 Percent_Gov_Business LnTA FiscalYear_Reported   CPI_96_07  Capex_2, re vce(clu
> ster   PRVDR_NUM)

Random-effects GLS regression                   Number of obs      =     37906
Group variable: PRVDR_NUM                       Number of groups   =      6522

R-sq:  within  = 0.0316                         Obs per group: min =         1
       between = 0.0475                                        avg =       5.8
       overall = 0.0410                                        max =        11

Random effects u_i ~ Gaussian                   Wald chi2(5)       =    573.73
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000

                           (Std. Err. adjusted for 6522 clusters in PRVDR_NUM)
```

Free_Cash_~2	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
Percent_Go~s	-.554022	.5028183	-1.10	0.271	-1.539528	.4314837
LnTA	-.6840443	.0710912	-9.62	0.000	-.8233806	-.5447081
FiscalYear~d	-.1239972	.1021284	-1.21	0.225	-.3241652	.0761708
CPI_96_07	.0412386	.013846	2.98	0.003	.0141011	.0683762
Capex_2	-2.51e-07	2.08e-08	-12.05	0.000	-2.92e-07	-2.10e-07
_cons	257.1672	202.5871	1.27	0.204	-139.8964	654.2307
sigma_u	4.4808152					
sigma_e	11.197981					
rho	.13801719	(fraction of variance due to u_i)				

Agency Cost of FCF Regressions: Model 4

```
. xtreg  Free_Cash_Flow2 Percent_Gov_Business LnTA FiscalYear_Reported   CPI_96_07  Capex_2 Leverage, r
> e vce(cluster   PRVDR_NUM)

Random-effects GLS regression                   Number of obs      =     33916
Group variable: PRVDR_NUM                       Number of groups   =      6205

R-sq:  within  = 0.0330                         Obs per group: min =         1
       between = 0.0460                                        avg =       5.5
       overall = 0.0414                                        max =        11

Random effects u_i ~ Gaussian                   Wald chi2(6)       =    603.10
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000

                           (Std. Err. adjusted for 6205 clusters in PRVDR_NUM)
```

Free_Cash_~2	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
Percent_Go~s	-.9535182	.5525551	-1.73	0.084	-2.036506	.12947
LnTA	-.8145414	.0771211	-10.56	0.000	-.965696	-.6633869
FiscalYear~d	-.2352247	.1094589	-2.15	0.032	-.4497602	-.0206891
CPI_96_07	.0544907	.0147957	3.68	0.000	.0254917	.0834898
Capex_2	-2.36e-07	2.10e-08	-11.23	0.000	-2.78e-07	-1.95e-07
Leverage	-1.53e-06	1.57e-07	-9.70	0.000	-1.83e-06	-1.22e-06
_cons	480.3986	217.1264	2.21	0.027	54.83867	905.9585
sigma_u	4.2725796					
sigma_e	11.352126					
rho	.12407714	(fraction of variance due to u_i)				

Agency Cost of FCF Regressions: Model 5

```
. xtreg  Free_Cash_Flow2 Percent_Gov_Business LnTA FiscalYear_Reported   CPI_96_07  Capex_2 Leverage Ne
> t_Marg, re vce(cluster   PRVDR_NUM)

Random-effects GLS regression                   Number of obs      =     33546
Group variable: PRVDR_NUM                       Number of groups   =      6172

R-sq:  within  = 0.0459                         Obs per group: min =         1
       between = 0.0527                                        avg =       5.4
       overall = 0.0532                                        max =        11

Random effects u_i ~ Gaussian                   Wald chi2(7)       =    708.01
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000

                           (Std. Err. adjusted for 6172 clusters in PRVDR_NUM)
------------------------------------------------------------------------------
             |               Robust
Free_Cash_~2 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
Percent_Go~s |  -1.148436   .5518697    -2.08   0.037    -2.230081   -.0667912
        LnTA |  -.9953373   .0796976   -12.49   0.000    -1.151542   -.8391329
FiscalYear~d |  -.0128142   .1122163    -0.11   0.909     -.232754    .2071256
   CPI_96_07 |   .0281733   .0151337     1.86   0.063    -.0014883    .0578349
     Capex_2 |  -2.38e-07   2.16e-08   -10.99   0.000    -2.80e-07   -1.95e-07
    Leverage |  -1.71e-06   1.30e-07   -13.16   0.000    -1.97e-06   -1.46e-06
    Net_Marg |    20.8939   2.493394     8.38   0.000     16.00694    25.78086
       _cons |   41.71102   222.5152     0.19   0.851    -394.4107    477.8327
-------------+----------------------------------------------------------------
     sigma_u |  4.2663576
     sigma_e |  11.256067
         rho |   .1256156   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Agency Cost of FCF Regressions: Model 6

```
. xtreg  Free_Cash_Flow2 Percent_Gov_Business LnTA FiscalYear_Reported   CPI_96_07  Capex_2 Leverage Ne
> t_Marg  new_change_in_FA, re vce(cluster   PRVDR_NUM)

Random-effects GLS regression                   Number of obs      =     33324
Group variable: PRVDR_NUM                       Number of groups   =      6151

R-sq:  within  = 0.0458                         Obs per group: min =         1
       between = 0.0525                                        avg =       5.4
       overall = 0.0530                                        max =        11

Random effects u_i ~ Gaussian                   Wald chi2(8)       =    710.94
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000

                           (Std. Err. adjusted for 6151 clusters in PRVDR_NUM)
------------------------------------------------------------------------------
             |               Robust
Free_Cash_~2 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
Percent_Go~s |  -1.166087   .5544491    -2.10   0.035    -2.252788   -.0793869
        LnTA |  -.9847097   .0806354   -12.21   0.000    -1.142752   -.8266672
FiscalYear~d |   -.017053   .1126917    -0.15   0.880    -.2379247    .2038186
   CPI_96_07 |   .0284022   .0152081     1.87   0.062    -.0014052    .0582096
     Capex_2 |  -2.41e-07   2.23e-08   -10.84   0.000    -2.85e-07   -1.98e-07
    Leverage |  -1.70e-06   1.29e-07   -13.15   0.000    -1.95e-06   -1.45e-06
    Net_Marg |   20.93784    2.57251     8.14   0.000     15.89582    25.97987
new_change~A |  -5.08e-09   1.13e-09    -4.49   0.000    -7.30e-09   -2.86e-09
       _cons |   50.01995    223.452     0.22   0.823    -387.9378    487.9777
-------------+----------------------------------------------------------------
     sigma_u |  4.2954091
     sigma_e |  11.249895
         rho |  .12723572   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Agency Cost of FCF Regressions: Model 7

```
. xtreg  Free_Cash_Flow2 Percent_Gov_Business LnTA FiscalYear_Reported   CPI_96_07  Capex_2 Leverage Ne
> t_Marg  new_change_in_FA Capital_Cost_Proxy, re vce(cluster   PRVDR_NUM)

Random-effects GLS regression                   Number of obs      =     33324
Group variable: PRVDR_NUM                       Number of groups   =      6151

R-sq:  within  = 0.0458                         Obs per group: min =         1
       between = 0.0525                                        avg =       5.4
       overall = 0.0530                                        max =        11

Random effects u_i ~ Gaussian                   Wald chi2(9)       =    714.29
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000

                           (Std. Err. adjusted for 6151 clusters in PRVDR_NUM)
------------------------------------------------------------------------------
             |               Robust
Free_Cash_~2 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
Percent_Go~s |  -1.164322   .5544202    -2.10   0.036    -2.250966   -.0776782
        LnTA |  -.9848002   .0806331   -12.21   0.000    -1.142838   -.8267622
FiscalYear~d |  -.0176286   .1126902    -0.16   0.876    -.2384974    .2032402
   CPI_96_07 |   .0284919   .0152078     1.87   0.061    -.0013147    .0582986
     Capex_2 |  -2.41e-07   2.23e-08   -10.84   0.000    -2.85e-07   -1.98e-07
    Leverage |  -1.70e-06   1.29e-07   -13.15   0.000    -1.95e-06   -1.45e-06
    Net_Marg |   20.93769   2.572492     8.14   0.000     15.89569    25.97968
new_change~A |  -5.08e-09   1.13e-09    -4.49   0.000    -7.30e-09   -2.86e-09
Capital_Co~y |   .0409969   .0259397     1.58   0.114     -.009844    .0918377
       _cons |   51.15921   223.4491     0.23   0.819    -386.7931    489.1115
-------------+----------------------------------------------------------------
     sigma_u |  4.2951295
     sigma_e |  11.250086
         rho |  .12721751   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Agency Cost of FCF Regressions: Model 8

```
. xtreg  Free_Cash_Flow2 Percent_Gov_Business LnTA FiscalYear_Reported   CPI_96_07  Capex_2 Leverage Ne
> t_Marg  new_change_in_FA Capital_Cost_Proxy Bi_Hosp_Size_1 Bi_Hosp_Size_2 Bi_Hosp_Size_3 Bi_Hosp_Size
> _4, re vce(cluster   PRVDR_NUM)

Random-effects GLS regression                   Number of obs      =     33324
Group variable: PRVDR_NUM                       Number of groups   =      6151

R-sq:  within  = 0.0455                         Obs per group: min =         1
       between = 0.0573                                        avg =       5.4
       overall = 0.0564                                        max =        11

Random effects u_i ~ Gaussian                   Wald chi2(13)      =    817.81
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000

                           (Std. Err. adjusted for 6151 clusters in PRVDR_NUM)
------------------------------------------------------------------------------
             |               Robust
Free_Cash_~2 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
Percent_Go~s |  -1.058694   .5519411    -1.92   0.055    -2.140478     .023091
        LnTA |  -1.319153   .0978324   -13.48   0.000      -1.5109   -1.127405
FiscalYear~d |    .032573   .1138845     0.29   0.775    -.1906365    .2557824
   CPI_96_07 |   .0253751   .0152828     1.66   0.097    -.0045786    .0553288
     Capex_2 |  -2.66e-07   2.17e-08   -12.24   0.000    -3.08e-07   -2.23e-07
    Leverage |  -2.10e-06   1.77e-07   -11.85   0.000    -2.44e-06   -1.75e-06
    Net_Marg |   21.64283   2.640682     8.20   0.000     16.46719    26.81847
new_change~A |  -4.85e-09   1.14e-09    -4.25   0.000    -7.08e-09   -2.61e-09
Capital_Co~y |   .0406208   .0256514     1.58   0.113    -.0096551    .0908967
Bi_Hosp_Si~1 |  -11.41172   3.976946    -2.87   0.004    -19.20639   -3.617049
Bi_Hosp_Si~2 |  -10.58711   3.972123    -2.67   0.008    -18.37233   -2.801896
Bi_Hosp_Si~3 |  -9.799534   3.993219    -2.45   0.014     -17.6261   -1.972969
Bi_Hosp_Si~4 |   -5.04388   4.026324    -1.25   0.210    -12.93533     2.84757
       _cons |  -32.27257   225.6762    -0.14   0.886    -474.5898    410.0447
-------------+----------------------------------------------------------------
     sigma_u |  4.2774097
     sigma_e |  11.250092
         rho |  .12630217   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

			Geometric Length of Stay by Date Range																			
EFF_DATE			10/1/1992	10/1/1993	10/1/1994	10/1/1995	10/1/1996	10/1/1997	10/1/1998	3/1/1999	10/1/1999	10/1/2000	4/1/2001	10/1/2001	10/1/2002	4/1/2003	10/1/2003	4/1/2004	10/1/2004	10/1/2005	10/1/2006	10/1/2007
GMLOS	BRON	100	2.50	2.40	2.30	2.10	2.00	1.80	1.70	1.70	1.80	1.80	1.80	1.80	1.70	1.70	1.80	1.80	1.80	1.70	1.70	1.70
	CBYP	107	10.20	9.80	9.30	8.60	7.80	7.30	9.50	9.50	9.30	9.20	9.20	9.70	9.20	9.20	9.20	9.20	9.30	13.50	12.40	12.40
	COLO	183	3.40	3.20	3.10	3.00	2.80	2.60	2.40	2.40	2.40	2.40	2.40	2.40	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30
	HIP	209	9.40	8.60	7.70	6.80	5.90	5.30	4.90	4.90	4.60	4.60	4.60	4.60	4.50	4.50	4.40	4.40	4.30	4.10	4.00	4.10
	ESWL	323	3.10	3.00	2.90	2.80	2.70	2.50	2.40	2.40	2.40	2.40	2.40	2.50	2.40	2.40	2.40	2.40	2.40	2.30	2.30	2.30
	LAVH	359	4.20	3.90	3.50	3.20	3.00	2.90	2.80	2.80	2.70	2.60	2.60	2.60	2.40	2.40	2.30	2.30	2.30	2.20	2.10	2.10
	CHOL	494	-	1.70	1.70	1.80	1.80	1.80	1.90	1.90	2.00	2.00	2.00	1.90	1.90	1.90	2.00	2.00	2.10	2.10	2.10	2.10
	KNEE	209	9.40	8.60	7.70	6.80	5.90	5.30	4.90	4.90	4.60	4.60	4.60	4.60	4.50	4.50	4.40	4.40	4.30	4.10	4.00	4.10
	EGD	183	3.40	3.20	3.10	3.00	2.80	2.60	2.40	2.40	2.40	2.40	2.40	2.40	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30

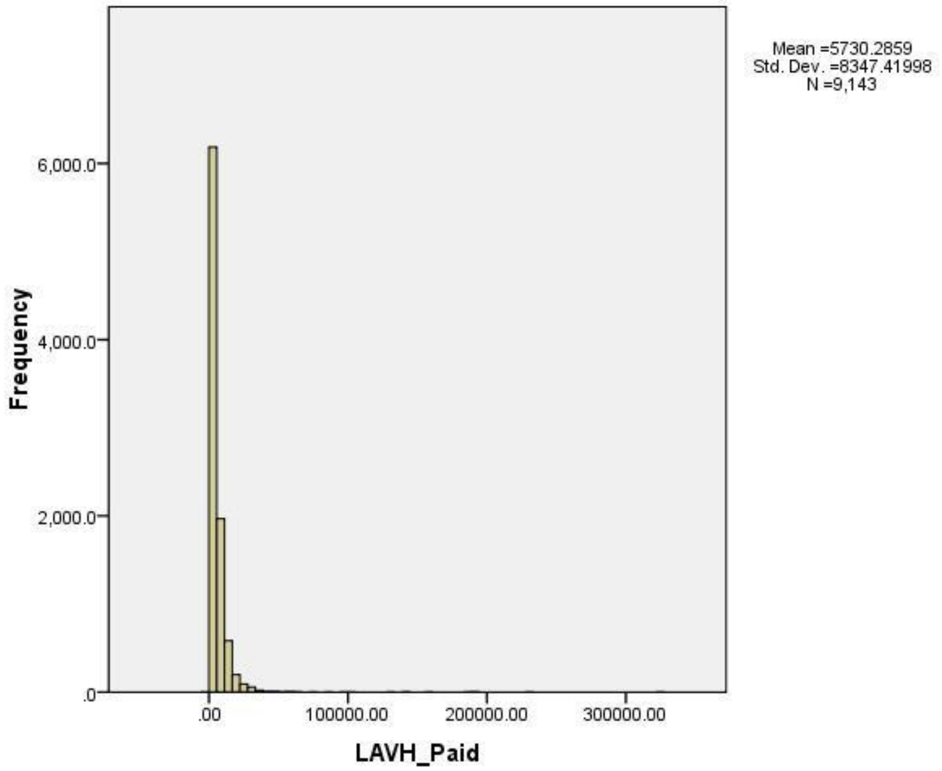
Chapter 6 Procedures

(exploratory, outliers, and data adjustments)

Laparoscopic Assisted Vaginal Hysterectomy (LAVH)

The LAVH made up 2% of our sample (n) = 9,143, with N = 457,146. The mean reimbursement was $5,730.29, with a standard error of 87.3. A high standard deviation of 8,347 was present. Outliers were evident, as there was a large range of $323,995.28. The minimum and maximum values also provided further evidence of outliers. A high kurtosis value of 404.97 was presented, which was to be expected because of the narrow band of reimbursement for procedures. The histogram of LAVH shows that the reimbursement was concentrated in a very narrow dollar reimbursement band. This was evident by the high kurtosis within the distribution.

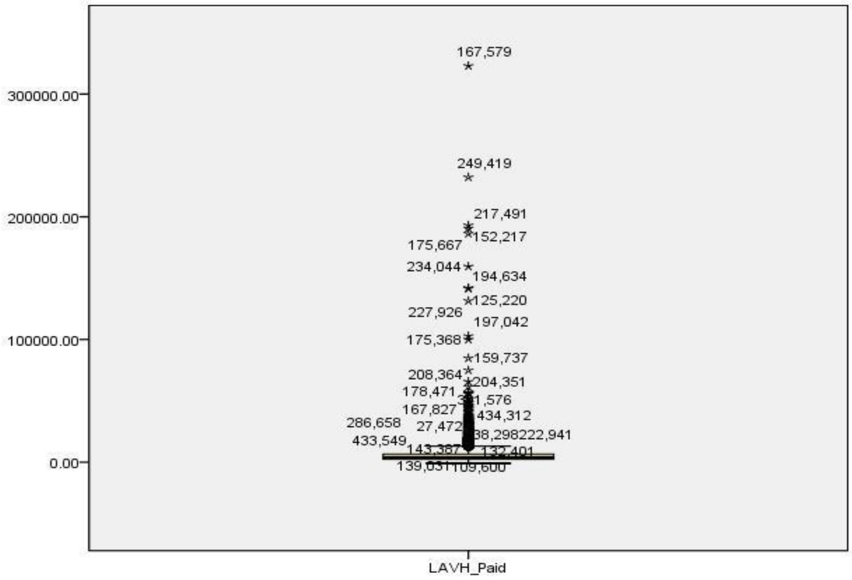
Figure 6.1A: Histogram LAVH Paid



A stem and leaf plot was used to identify outliers within the LAVH subsample. Approximately 712 cases were identified as outliers using Tukey's (1977) definition. This represented approximately 7.8% of the subsample. All values greater than or equal to $13,084.00 were to be removed.

Outliers were evident in the box plot of LAVH reimbursement found in Figure 6.2A. The plot confirmed multiple outliers, and the main distribution was compressed, with the mean unrecognizable within the box plot.

Figure 6.2A: Box plot: LAVH_Paid



From previous descriptives of the LAVH, it is known that outliers were present within the subsample; however, a review of the mean_LAVH reimbursement by Year and Payer is still helpful. It should be noted that the means were distorted. The years 2001-2002 remain set apart from the overall trend in the data. Commercial pay continued on the same growth rate overall. This could be the government reimbursement growth rate plateauing, or outliers could distort those values of commercial pay. Figure 6.3A illustrates that government payments in the sample were less than those of commercial payments.

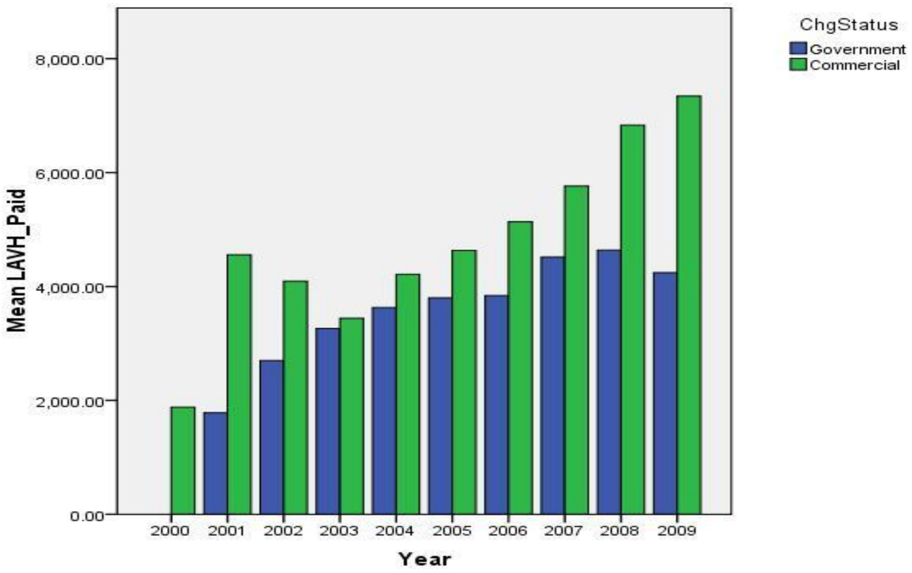


Figure 0.1.3A: Mean LAVH_Paid by Year and Payer

Figure 6.4A confirmed the presence of both government and commercial outliers, with government represented in blue and commercial in green. Commercial had a greater number of outliers in 2007-2008. These outliers also were greater in their amplitude or deviation from the mean.

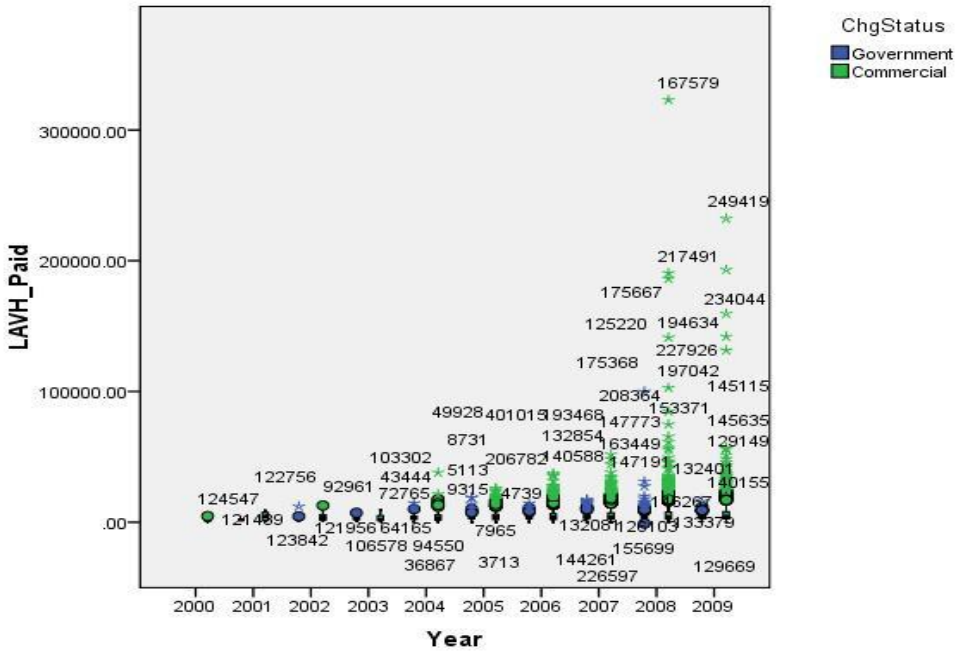


Figure 6.4A: Box Plot LAVH_Paid by Year and Payer

Upon the removal of the outliers for LAVH_Paid, a new graph of mean LAVH_paid by year and payor type was created. For 2001 and 2002, commercial reimbursement, depicted by the green bar in Figure 6.5A, was not in line with regard to the other years in the study. The years prior to 2004 were smaller in sample size for electronic remits. The means that the years 2001 and 2002 may be distorted by this fact. Clearly, beyond 2002, both commercial and government reimbursements seem to correlate quite well. The change in the mean adjusted at roughly the same rate, except for 2005. Even so, this year was only mildly out of step with other increases in reimbursement from both. The values presented here were not in real dollars; therefore, some of the increase year on year is due to adjustment for inflation within the reimbursement. Through the entire study, commercial reimbursement was greater than that of the government. This is typical, as the government is usually the low-cost payor.

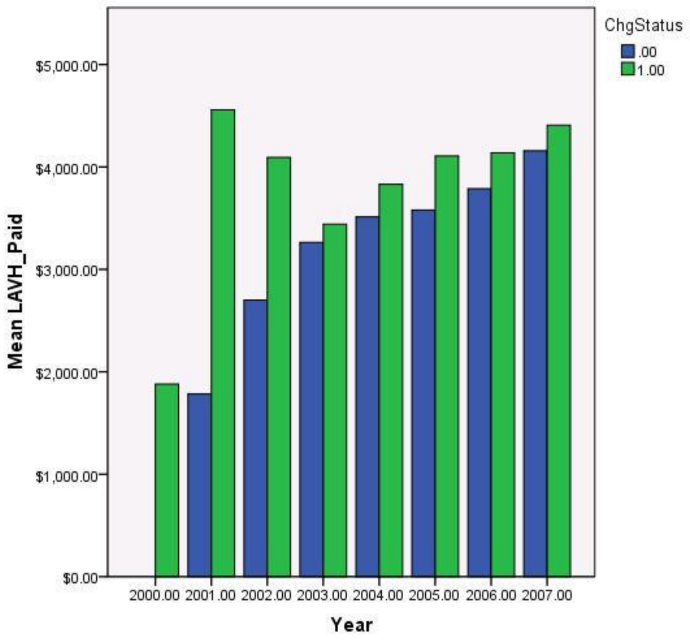


Figure 6.5A: Mean LAVH_Paid by Year and Payor Type

Coronary Artery Bypass Surgery (CBYP)

Cardiac bypass surgery had a highly kurtosic distribution within this subsample. This was evidenced in the histogram outlined in Figure 6.6A. The CBYP (n) =141,054, out of a total N of 457,146.

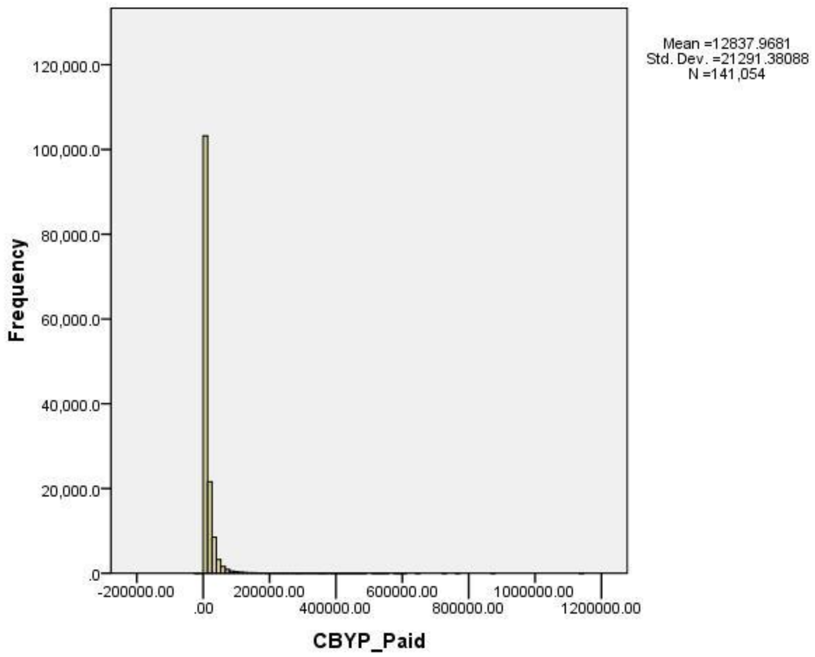


Figure 6.6A: Histogram CBYP (outliers present)

The CBYP had a significantly large range of $1,161,901. Once again, this was evidence of the presence of outliers within the subsample. A high kurtosis value of 213.39 was to be expected, as payments for the procedure should have had a narrow distribution due to the underlying service being the same. Any deviation in payments would be payer deviations based on nuances within each claim that was filed for payment. The distribution was skewed to the left, with most of the frequency of cases around zero. The stem and leaf plot confirmed the presence of outliers in both negative and positive values. The median payment for CBYP was $7,043.70, which was significantly different from the mean of $12,837.96. This was the result of outliers present within the sample.

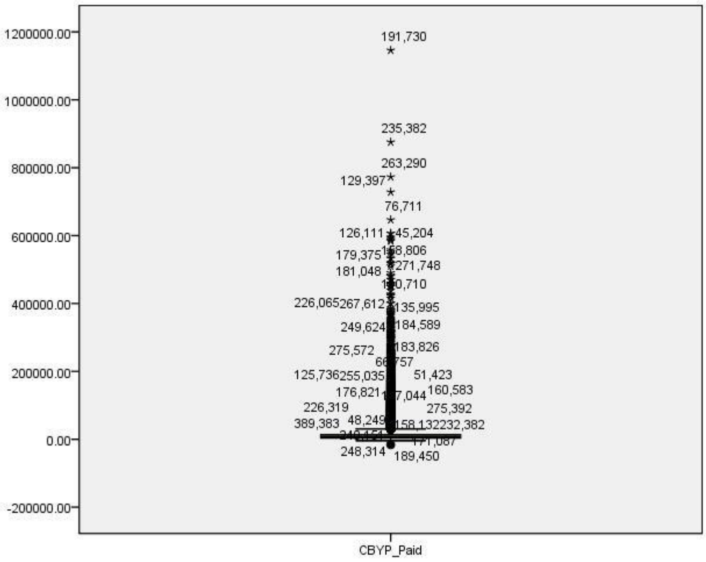


Figure 6.7A: Boxplot CBYP (outliers present)

The bar chart in Figure 6.8A illustrates the mean of CBYP for each year and payer. The means were similar and seem to correlate with one another. However, deviation began to take place in the years 2005 and 2006, and carried through to 2008. Given the box plot in Figure 6.9A, this was caused by the presence of outliers in those years. The box plot also confirmed that outliers were present in both payer types. This led to a deviation of the mean in all of the years. The removal of outliers would correct this.

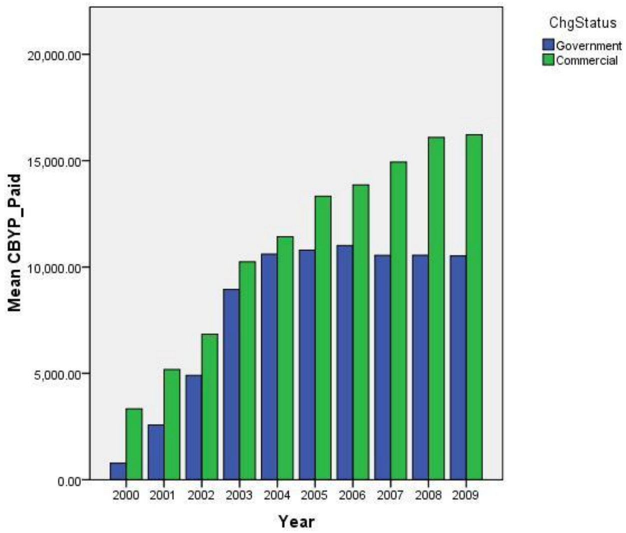


Figure 6.8A: Mean CBYP_Paid by Year

As noted in Figure 6.8A, the CBYP remained a significant contributor of claims in the study, with good representation of both government and commercial claims. Outliers present within the subsample were identified in the box plot in Figure 6.9A.

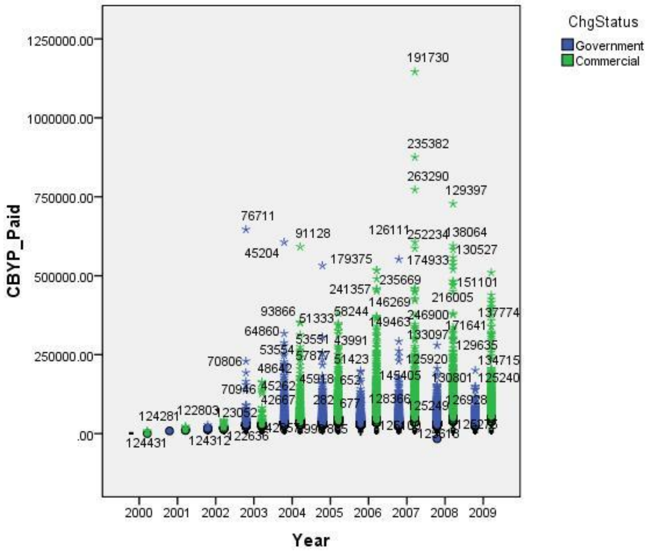


Figure 6.9A: Box plot of CBYP_Paid by year and payer

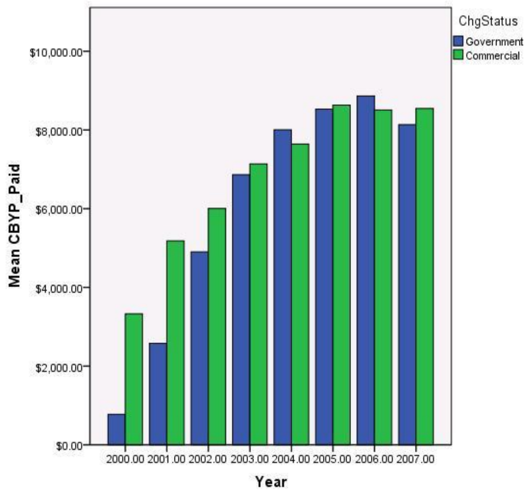


Figure 6.10A: Mean CBYP_Paid by year and payor type (outliers removed)

Figure 6.10A shows that upon the removal of the outliers, there was low reimbursement in 2000 from the government, in contrast to the commercial reimbursement. The sample size within this year may have influenced the initial years, as discussed earlier. Government and commercial payors correlated in payment increases over time, with both trading off leadership in reimbursement for the CBYP. Commercial led with the highest reimbursement in the most years. This confirmed the discussions related to government reimbursement stated previously, that government was the lowest reimbursement payor. Reimbursement rates for both government and commercial payors increased year on year throughout the study, with a stabilization of reimbursement occurring in 2005. Some reduction of reimbursement for the CBYP occurred in 2007. Values present are in nominal dollars.

Laparoscopic Cholecystectomy (CHOLX)

The CHOLX was distributed around a narrow value band around the zero delineation mark. The distribution was skewed to the left. This was due to few negative values present within the data. The CHOLX (n) =52,120 out of N= 457,146. The high kurtosis value of the distribution of 312.99 is very evident in the histogram in Figure 6.11A.

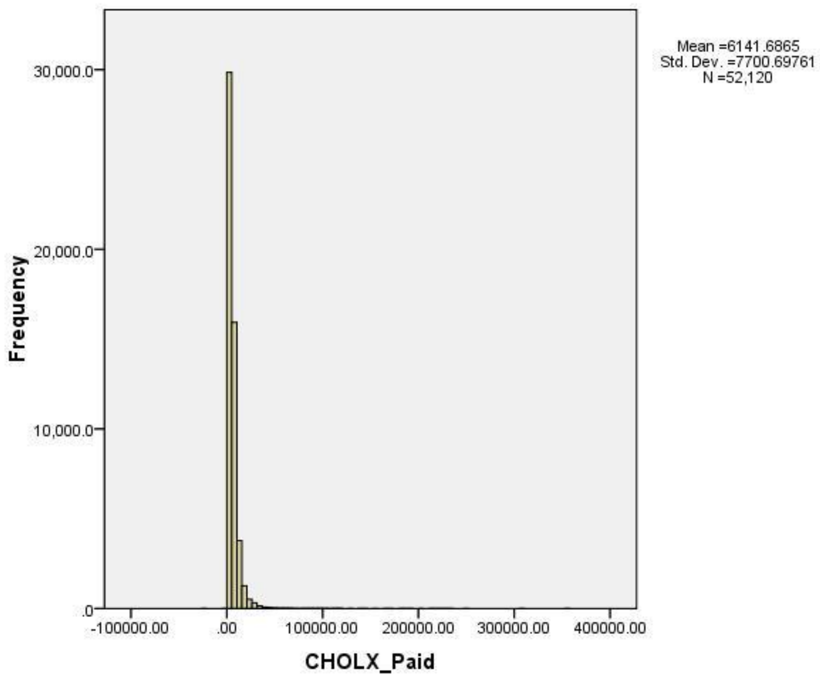


Figure 6.11A: Histogram CHOLX (outliers present)

The CHOLX distribution has a range of $375,432.87, which provided evidence of outliers. This was substantiated further by the difference between the median of $4,475.16 and the mean of $6,141.69. The sample presented a standard deviation of $7,700.70.

Using Tukey's (1977) definition, outliers were further illustrated in the stem and leaf plot, which identified values below -$212,264 and above $16,312.00 as outliers. Within the stem and leaf, 2,382 outliers were identified, with a predominance of these above $16,312 (2,382 cases). One outlier was identified below -21,264. These outliers are identified further in the box plot in Figure 6.12A, which illustrates all of the outliers along with a flattened normal distribution around the mean.

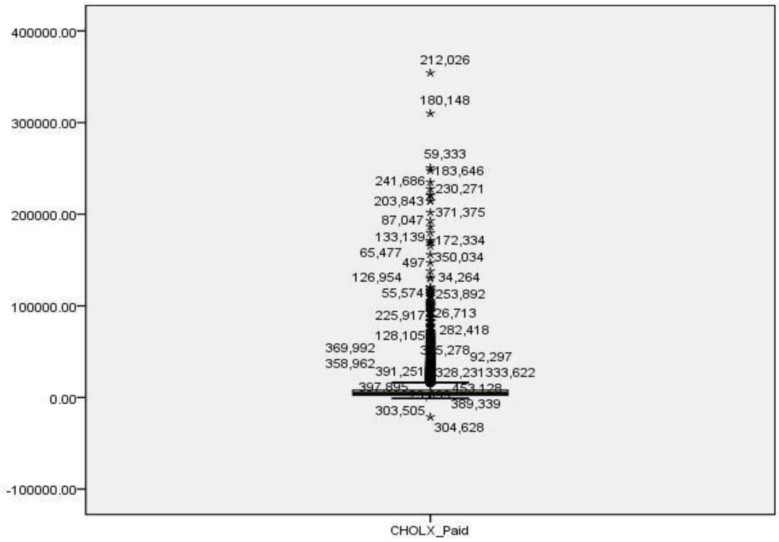


Figure 6.12A: Box Plot CHOLX_Paid

In Figure 6.13A, the mean of CHOLX_paid is presented by year and payer. The mean for both payers was close in value for all years, and while the box plot showed that outliers were present, the location of the outliers was not evident via the bar chart.

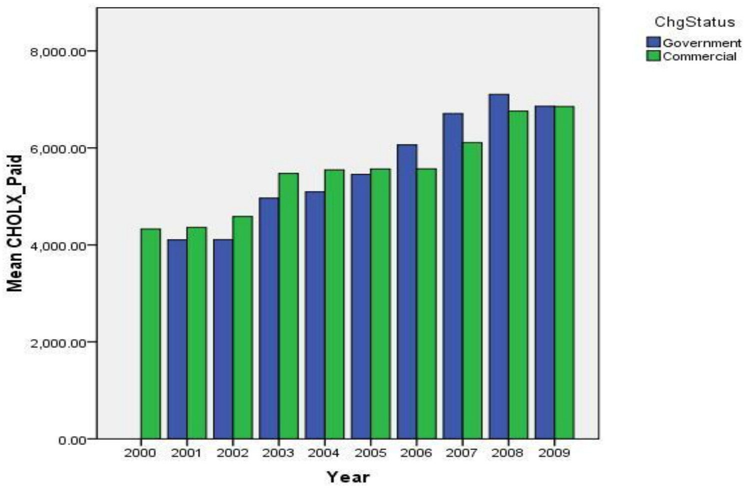


Figure 6.13A: CHOLX_Paid by year and payer

By viewing the box plot of the CHOLX_paid by year and payer in Figure 6.12A, we see that outliers were present. There was great amplitude of the outlier in relation to the mean in 2004-2008. The removal of the outliers will provide normal distributions with which to conduct any further research.

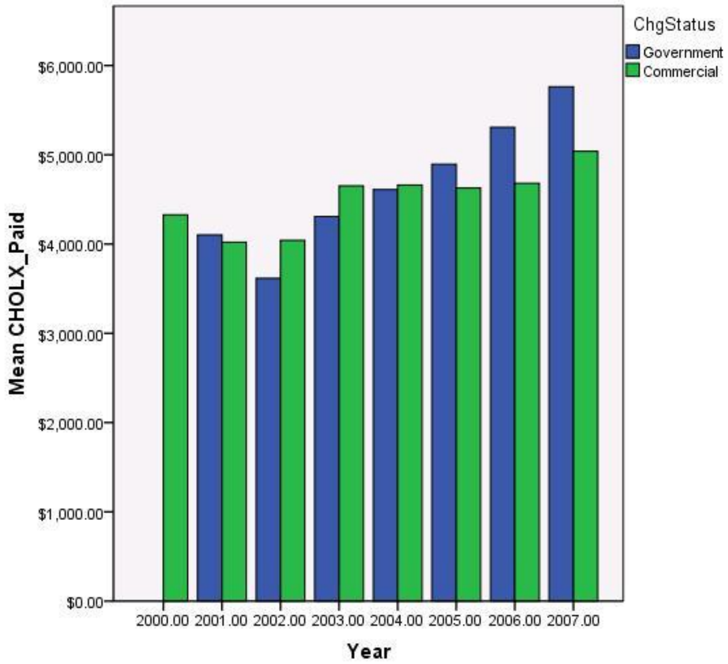


Figure 6.14A: Mean CHOLX_Paid by Year and Payor type (outliers removed)

Upon the removal of the outliers, Figure 6.14A shows Mean CHOLX_paid by year and payor type. There were cases of government reimbursement for CHOLX in the sample for the year 2000. This may be the result of a lack of the electronic remits acceptance as a primary tracking tool of the payment itself, as the federal government did not mandate the electronic remit until 2004, as stated previously. The value of reimbursement for government and commercial payors correlate in the change of reimbursement over time, with the exception of 2005, 2006, and 2007. In these later years, government reimbursement growth exceeded that of commercial reimbursement. This was unusual, as government is normally the lower reimbursement payor. No evidence was provided in the sample to lead the author to believe that this was caused by an extraneous value left within the data. All values are presented in nominal dollars.

Extracorporeal Shock Wave Lithotripsy (ESWL)

The distribution of ESWL is illustrated in the histogram in Figure 6.15A. This figure shows that while previous procedures were highly kurtosic, this distribution was less so. This also was confirmed with a kurtosis value of 101.86. The distribution was skewed to the left, closer to zero.

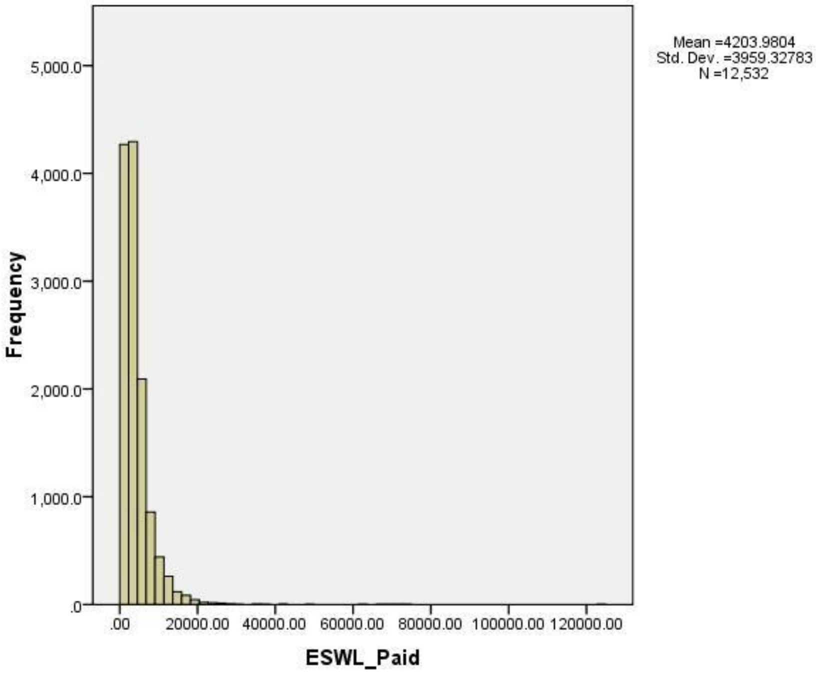


Figure 6.15A: Histogram ESWL_Paid

The ESWL (n) = 12,532, with N= 457,146. This represented 2.7% of the total sample. The range presented in this distribution was lower, with a value of $122,910.43, which suggested that less outliers were present in this subsample. The separation of the mean and median was less, with the mean value of $4,203.98 and a median of $3205.25.

The standard deviation for the ESWL was 3,959.33. A stem and leaf plot confirmed the presence of outliers using Tukey's (1977) definition, with 702 outliers present above $10,639. This is illustrated further in Figure 6.16A, which contains a box plot of ESWL_Paid. While previous variables showed the heavy presence of outliers, by compressing the box that contained the normal distribution, the normal distribution remains visible in this box plot. However, outliers still were shown to be present.

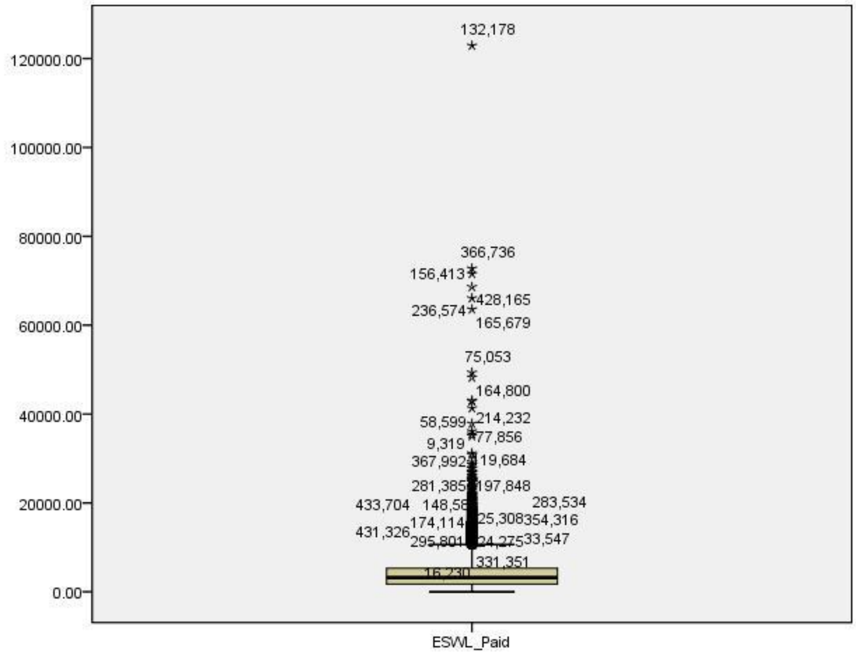


Figure 6.16A: Box Plot ESWL_Paid

The bar chart in Figure 6.17A shows the mean ESWL_paid for each year and payer. From this bar chart, it was evident that the reimbursements from commercial payers were considerably more than that of government payers. This trend remained throughout all years of the study. As shown in Figure 6.18A, the outliers were present in all years and with both payers. Removals of the outliers were necessary to conduct further research with this subsample.

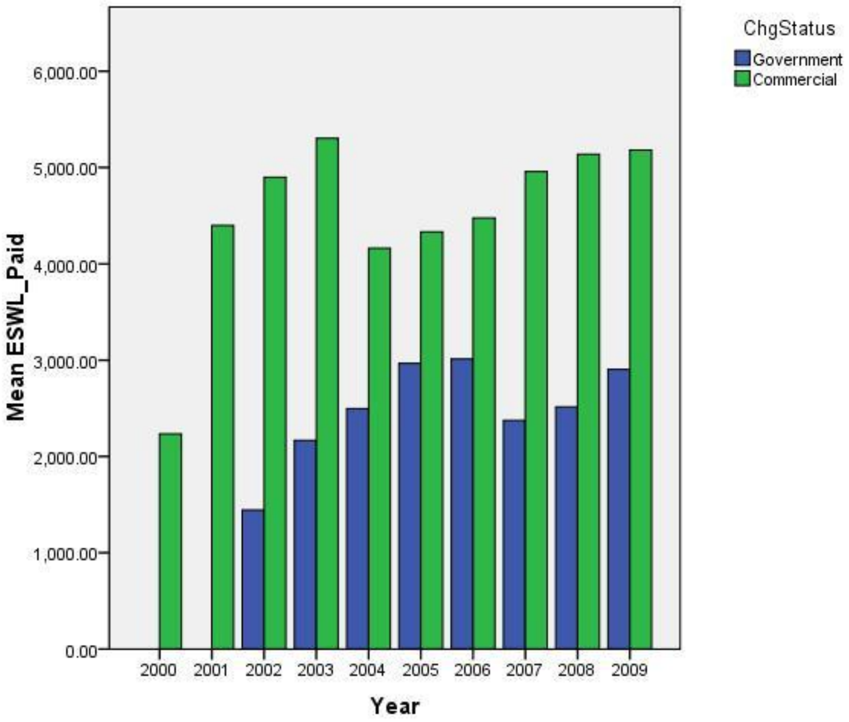


Figure 6.17A: ESWL_Paid by Year and Payer

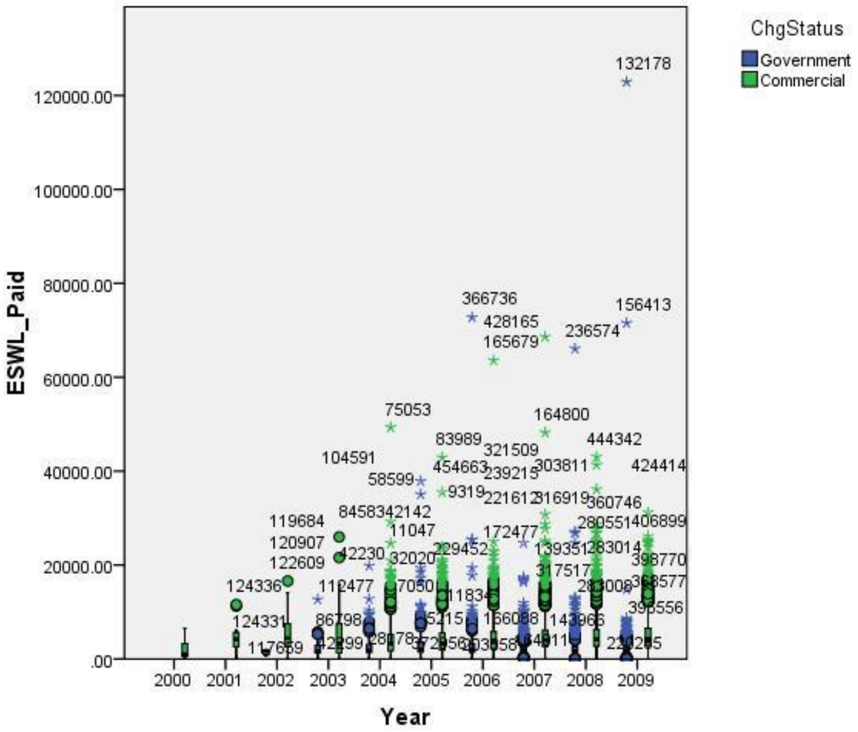


Figure 6.18A: Box Plot ESWL_Paid by Year and Payer

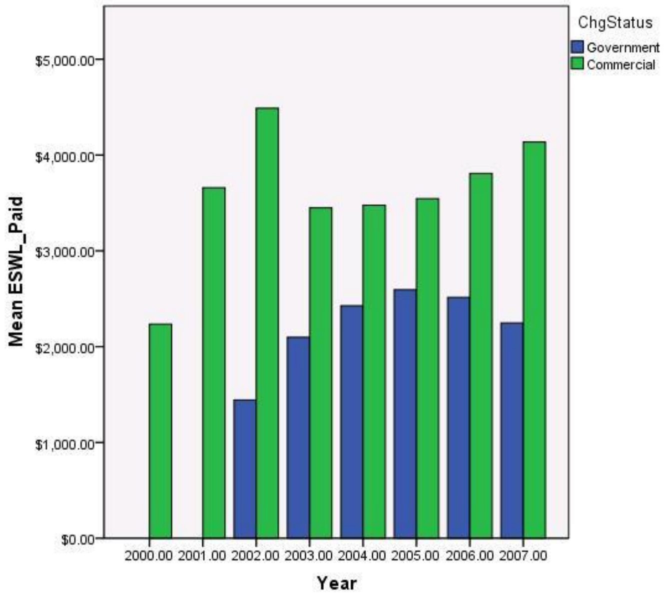


Figure 6.19A: Mean ESWL_Paid by Year and Payor Type (outliers removed)

Upon the removal of the outliers, a bar chart of the mean ESWL_Paid was created in Figure 6.19A. The bar chart revealed that no reimbursement exists for government payors in 2000 and 2001. Reimbursement changes between commercial and government payors did not correlate, as commercial payors increased at a higher rate from 2000 to 2002, with commercial payors reducing reimbursement in 2003 and stabilizing until 2006, where increases again were evident for commercial payors. Government reimbursement increased year on year from 2002-2005 at a delta less than commercial payors, until 2003, where government reimbursement continued to grow until 2005. While commercial reimbursement stabilized, from 2005 onward, government reimbursement decreased year on year through 2007. Commercial reimbursement was significantly higher in all years than government reimbursement. All values present are in nominal dollars.

Bronchoscopy (BRON)

The BRON variable was heavily kurtosic and concentrated around zero. The relatively high kurtosis was to be expected, as payments were concentrated around a given value. The underlying procedure did not change in the population; therefore, it was expected that payment values would not deviate greatly from the mean.

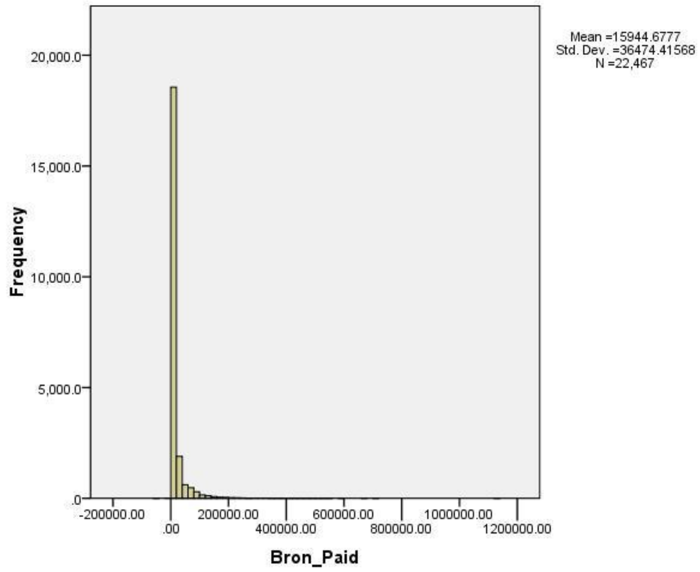


Figure 6.20A: Histogram: Bron_Paid

The BRON (n) = 22,467 with N = 457,146. This represented 4.9% of the overall sample. A relatively high range of $1,187,595 suggested the presence of outliers within the subsample. The distribution was skewed to the left, with the highest frequency present around zero, as shown in Figure 6.20A. Distortions in the subsample via outliers were suggested further by the mean and median separation, with a mean value of $15,944.68, and a median of $5,639.14. The standard deviation of the subsample was $36,474.42. Outliers were substantiated via stem and leaf, with 2,284 outliers present. Outliers are defined as values below $-48,614 and above $34,755. While values below zero were present, these values were cut off, as no negative values were accepted in the study as take backs, and denials were not included in the study.

The box plot in Figure 6.21A confirmed the presence of outliers, with outliers outlined as stars, and a compression of the box represents the normal distribution.

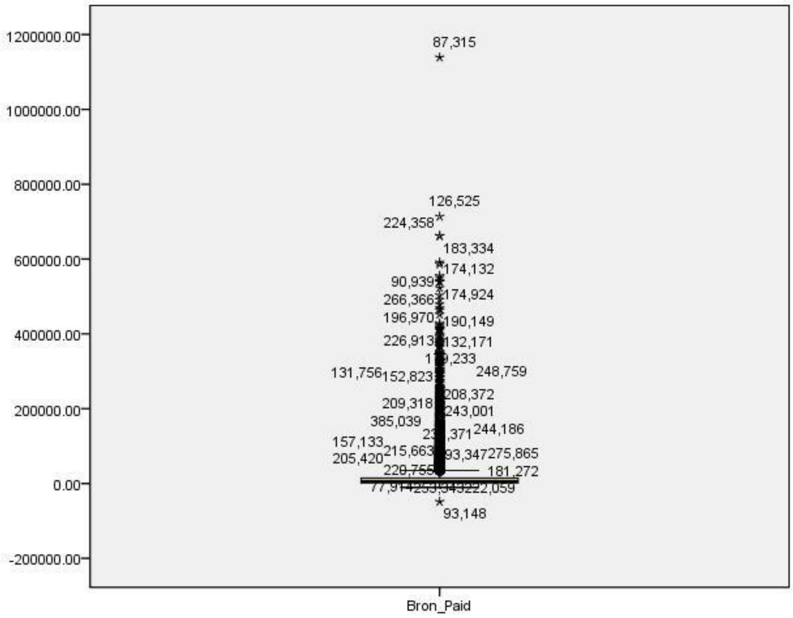


Figure 6.21A: Box Plot BRON_Paid

The bar chart in Figure 6.22A represents mean BRON_paid by year and payer. What was evident is that the mean increased over time, but also that in the first few years of the study, government reimbursement was greater than commercial. However, outliers influenced those values. Commercial payors led in reimbursement dollars in 2004 and onwards.

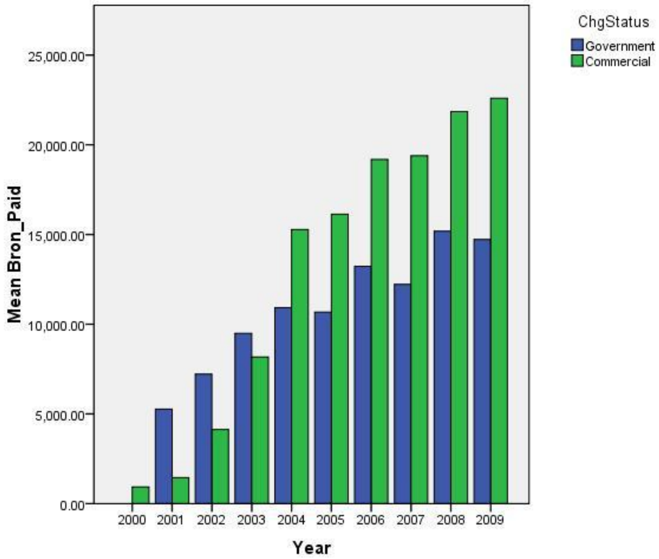


Figure 6.22A: Mean Bron_Paid by Year and Payer

The presence of outliers within each year and payer were confirmed in Figure 6.23A. These outliers influenced the means in Figure 6.24A. The removal of outliers was necessary before additional research could be done.

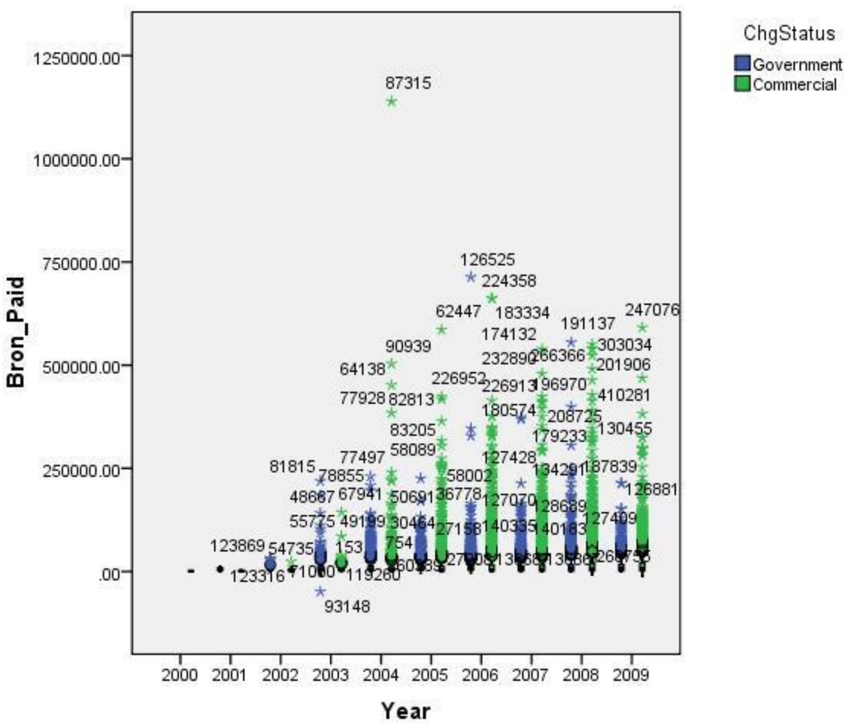


Figure 6.23A: Box Plot Bron_Paid by year and payer

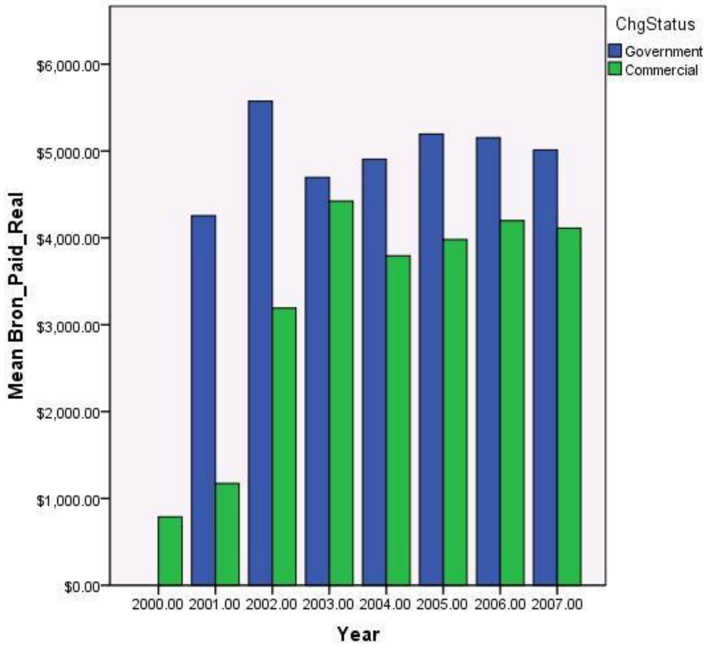


Figure 6.24A: Mean BRON_Paid by Year and Payor Type (outliers removed)

Figure 6.24A shows a bar chart that was created after the removal of outliers, and depicts Mean BRON_Paid by year and payor type. No government reimbursement cases existed for the year 2000. Government reimbursement was higher in all of the years in comparison to commercial reimbursement. This was unusual, as government is normally the lower reimbursement payor. These trends of higher payment existed throughout the entire time frame of the study. Changes in reimbursement for government and commercial did not correlate at any time within the time frame of the study. Both payors increased reimbursement for BRON procedures year on year until 2004, when commercial payors reduced reimbursement. A decrease in government reimbursement occurred two years later in 2006. The differentiation in payment between government and commercial may have been driven by the average age of the patients who receive bronchoscopies; however, this is pure speculation by the author. All values presented are in nominal dollars.

COLO: (Colonoscopy)

The distribution of the variable COLO was highly kurtosic, with very little distribution evident beyond the zero value on the X-axis, as shown in Figure 6.26A. This was confirmed with a kurtosis value of 2,573. This concentration of the population was to be expected, as the procedure or service was not changing; therefore, the distribution should have been kurtosic.

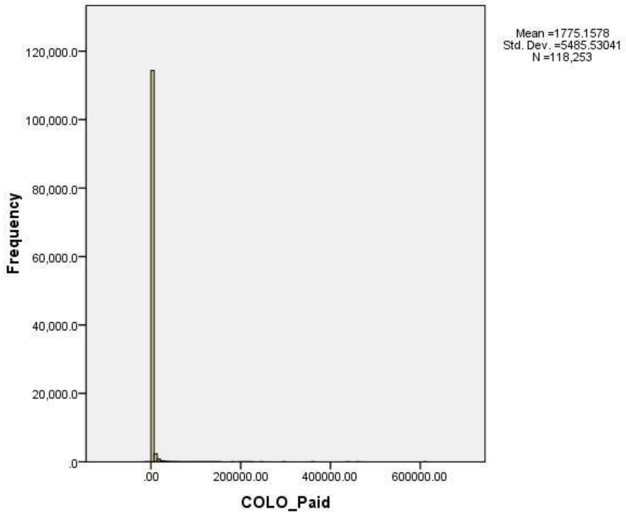


Figure 6.26A: Histogram COLO_Paid

The COLO (n) =118,253, with N =457,186. This represented 25.9% of the sample population. Outliers were suggested, with a large range of $619,602.15. The difference of the mean and median also suggested that outliers were present, with a mean value of $177,515.16 and a median of $787.50. Outliers were confirmed via stem and leaf plot using Tukey's (1977) definition of outliers; 15,125 outliers were identified with values below –$1,522 and above $3,069. The bulk of the 15,122 outliers were those above $3,069.

These outliers were illustrated in the box plot in Figure 6.27A. The box and whiskers representing the normal distribution were compressed to a single line. This suggested that the presence of outliers had a significant influence on the subsample.

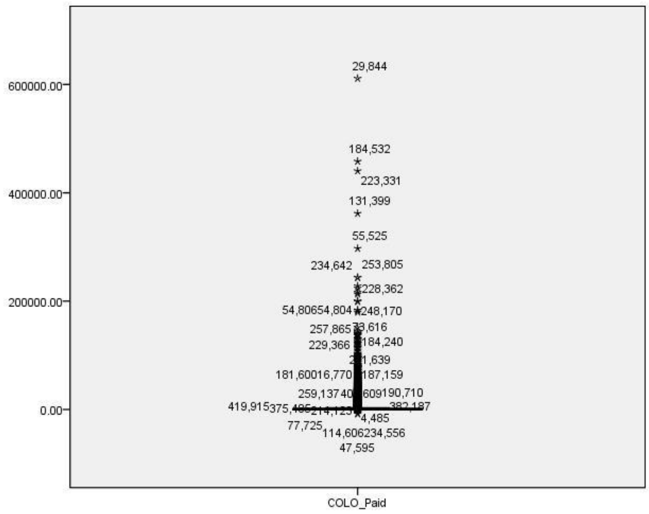


Figure 6.27A: Box Plot COLO_Paid

A bar chart of the mean COLO_paid is presented in Figure 6.28A. The chart indicated that the mean for both payers grew year on year, with the exception of 2004-2007 of government payment. In 2005-2007, the mean government pay decreased year on year throughout the rest of the study period, with some indication of outlier influence in government pay in perhaps 2001, and then in 2005-2007. This could be confirmed by the removal of the outliers. The commercial pay mean continued to grow year after year.

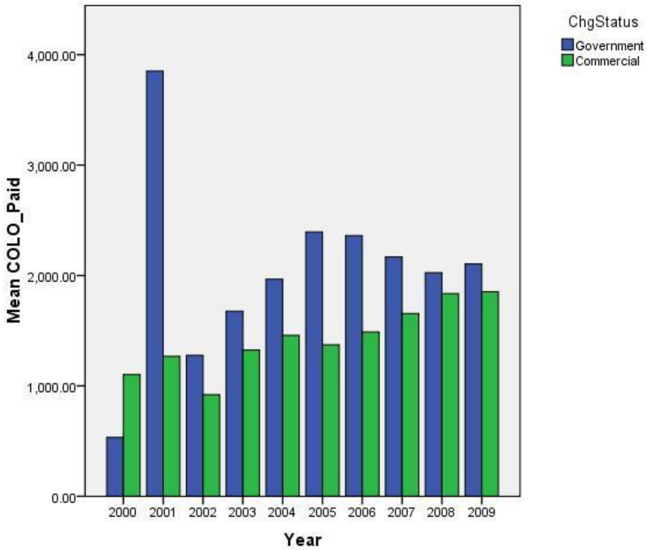


Figure 6.28A: Mean COLO_Paid by Year and Payer

The box plot of COLO_Paid by year and payer, in Figure 6.29A, confirmed that outliers were present in each year for both payers. Greater amplitude of the outliers was present for both payers in 2004-2008.

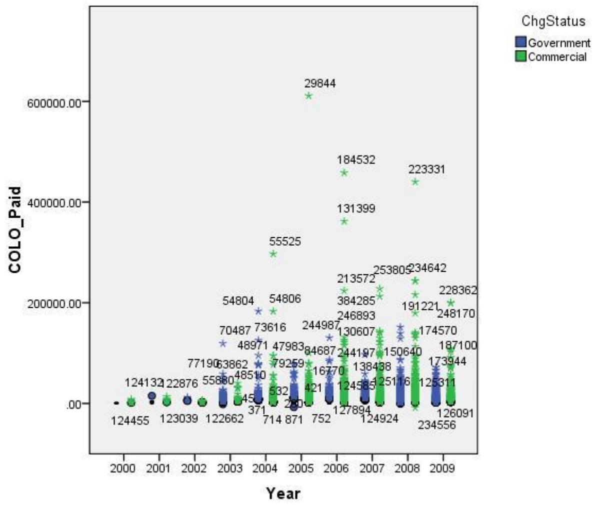


Figure6.29A: COLO_Paid by Year and Payer

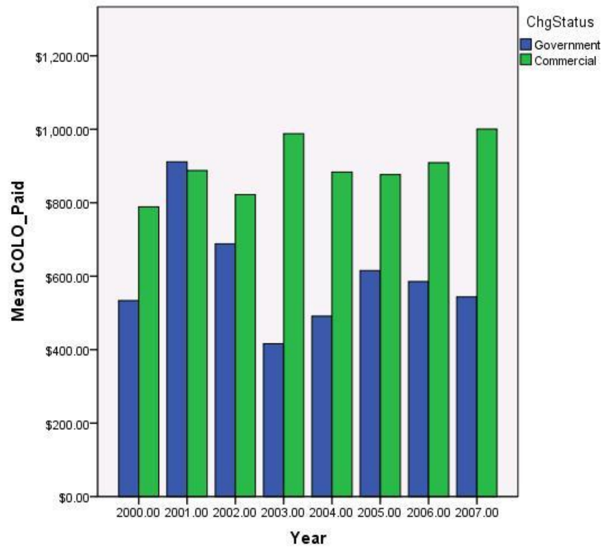


Figure 6.30A: Mean COLO_Paid by Year and Payor Type (outliers removed)

Figure 6.30A shows a bar chart created after the removal of the outliers, showing COLO_Paid by year and payor type. Both payor types were present in each year, with commercial as the higher reimbursement provider for all of the years with the exception of 2001. Changes in reimbursement did not correlate well within the sample for this procedure. Larger increases for government reimbursement were seen from 2000 to 2001, with very rapid erosion of the reimbursement dropping by roughly 25% in 2002. Further erosion in reimbursement from the government occurred again in 2003, with increases year on year after that until 2006, which again saw a decline. Commercial reimbursement was variable from 2000-2003, with a stabilization in reimbursement occurring in 2004. Real increases for commercial reimbursement resumed in 2007. Payments for both payers were relatively close from 2000 to 2002, with a large divergence in reimbursement occurring thereafter. Commercial reimbursement from 2002 onwards was approximately 25% to 50% more than government in any one year. All values presented are in nominal dollars.

Esophagogastroduodenoscopy (EGD)

The EGD represented 13.3% of the sample, with an (n) of 61,019 out of an (N) of 457,146. A suggestion of outliers was given by the separation of the mean and the median. There was also a large range present in the subsample of $918,372. Kurtosis was high, as represented in the histogram in Figure 6.31A. This was confirmed by the kurtosis value of 551.40. Evidence of outliers was confirmed with a stem and leaf plot. Outliers were expressed to be values below -7,022 and those values above 12,701.

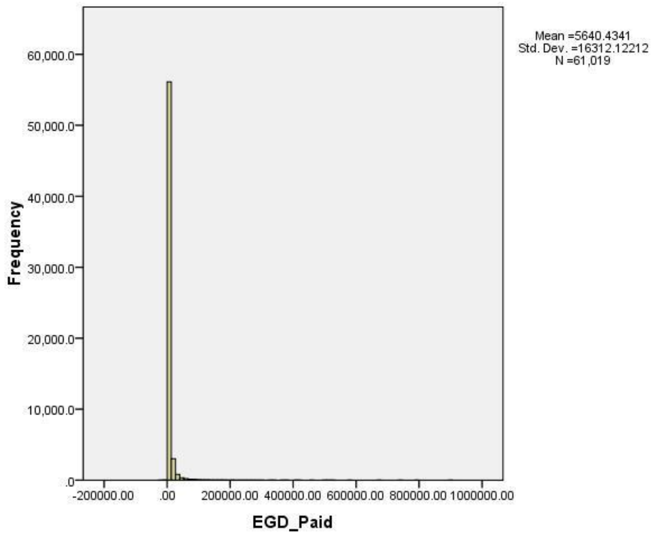


Figure 6.31A: Histogram EGD_Paid

The box plot in Figure 6.32A confirmed the presence of outliers, as the box was compressed and not visible. Asterisks representing the outliers were readily apparent and located on the upper values above the mean.

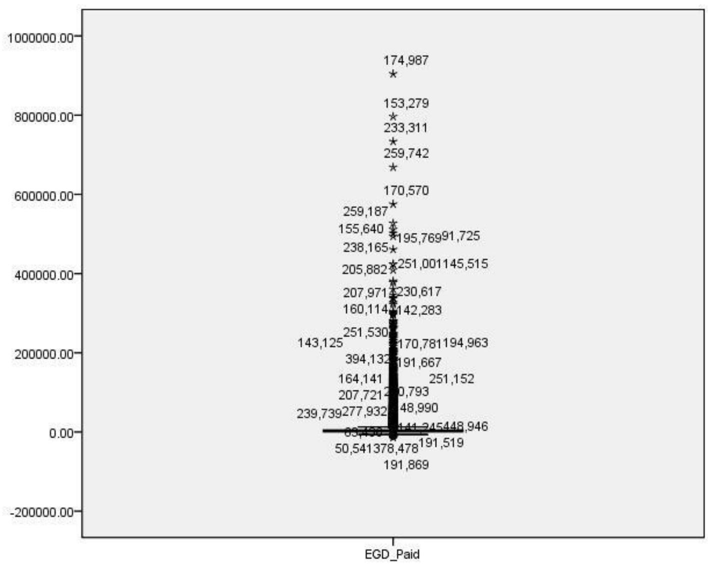


Figure 6.32A: Box Plot EGD_Paid

The mean EGD in Figure 6.33A increased each year, with some early variation between government and commercial reimbursements. The year 2005 onwards saw both increasing at roughly the same rate.

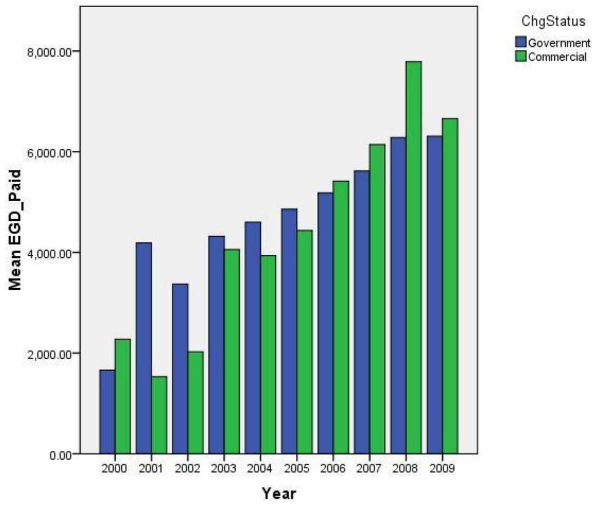


Figure 6.33A: Mean EGD_Paid by Year and Payer

The box plot in Figure 6.32A confirmed the presence of outliers as in the previous box plot; however, Figure 6.34A shows that the outliers existed for both the government and commercial payers, with most outliers present in the latter years of the study.

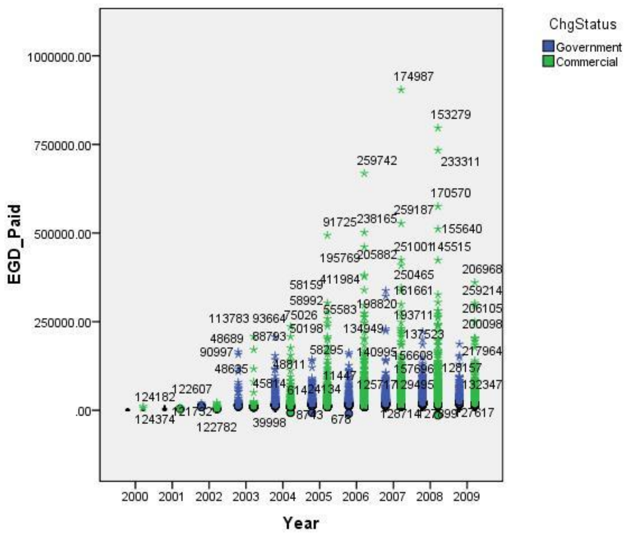


Figure 6.34A: Box Plot EGD_Paid by Year and Payer

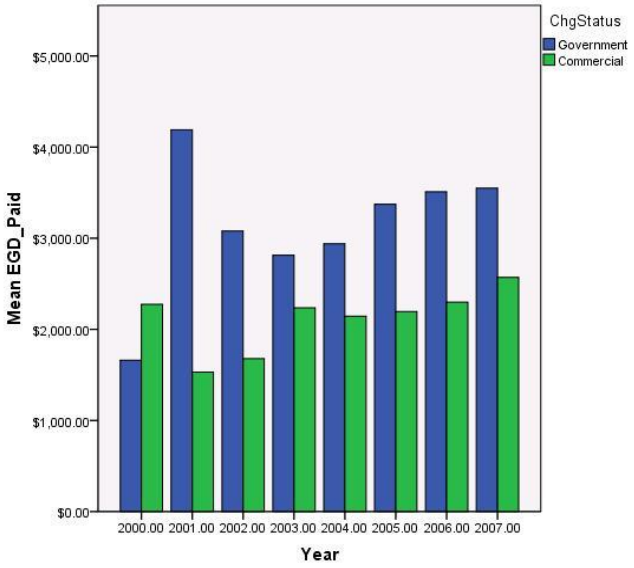


Figure 6.35A: Mean EGD_Paid by Year and Payor Type (outliers removed)

Figure 6.35A shows the removal of the outliers. Both payers were present in all of the years, 2000-2007. Government was the higher reimbursement payor in all of the years except 2000. No correlation of change in reimbursement could be seen in the years. The government reimbursement for 2000 and 2001 seemed unrealistic, especially in 2001. This value may have been generated by a low sample size for that year, which was distorting the mean. Government reimbursement for 2003-2007 increased year on year and was approximately 30% higher than commercial reimbursement. All values presented are in nominal dollars.

Total Hip Replacement Surgery (HIP)

The histogram in Figure 6.36Ashows the distribution of HIP_Paid. The distribution, while skewed to the left, was fairly dispersed in the payment spectrum. The HIP represented 0.00016 % of the sample population, and had the smallest contribution to the study with an (n) of 75, compared to an (N) of 457,146. The range of payment for HIP was high, with a range of $58,827. This also was recognized in the histogram. The separation of the mean and the median suggested a smaller number of outliers, just as shown in the previous procedure reimbursements. The kurtosis value was low at 3.28. This confirmed the histogram interpretations.

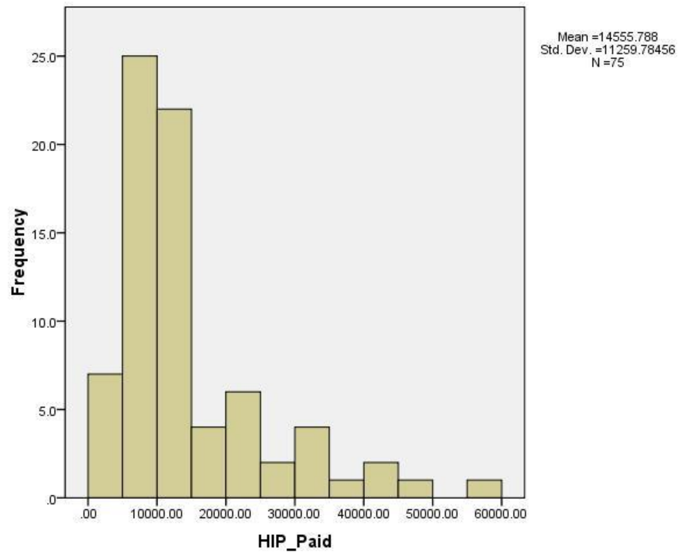


Figure 6.36A: Histogram HIP_Paid

A stem and leaf plot confirmed the low number of outliers, with nine total outliers. Outliers were identified as values above $30,972. This was also confirmed by the box plot in Figure 6.37A, which showed very few outliers, in addition to a well-proportioned box and whiskers, symbolizing the lack of distortion of outliers within the subsample.

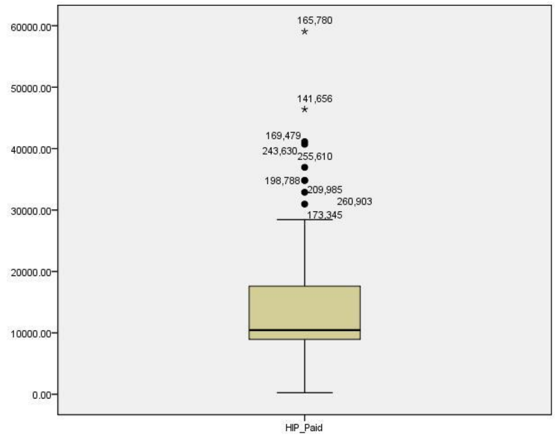


Figure 6.37A: Box Plot HIP_Paid

Figure 6.38A shows the mean reimbursement by year and payer. In the study, the HIP payments were present only from 2004 onwards. While 2008-2009 data is shown, it is only for trend identification purposes and is not utilized within the study.

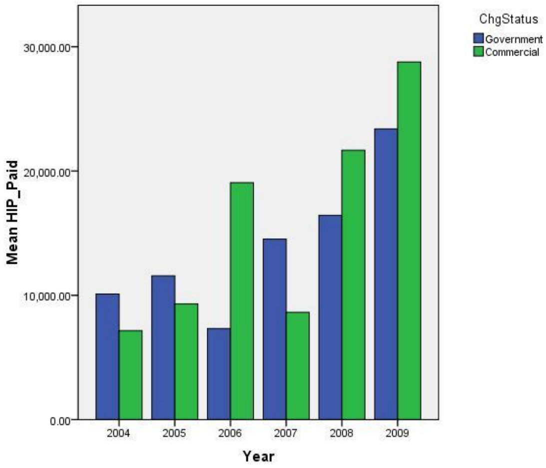


Figure 6.38A: Mean HIP_Paid by year and Payer

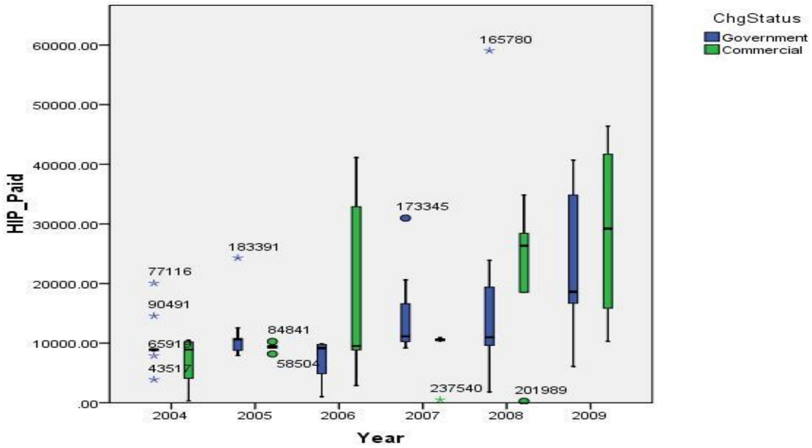


Figure 6.39A: Box Plot HIP_Paid by Year and Payer

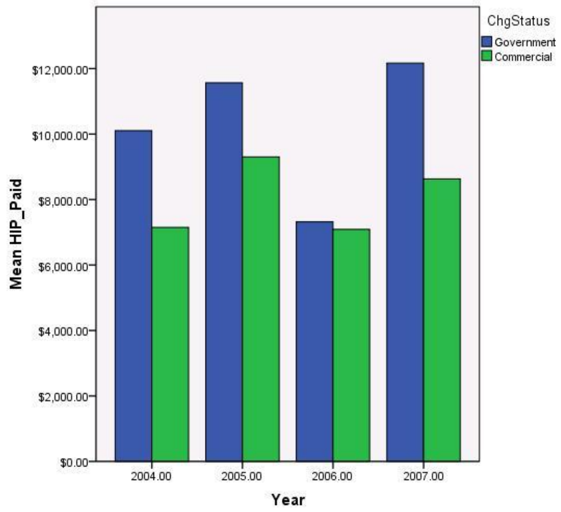


Figure 6.40A: Mean HIP_Paid by Year and Payor type (outliers removed)

The bar chart in Figure 6.40A shows the mean HIP_Paid by year and payor type. Only claim/remits were available for 2004-2007. This limitation was due to the small sample size. The government reimbursement was higher in all of the years than commercial reimbursement by approximately 20%, with the exception of 2006, in which there was only a modest difference in reimbursement. Reimbursement for both payers increased in 2004 to 2005, with a large decrease for both payors thereafter. The year 2007 saw a return to preexisting payment levels, as government reimbursement was a little higher than previous years, and commercial reimbursement a little lower.

Total Knee Replacement Surgery (KNEE)

The KNEE_Paid represented 8.9% of the overall sample population, with an (n) of 40,483 out of an (N) of 457,146. The subsample was leptokurtic, as evidenced in Figure 148. Outliers were suggested, with a range value of $3,878,658. The median and mean were separated greatly, but still suggested outliers as present, with a mean value of $12,496 and a median of $10,259. The low level of skewness identified in the histogram of Figure 6.41A was confirmed with a skewness value of 151. Outliers were identified as values below $2,084 and values above $20,507. Stem and leaf identified 5,552 outliers using Tukey’s (1977) definition.

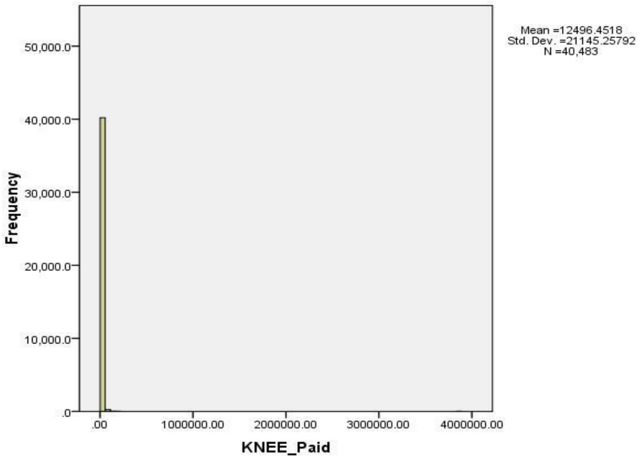


Figure 6.41A: Histogram KNEE_Paid

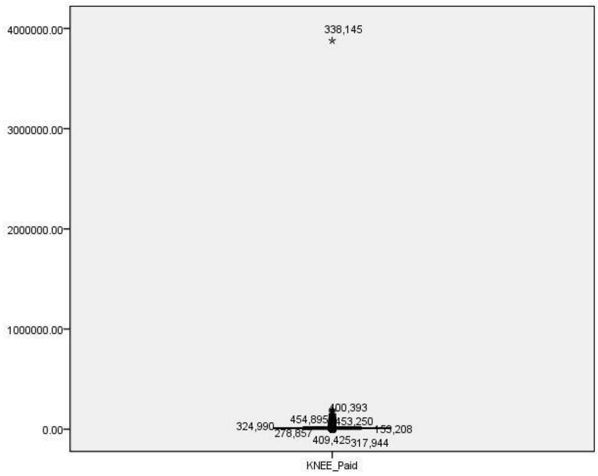


Figure 6.42A: Box Plot KNEE_Paid

The box plot in Figure 6.42A confirmed the presence of outliers; however, it is probable that the single outlier with a value of $338,145 caused a large portion of the distortion. The box and whiskers associated with a normal distribution were compressed and indistinguishable. From the bar chart in Figure 6.43A, we can see that commercial pay exceeded government pay from 2000-2007, the term of the study. Mean payments for KNEE decreased early in the study, while increasing from 2003 onwards. However, the government reimbursement did not increase at the same rate.

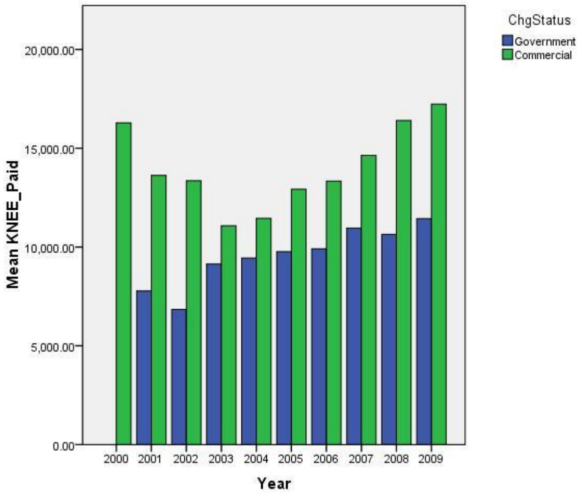


Figure6.43A: Mean KNEE_Paid by Year and Payer

The box plot in Figure 6.44A suggests that only a few outliers were distorting the box and whiskers representing the normal distribution. Outliers were identifiable for both government and commercial payers.

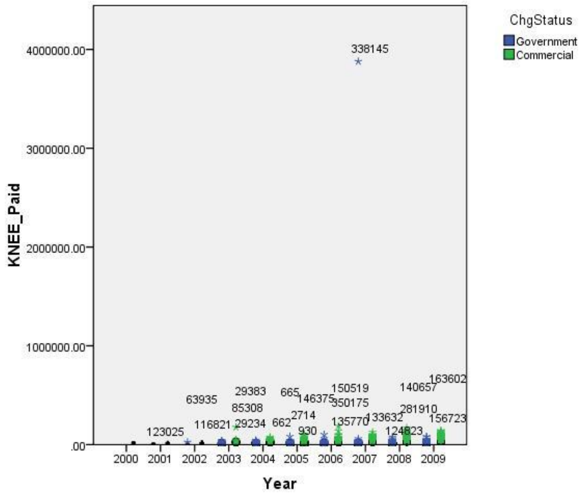


Figure 6.44A: KNEE_Paid by Year and Payer

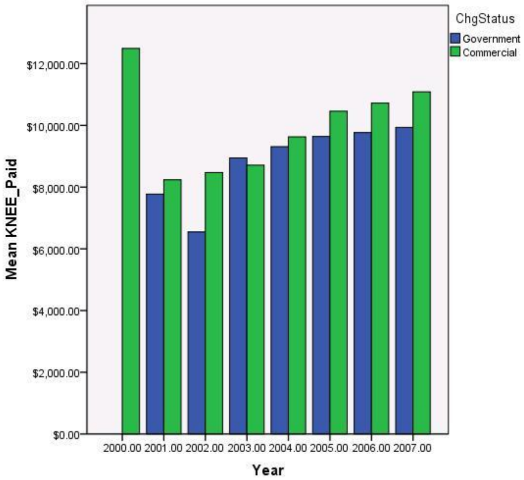


Figure 6.45A: Mean KNEE_Paid by Year and Payor type (outliers removed)

Figure 6.45A presents a bar chart displaying information on mean KNEE_Paid by year and payor type. No government reimbursement cases are visible for the year 2000. In comparison to 2001, commercial reimbursement for 2000 was relatively high. This may be the result of a low number of cases in that year. Both payor types were represented in all other years. There was evidence of a modest correlation of both payors' reimbursements for the years 2003-2005. Beyond 2005, commercial reimbursement had a higher growth rate than that of government. The largest divergence in reimbursement occurred in 2002, and was approximately 25%. In all of the years with the exception of 2003, commercial reimbursement was higher than government. All reimbursements increased throughout the time frame of the study. All values are in nominal dollars.

Chapter 6 Appendix (Panel Data Regression Models)

Herfindahl Hirschman Index: Model 1

Model 1: payor_count >=7, binary control for size, time, and payor count. The binary variables for payor_count were (8-50), with 50 and above in one variable. Standard Error was adjusted for clustering in the model.

```
note: PayorCnt_Bi_34 dropped because of collinearity
note: PayorCnt_Bi_36 dropped because of collinearity
note: PayorCnt_Bi_40 dropped because of collinearity
note: PayorCnt_Bi_45 dropped because of collinearity
note: PayorCnt_Bi_47 dropped because of collinearity
note: PayorCnt_Bi_48 dropped because of collinearity
note: PayorCnt_Bi_49 dropped because of collinearity

Random-effects GLS regression                   Number of obs      =       372
Group variable: prvdr_num                       Number of groups   =       188

R-sq:  within  = 0.2543                         Obs per group: min =         1
       between = 0.1973                                        avg =       2.0
       overall = 0.2104                                        max =         6

Random effects u_i ~ Gaussian                   Wald chi2(46)      =         .
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =         .

                             (Std. Err. adjusted for 188 clusters in prvdr_num)
```

real_fcf2	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
hhi	-.7907834	2.954739	-0.27	0.789	-6.581966	5.0004
Bi_Hosp_Si~2	.520624	1.782343	0.29	0.770	-2.972704	4.013952
Bi_Hosp_Si~3	2.951923	2.904785	1.02	0.310	-2.741351	8.645197
Bi_Hosp_Si~4	9.452296	5.853535	1.61	0.106	-2.020421	20.92501
Bi_Hosp_Si~5	9.066729	3.618602	2.51	0.012	1.974399	16.15906
Capital_Co~y	.8004249	.5278028	1.52	0.129	-.2340495	1.834899
Capex_2	-1.21e-07	4.49e-08	-2.69	0.007	-2.09e-07	-3.27e-08
LnTA	-3.185476	.8072393	-3.95	0.000	-4.767636	-1.603316
Leverage	-1.254144	1.355294	-0.93	0.355	-3.910472	1.402183
Percent_Go~s	-8.725174	5.194519	-1.68	0.093	-18.90624	1.455896
Net_Marg	9.58404	5.043516	1.90	0.057	-.3010707	19.46915
FiscalYear~d	.2224521	.5153129	0.43	0.666	-.7875426	1.232447
PayorCnt_~_8	-1.313248	1.831249	-0.72	0.473	-4.902431	2.275934
PayorCnt_~_9	1.648157	2.154766	0.76	0.444	-2.575107	5.87142
PayorCnt_~10	-1.78258	2.463447	-0.72	0.469	-6.610848	3.045688
PayorCnt_~11	-.1125899	2.87528	-0.04	0.969	-5.748034	5.522854
PayorCnt_~12	-3.857453	2.873466	-1.34	0.179	-9.489342	1.774436
PayorCnt_~13	-7.745565	4.105405	-1.89	0.059	-15.79201	.3008811
PayorCnt_~14	2.781213	2.565803	1.08	0.278	-2.247669	7.810095
PayorCnt_~15	-1.028257	4.281543	-0.24	0.810	-9.419927	7.363413
PayorCnt_~16	2.118589	3.262717	0.65	0.516	-4.276219	8.513397
PayorCnt_~17	-9.929984	2.25969	-4.39	0.000	-14.3589	-5.501073
PayorCnt_~18	-10.73119	3.670181	-2.92	0.003	-17.92461	-3.53777
PayorCnt_~19	-3.619728	3.03797	-1.19	0.233	-9.574041	2.334584
PayorCnt_~20	1.09736	3.49594	0.31	0.754	-5.754557	7.949277
PayorCnt_~21	7.132592	2.999703	2.38	0.017	1.253283	13.0119
PayorCnt_~22	-1.633205	2.673916	-0.61	0.541	-6.873984	3.607573
PayorCnt_~23	12.83156	10.22624	1.25	0.210	-7.211495	32.87461
PayorCnt_~24	-5.523761	5.873456	-0.94	0.347	-17.03552	5.988001
PayorCnt_~25	-11.5625	5.712454	-2.02	0.043	-22.7587	-.3662945
PayorCnt_~26	-15.06823	3.59723	-4.19	0.000	-22.11868	-8.017792
PayorCnt_~27	2.877829	4.001357	0.72	0.472	-4.964687	10.72034
PayorCnt_~28	-5.135515	6.162768	-0.83	0.405	-17.21432	6.943289
PayorCnt_~29	-13.35534	4.282813	-3.12	0.002	-21.7495	-4.961179
PayorCnt_~30	-6.185819	2.772211	-2.23	0.026	-11.61925	-.7523847
PayorCnt_~31	4.06872	7.282351	0.56	0.576	-10.20443	18.34187
PayorCnt_~32	-1.901405	3.743727	-0.51	0.612	-9.238975	5.436165
PayorCnt_~33	-3.587799	3.923726	-0.91	0.361	-11.27816	4.102562
PayorCnt_~35	-13.46191	5.079036	-2.65	0.008	-23.41664	-3.507182
PayorCnt_~37	-2.265571	2.583316	-0.88	0.380	-7.328777	2.797636
PayorCnt_~38	4.83679	2.732561	1.77	0.077	-.5189313	10.19251
PayorCnt_~39	-16.16914	5.540476	-2.92	0.004	-27.02827	-5.310002
PayorCnt_~41	-15.01405	2.486473	-6.04	0.000	-19.88744	-10.14065
PayorCnt_~42	1.13894	2.25439	0.51	0.613	-3.279583	5.557463
PayorCnt_~43	-8.039338	4.224476	-1.90	0.057	-16.31916	.240483
PayorCnt_~44	6.781233	7.793789	0.87	0.384	-8.494313	22.05678
PayorCnt_~46	-12.82935	3.149623	-4.07	0.000	-19.00249	-6.656199
PayorCnt_~50	.4244851	2.638814	0.16	0.872	-4.747495	5.596466
PayorCnt_B~w	2.061517	3.878321	0.53	0.595	-5.539852	9.662887
FiscalY~2001	-1.783811	2.796995	-0.64	0.524	-7.26582	3.698197
FiscalY~2002	.8968507	2.478745	0.36	0.717	-3.961401	5.755102
FiscalY~2003	.7912266	2.37185	0.33	0.739	-3.857515	5.439968
FiscalY~2004	-1.535413	1.886715	-0.81	0.416	-5.233307	2.162481
FiscalY~2005	-.4224495	1.719938	-0.25	0.806	-3.793466	2.948567
_cons	-381.5079	1033.121	-0.37	0.712	-2406.388	1643.372
sigma_u	6.6438436					
sigma_e	8.9870846					
rho	.35338437	(fraction of variance due to u_i)				

Model 2: payor_count >=6, binary control for size, time, and payor count. The binary variables for payor_count were (7-50), with 50 and above in one variable. Standard Error was adjusted for clustering in the model.

```
note: PayorCnt_Bi_34 dropped because of collinearity
note: PayorCnt_Bi_36 dropped because of collinearity
note: PayorCnt_Bi_40 dropped because of collinearity
note: PayorCnt_Bi_45 dropped because of collinearity
note: PayorCnt_Bi_47 dropped because of collinearity
note: PayorCnt_Bi_48 dropped because of collinearity
note: PayorCnt_Bi_49 dropped because of collinearity

Random-effects GLS regression                   Number of obs      =       471
Group variable: prvdr_num                       Number of groups   =       242

R-sq:  within  = 0.2206                         Obs per group: min =         1
       between = 0.1716                                        avg =       1.9
       overall = 0.1879                                        max =         6

Random effects u_i ~ Gaussian                   Wald chi2(47)      =         .
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =         .

                             (Std. Err. adjusted for 242 clusters in prvdr_num)
```

real_fcf2	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
hhi	-.8366864	2.483555	-0.34	0.736	-5.704365	4.030992
Bi_Hosp_Si~2	.6874729	1.58319	0.43	0.664	-2.415522	3.790467
Bi_Hosp_Si~3	3.602507	2.489165	1.45	0.148	-1.276166	8.48118
Bi_Hosp_Si~4	11.14671	5.284668	2.11	0.035	.7889481	21.50447
Bi_Hosp_Si~5	9.249199	3.31492	2.79	0.005	2.752075	15.74632
Capital_Co~y	1.05756	.3936477	2.69	0.007	.2860248	1.829095
Capex_2	-1.47e-07	3.96e-08	-3.71	0.000	-2.25e-07	-6.93e-08
LnTA	-3.11706	.7588358	-4.11	0.000	-4.604351	-1.629769
Leverage	-1.447085	1.185254	-1.22	0.222	-3.77014	.8759711
Percent_Go~s	-9.71394	4.648209	-2.09	0.037	-18.82426	-.6036188
Net_Marg	9.47596	5.210856	1.82	0.069	-.7371306	19.68905
FiscalYear~d	.2561131	.4008228	0.64	0.523	-.5294852	1.041711
PayorCnt_~_7	.5156602	1.554173	0.33	0.740	-2.530462	3.561783
PayorCnt_~_8	-1.054818	1.924334	-0.55	0.584	-4.826443	2.716808
PayorCnt_~_9	2.388259	2.104629	1.13	0.256	-1.736739	6.513257
PayorCnt_~10	-.8219982	2.435224	-0.34	0.736	-5.59495	3.950954
PayorCnt_~11	.2038708	2.661228	0.08	0.939	-5.012041	5.419782
PayorCnt_~12	-3.101275	2.75047	-1.13	0.260	-8.492097	2.289548
PayorCnt_~13	-7.113977	4.097109	-1.74	0.083	-15.14416	.916208
PayorCnt_~14	2.598777	2.652206	0.98	0.327	-2.599452	7.797005
PayorCnt_~15	-.2424922	4.130975	-0.06	0.953	-8.339054	7.85407
PayorCnt_~16	2.493433	3.174535	0.79	0.432	-3.728541	8.715408
PayorCnt_~17	-9.115063	2.105031	-4.33	0.000	-13.24085	-4.989279
PayorCnt_~18	-10.35763	3.479787	-2.98	0.003	-17.17789	-3.537378
PayorCnt_~19	-2.33376	2.857604	-0.82	0.414	-7.934562	3.267041
PayorCnt_~20	1.043676	3.45569	0.30	0.763	-5.729353	7.816704
PayorCnt_~21	7.151199	2.69631	2.65	0.008	1.866527	12.43587
PayorCnt_~22	-.1569702	2.867373	-0.05	0.956	-5.776918	5.462978
PayorCnt_~23	13.94187	9.914308	1.41	0.160	-5.489814	33.37356
PayorCnt_~24	-5.207758	6.207737	-0.84	0.402	-17.3747	6.959182
PayorCnt_~25	-10.69801	5.341924	-2.00	0.045	-21.16798	-.2280274
PayorCnt_~26	-13.30193	2.997575	-4.44	0.000	-19.17707	-7.426794
PayorCnt_~27	4.022255	3.924292	1.02	0.305	-3.669216	11.71373
PayorCnt_~28	-4.608916	5.448305	-0.85	0.398	-15.2874	6.069566
PayorCnt_~29	-12.50335	3.700258	-3.38	0.001	-19.75573	-5.250982
PayorCnt_~30	-3.953716	2.751921	-1.44	0.151	-9.347381	1.43995
PayorCnt_~31	5.226138	6.856835	0.76	0.446	-8.21301	18.66529
PayorCnt_~32	-1.201851	3.466374	-0.35	0.729	-7.99582	5.592117
PayorCnt_~33	-2.635527	4.178623	-0.63	0.528	-10.82548	5.554424
PayorCnt_~35	-13.41653	4.106737	-3.27	0.001	-21.46559	-5.367473
PayorCnt_~37	-1.865154	2.731862	-0.68	0.495	-7.219506	3.489198
PayorCnt_~38	5.073881	2.819659	1.80	0.072	-.4525487	10.60031
PayorCnt_~39	-16.20656	5.835999	-2.78	0.005	-27.64491	-4.768211
PayorCnt_~41	-15.16885	2.688445	-5.64	0.000	-20.4381	-9.899591
PayorCnt_~42	1.31608	1.970187	0.67	0.504	-2.545415	5.177576
PayorCnt_~43	-6.227932	4.336697	-1.44	0.151	-14.7277	2.271838
PayorCnt_~44	7.142922	7.44888	0.96	0.338	-7.456614	21.74246
PayorCnt_~46	-13.54832	3.140258	-4.31	0.000	-19.70311	-7.393525
PayorCnt_~50	1.738038	2.484988	0.70	0.484	-3.132449	6.608524
PayorCnt_B~w	2.074541	3.805137	0.55	0.586	-5.38339	9.532472
FiscalY~2001	-.2308872	2.496359	-0.09	0.926	-5.123662	4.661887
FiscalY~2002	.5696517	2.09207	0.27	0.785	-3.53073	4.670034
FiscalY~2003	.1400753	1.958551	0.07	0.943	-3.698614	3.978764
FiscalY~2004	-1.007094	1.561207	-0.65	0.519	-4.067004	2.052816
FiscalY~2005	.7688406	1.463165	0.53	0.599	-2.09891	3.636591
_cons	-450.4745	803.9166	-0.56	0.575	-2026.122	1125.173
sigma_u	6.4839058					
sigma_e	8.9087856					
rho	.34628039	(fraction of variance due to u_i)				

Model 3: payor_count >=5, binary control for size, time, and payor count. The binary variables for payor_count were (6-50), with 50 and above in one variable. Standard Error was adjusted for clustering in the model.

```
note: PayorCnt_Bi_34 dropped because of collinearity
note: PayorCnt_Bi_36 dropped because of collinearity
note: PayorCnt_Bi_40 dropped because of collinearity
note: PayorCnt_Bi_45 dropped because of collinearity
note: PayorCnt_Bi_47 dropped because of collinearity
note: PayorCnt_Bi_48 dropped because of collinearity
note: PayorCnt_Bi_49 dropped because of collinearity

Random-effects GLS regression                   Number of obs      =       632
Group variable: prvdr_num                       Number of groups   =       322

R-sq:  within  = 0.1755                         Obs per group: min =         1
       between = 0.1710                                        avg =       2.0
       overall = 0.1739                                        max =         6

Random effects u_i ~ Gaussian                   Wald chi2(50)      =         .
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =         .

                            (Std. Err. adjusted for 322 clusters in prvdr_num)
```

real_fcf2	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
hhi	-1.856242	2.186739	-0.85	0.396	-6.142171	2.429688
Bi_Hosp_Si~2	-.7601632	1.356586	-0.56	0.575	-3.419024	1.898697
Bi_Hosp_Si~3	1.757884	2.178305	0.81	0.420	-2.511516	6.027284
Bi_Hosp_Si~4	10.42367	4.027689	2.59	0.010	2.52954	18.31779
Bi_Hosp_Si~5	7.394205	2.957947	2.50	0.012	1.596735	13.19168
Capital_Co~y	1.060866	.3103721	3.42	0.001	.4525474	1.669184
Capex_2	-1.35e-07	3.81e-08	-3.53	0.000	-2.09e-07	-6.00e-08
LnTA	-2.845651	.6339839	-4.49	0.000	-4.088236	-1.603065
Leverage	-1.853029	.9771508	-1.90	0.058	-3.76821	.0621509
Percent_Go~s	-8.33088	4.278339	-1.95	0.052	-16.71627	.0545112
Net_Marg	10.36292	5.575942	1.86	0.063	-.5657261	21.29157
FiscalYear~d	.54965	.3623606	1.52	0.129	-.1605638	1.259864
PayorCnt_~_6	-.1999123	1.407152	-0.14	0.887	-2.957879	2.558054
PayorCnt_~_7	.0504687	1.451958	0.03	0.972	-2.795317	2.896255
PayorCnt_~_8	-1.296548	1.670529	-0.78	0.438	-4.570725	1.977628
PayorCnt_~_9	2.112967	2.044978	1.03	0.301	-1.895117	6.12105
PayorCnt_~10	-1.625964	2.297429	-0.71	0.479	-6.128843	2.876914
PayorCnt_~11	-.3414467	2.63975	-0.13	0.897	-5.515261	4.832368
PayorCnt_~12	-3.104772	2.681401	-1.16	0.247	-8.360222	2.150678
PayorCnt_~13	-7.359936	3.623415	-2.03	0.042	-14.4617	-.2581729
PayorCnt_~14	1.322467	2.31352	0.57	0.568	-3.211949	5.856884
PayorCnt_~15	-.3412848	3.805139	-0.09	0.929	-7.79922	7.11665
PayorCnt_~16	2.086278	3.253465	0.64	0.521	-4.290396	8.462953
PayorCnt_~17	-8.956828	1.924502	-4.65	0.000	-12.72878	-5.184873
PayorCnt_~18	-10.95716	3.477692	-3.15	0.002	-17.77331	-4.141004
PayorCnt_~19	-2.725704	2.890108	-0.94	0.346	-8.390212	2.938804
PayorCnt_~20	.691692	2.957524	0.23	0.815	-5.104949	6.488333
PayorCnt_~21	7.062624	3.169854	2.23	0.026	.8498244	13.27542
PayorCnt_~22	-1.024919	2.588779	-0.40	0.692	-6.098833	4.048994
PayorCnt_~23	12.60758	9.227347	1.37	0.172	-5.477684	30.69285
PayorCnt_~24	-6.389744	5.470586	-1.17	0.243	-17.1119	4.332408
PayorCnt_~25	-11.91655	5.138134	-2.32	0.020	-21.98711	-1.845993
PayorCnt_~26	-12.4829	2.481414	-5.03	0.000	-17.34638	-7.619414
PayorCnt_~27	4.552973	3.642762	1.25	0.211	-2.586708	11.69265
PayorCnt_~28	-5.276247	5.238523	-1.01	0.314	-15.54356	4.991069
PayorCnt_~29	-10.75678	3.433326	-3.13	0.002	-17.48597	-4.027583
PayorCnt_~30	-4.575727	2.247194	-2.04	0.042	-8.980146	-.1713075
PayorCnt_~31	5.585466	7.298783	0.77	0.444	-8.719885	19.89082
PayorCnt_~32	-2.104197	3.396422	-0.62	0.536	-8.761062	4.552668
PayorCnt_~33	-3.326839	3.845616	-0.87	0.387	-10.86411	4.210431
PayorCnt_~35	-11.66595	2.388639	-4.88	0.000	-16.3476	-6.984304
PayorCnt_~37	-2.242324	2.441754	-0.92	0.358	-7.028074	2.543426
PayorCnt_~38	4.648067	2.669459	1.74	0.082	-.5839764	9.880111
PayorCnt_~39	-17.20005	5.612034	-3.06	0.002	-28.19943	-6.20066
PayorCnt_~41	-16.29846	2.396023	-6.80	0.000	-20.99458	-11.60234
PayorCnt_~42	.4010839	1.768874	0.23	0.821	-3.065845	3.868013
PayorCnt_~43	-7.123898	2.697124	-2.64	0.008	-12.41016	-1.837631
PayorCnt_~44	6.858617	7.144824	0.96	0.337	-7.144982	20.86222
PayorCnt_~46	-14.66782	2.382358	-6.16	0.000	-19.33715	-9.998483
PayorCnt_~50	1.471019	1.85987	0.79	0.429	-2.174259	5.116296
PayorCnt_B~w	1.499544	3.600222	0.42	0.677	-5.556761	8.555849
FiscalY~2001	1.316038	2.1452	0.61	0.540	-2.888477	5.520552
FiscalY~2002	2.249943	1.961393	1.15	0.251	-1.594316	6.094202
FiscalY~2003	.5844427	1.62811	0.36	0.720	-2.606595	3.77548
FiscalY~2004	-.2773392	1.351116	-0.21	0.837	-2.925477	2.370799
FiscalY~2005	.6902363	1.246759	0.55	0.580	-1.753366	3.133839
_cons	-1042.579	726.299	-1.44	0.151	-2466.099	380.9406
sigma_u	6.8588301					
sigma_e	8.8789399					
rho	.37372003	(fraction of variance due to u_i)				

Model 4: payor_count >=4, binary control for size, time, and payor count. The binary variables for payor_count were (5-50), with 50 and above in one variable. Standard Error was adjusted for clustering in the model.

```
note: PayorCnt_Bi_34 dropped because of collinearity
note: PayorCnt_Bi_36 dropped because of collinearity
note: PayorCnt_Bi_40 dropped because of collinearity
note: PayorCnt_Bi_45 dropped because of collinearity
note: PayorCnt_Bi_47 dropped because of collinearity
note: PayorCnt_Bi_48 dropped because of collinearity
note: PayorCnt_Bi_49 dropped because of collinearity

Random-effects GLS regression                   Number of obs      =       891
Group variable: prvdr_num                       Number of groups   =       433

R-sq:  within  = 0.1425                         Obs per group: min =         1
       between = 0.1362                                        avg =       2.1
       overall = 0.1470                                        max =         6

Random effects u_i ~ Gaussian                   Wald chi2(51)      =         .
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =         .

                          (Std. Err. adjusted for 433 clusters in prvdr_num)
```

real_fcf2	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
hhi	-3.68104	1.779562	-2.07	0.039	-7.168918	-.1931613
Bi_Hosp_Si~2	-.3749028	1.107473	-0.34	0.735	-2.545511	1.795705
Bi_Hosp_Si~3	1.476685	1.798956	0.82	0.412	-2.049204	5.002574
Bi_Hosp_Si~4	10.43624	3.276446	3.19	0.001	4.014519	16.85795
Bi_Hosp_Si~5	10.23787	3.393535	3.02	0.003	3.586669	16.88908
Capital_Co~y	.8402394	.3571994	2.35	0.019	.1401415	1.540337
Capex_2	-1.28e-07	3.17e-08	-4.04	0.000	-1.90e-07	-6.59e-08
LnTA	-2.36606	.5128803	-4.61	0.000	-3.371287	-1.360833
Leverage	-1.483338	.8205969	-1.81	0.071	-3.091678	.1250022
Percent_Go~s	-7.498846	3.44382	-2.18	0.029	-14.24861	-.7490834
Net_Marg	12.02302	6.816976	1.76	0.078	-1.338011	25.38405
FiscalYear~d	.4427292	.3025869	1.46	0.143	-.1503301	1.035789
PayorCnt_~_5	-1.68614	1.146074	-1.47	0.141	-3.932403	.5601236
PayorCnt_~_6	-2.191027	1.330251	-1.65	0.100	-4.79827	.4162162
PayorCnt_~_7	-1.567623	1.323354	-1.18	0.236	-4.161349	1.026103
PayorCnt_~_8	-2.802169	1.44952	-1.93	0.053	-5.643175	.0388376
PayorCnt_~_9	.0695595	1.93426	0.04	0.971	-3.721521	3.86064
PayorCnt_~10	-3.791726	2.102833	-1.80	0.071	-7.913203	.3297505
PayorCnt_~11	-1.972657	2.523825	-0.78	0.434	-6.919264	2.97395
PayorCnt_~12	-4.988857	2.678699	-1.86	0.063	-10.23901	.2612963
PayorCnt_~13	-8.930574	3.723291	-2.40	0.016	-16.22809	-1.633058
PayorCnt_~14	-1.311867	2.114717	-0.62	0.535	-5.456637	2.832903
PayorCnt_~15	-3.121813	3.836247	-0.81	0.416	-10.64072	4.397093
PayorCnt_~16	.5648718	3.24919	0.17	0.862	-5.803424	6.933167
PayorCnt_~17	-11.84122	1.811577	-6.54	0.000	-15.39184	-8.290591
PayorCnt_~18	-12.92784	3.136421	-4.12	0.000	-19.07511	-6.780562
PayorCnt_~19	-4.38513	2.934557	-1.49	0.135	-10.13676	1.366496
PayorCnt_~20	-2.621987	3.173471	-0.83	0.409	-8.841875	3.597902
PayorCnt_~21	4.767023	3.614744	1.32	0.187	-2.317745	11.85179
PayorCnt_~22	-2.672687	2.489662	-1.07	0.283	-7.552334	2.20696
PayorCnt_~23	10.163	8.437729	1.20	0.228	-6.374648	26.70064
PayorCnt_~24	-9.475638	5.44397	-1.74	0.082	-20.14562	1.194347
PayorCnt_~25	-13.09091	4.04579	-3.24	0.001	-21.02052	-5.161312
PayorCnt_~26	-14.93318	2.276918	-6.56	0.000	-19.39586	-10.4705
PayorCnt_~27	.6988369	3.951898	0.18	0.860	-7.046742	8.444415
PayorCnt_~28	-7.561098	5.528434	-1.37	0.171	-18.39663	3.274434
PayorCnt_~29	-13.77967	3.130231	-4.40	0.000	-19.91482	-7.644534
PayorCnt_~30	-4.501604	1.805584	-2.49	0.013	-8.040484	-.9627239
PayorCnt_~31	3.532007	6.651989	0.53	0.595	-9.505651	16.56967
PayorCnt_~32	-3.490009	2.863754	-1.22	0.223	-9.102862	2.122845
PayorCnt_~33	-6.154839	4.407915	-1.40	0.163	-14.79419	2.484516
PayorCnt_~35	-16.57581	3.019655	-5.49	0.000	-22.49423	-10.65739
PayorCnt_~37	-4.802431	2.095147	-2.29	0.022	-8.908844	-.6960179
PayorCnt_~38	2.849091	2.780096	1.02	0.305	-2.599797	8.297979
PayorCnt_~39	-20.00971	5.766693	-3.47	0.001	-31.31222	-8.707203
PayorCnt_~41	-19.57126	1.965183	-9.96	0.000	-23.42295	-15.71957
PayorCnt_~42	-1.982088	1.498321	-1.32	0.186	-4.918743	.9545666
PayorCnt_~43	-12.59101	3.533229	-3.56	0.000	-19.51601	-5.666003
PayorCnt_~44	4.773679	6.667226	0.72	0.474	-8.293843	17.8412
PayorCnt_~46	-17.60035	2.124001	-8.29	0.000	-21.76332	-13.43739
PayorCnt_~50	-.1692941	1.810633	-0.09	0.926	-3.718069	3.379481
PayorCnt_B~w	-.840946	3.583703	-0.23	0.814	-7.864874	6.182982
FiscalY~2001	2.452051	1.758536	1.39	0.163	-.9946156	5.898718
FiscalY~2002	2.413085	1.540878	1.57	0.117	-.6069794	5.433149
FiscalY~2003	.2206353	1.281691	0.17	0.863	-2.291434	2.732704
FiscalY~2004	.4044304	1.157094	0.35	0.727	-1.863433	2.672294
FiscalY~2005	.9217518	1.059046	0.87	0.384	-1.15394	2.997443
_cons	-834.9919	606.8728	-1.38	0.169	-2024.441	354.4569
sigma_u	6.5092706					
sigma_e	9.0455947					
rho	.34116634	(fraction of variance due to u_i)				

Herfindahl Hirschman Index: Model 5

Model 5: payor_count >=3 binary control for size, time, and payor count. The binary variables for payor_count were (4-50), with 50 and above in one variable. Standard Error was adjusted for clustering in the model.

```
note: PayorCnt_Bi_34 dropped because of collinearity
note: PayorCnt_Bi_36 dropped because of collinearity
note: PayorCnt_Bi_40 dropped because of collinearity
note: PayorCnt_Bi_45 dropped because of collinearity
note: PayorCnt_Bi_47 dropped because of collinearity
note: PayorCnt_Bi_48 dropped because of collinearity
note: PayorCnt_Bi_49 dropped because of collinearity

Random-effects GLS regression                   Number of obs      =      1324
Group variable: prvdr_num                       Number of groups   =       600

R-sq:  within  = 0.1139                         Obs per group: min =         1
       between = 0.1113                                        avg =       2.2
       overall = 0.1304                                        max =         7

Random effects u_i ~ Gaussian                   Wald chi2(52)      =         .
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =         .

                               (Std. Err. adjusted for 600 clusters in prvdr_num)
```

real_fcf2	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
hhi	-3.469228	1.501483	-2.31	0.021	-6.412081	-.526374
Bi_Hosp_Si~2	-.2157893	.8802615	-0.25	0.806	-1.94107	1.509492
Bi_Hosp_Si~3	2.49038	1.50736	1.65	0.099	-.4639915	5.444751
Bi_Hosp_Si~4	7.319262	3.175915	2.30	0.021	1.094583	13.54394
Bi_Hosp_Si~5	6.393814	2.794141	2.29	0.022	.9173976	11.87023
Capital_Co~y	1.085651	.5750017	1.89	0.059	-.0413321	2.212633
Capex_2	-1.27e-07	3.30e-08	-3.86	0.000	-1.92e-07	-6.26e-08
LnTA	-2.363778	.4360923	-5.42	0.000	-3.218503	-1.509053
Leverage	-1.294987	.5793172	-2.24	0.025	-2.430427	-.1595457
Percent_Go~s	-4.658025	2.684658	-1.74	0.083	-9.919859	.6038089
Net_Marg	15.42476	7.540223	2.05	0.041	.6461914	30.20332
FiscalYear~d	.4470001	.2336494	1.91	0.056	-.0109442	.9049444
PayorCnt_~_4	1.480551	.8454221	1.75	0.080	-.1764463	3.137547
PayorCnt_~_5	-.1188327	1.028982	-0.12	0.908	-2.135601	1.897935
PayorCnt_~_6	-.4451885	1.219692	-0.37	0.715	-2.835741	1.945364
PayorCnt_~_7	.0828045	1.273688	0.07	0.948	-2.413578	2.579187
PayorCnt_~_8	-.3690042	1.442934	-0.26	0.798	-3.197103	2.459094
PayorCnt_~_9	1.90178	1.730926	1.10	0.272	-1.490772	5.294331
PayorCnt_~10	-1.503786	1.862287	-0.81	0.419	-5.153802	2.14623
PayorCnt_~11	.313772	2.297664	0.14	0.891	-4.189567	4.817111
PayorCnt_~12	-2.484016	2.624599	-0.95	0.344	-7.628136	2.660104
PayorCnt_~13	-6.45928	3.654723	-1.77	0.077	-13.62241	.703846
PayorCnt_~14	1.543676	1.720002	0.90	0.369	-1.827466	4.914819
PayorCnt_~15	-1.311943	3.554442	-0.37	0.712	-8.278521	5.654635
PayorCnt_~16	2.86948	3.245212	0.88	0.377	-3.491019	9.229979
PayorCnt_~17	-10.31685	1.518243	-6.80	0.000	-13.29255	-7.341145
PayorCnt_~18	-10.29641	2.78887	-3.69	0.000	-15.76249	-4.830325
PayorCnt_~19	-2.402616	2.776616	-0.87	0.387	-7.844683	3.03945
PayorCnt_~20	-.9940212	3.383202	-0.29	0.769	-7.624976	5.636933
PayorCnt_~21	6.099994	3.559445	1.71	0.087	-.8763891	13.07638
PayorCnt_~22	-.8573344	2.429452	-0.35	0.724	-5.618973	3.904304
PayorCnt_~23	12.02765	7.785348	1.54	0.122	-3.231352	27.28665
PayorCnt_~24	-6.829725	5.425269	-1.26	0.208	-17.46306	3.803606
PayorCnt_~25	-10.34436	2.795823	-3.70	0.000	-15.82407	-4.864645
PayorCnt_~26	-13.45042	1.919116	-7.01	0.000	-17.21182	-9.689025
PayorCnt_~27	2.347385	3.989875	0.59	0.556	-5.472627	10.1674
PayorCnt_~28	-4.192323	5.769322	-0.73	0.467	-15.49999	7.115339
PayorCnt_~29	-11.87437	2.908334	-4.08	0.000	-17.5746	-6.174141
PayorCnt_~30	-3.253117	1.464554	-2.22	0.026	-6.12359	-.3826435
PayorCnt_~31	5.028099	6.442243	0.78	0.435	-7.598466	17.65466
PayorCnt_~32	-.595708	2.716562	-0.22	0.826	-5.920072	4.728656
PayorCnt_~33	-4.961622	4.936582	-1.01	0.315	-14.63715	4.7139
PayorCnt_~35	-14.97932	2.790757	-5.37	0.000	-20.4491	-9.509536
PayorCnt_~37	-3.080967	1.567283	-1.97	0.049	-6.152786	-.0091478
PayorCnt_~38	5.309358	2.133531	2.49	0.013	1.127714	9.491003
PayorCnt_~39	-18.04015	5.623315	-3.21	0.001	-29.06165	-7.018656
PayorCnt_~41	-17.35489	1.791882	-9.69	0.000	-20.86691	-13.84286
PayorCnt_~42	-.9413851	1.296619	-0.73	0.468	-3.482711	1.599941
PayorCnt_~43	-10.91984	2.906882	-3.76	0.000	-16.61723	-5.222459
PayorCnt_~44	6.417277	7.399322	0.87	0.386	-8.085128	20.91968
PayorCnt_~46	-14.9459	1.904227	-7.85	0.000	-18.67811	-11.21368
PayorCnt_~50	1.422211	1.633018	0.87	0.384	-1.778444	4.622867
PayorCnt_B~w	1.573629	3.460173	0.45	0.649	-5.208186	8.355443
FiscalY~2001	1.960803	1.424314	1.38	0.169	-.8308015	4.752407
FiscalY~2002	2.139524	1.185957	1.80	0.071	-.1849083	4.463957
FiscalY~2003	.336907	.9999638	0.34	0.736	-1.622986	2.2968
FiscalY~2004	.8668369	.9502951	0.91	0.362	-.9957074	2.729381
FiscalY~2005	-.1619422	.8212768	-0.20	0.844	-1.771615	1.447731
_cons	-847.273	468.9786	-1.81	0.071	-1766.454	71.90819
sigma_u	6.1721104					
sigma_e	8.9419143					
rho	.3226942	(fraction of variance due to u_i)				

Herfindahl Hirschman Index: Model 6

Model 6: payor_count >=2 binary control for size, time, and payor count. The binary variables for payor_count were (3-50), with 50 and above in one variable. Standard Error was adjusted for clustering in the model.

```
> FiscalYear_Bi_2003 FiscalYear_Bi_2004 FiscalYear_Bi_2005, re vce(cluster  prvdr_num)
note: PayorCnt_Bi_34 dropped because of collinearity
note: PayorCnt_Bi_36 dropped because of collinearity
note: PayorCnt_Bi_40 dropped because of collinearity
note: PayorCnt_Bi_45 dropped because of collinearity
note: PayorCnt_Bi_47 dropped because of collinearity
note: PayorCnt_Bi_48 dropped because of collinearity
note: PayorCnt_Bi_49 dropped because of collinearity

Random-effects GLS regression                   Number of obs      =      2118
Group variable: prvdr_num                       Number of groups   =       847

R-sq:  within  = 0.1075                         Obs per group: min =         1
       between = 0.0886                                        avg =       2.5
       overall = 0.1120                                        max =         7

Random effects u_i ~ Gaussian                   Wald chi2(52)      =         .
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =         .

                             (Std. Err. adjusted for 847 clusters in prvdr_num)
```

real_fcf2	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
hhi	-2.730321	1.302367	-2.10	0.036	-5.282913	-.177728
Bi_Hosp_Si~2	.1470463	.7125235	0.21	0.836	-1.249474	1.543567
Bi_Hosp_Si~3	3.102911	1.240283	2.50	0.012	.6720017	5.533821
Bi_Hosp_Si~4	7.153569	2.722199	2.63	0.009	1.818156	12.48898
Bi_Hosp_Si~5	3.886303	3.412474	1.14	0.255	-2.802023	10.57463
Capital_Co~y	.9500599	.5076786	1.87	0.061	-.0449718	1.945092
Capex_2	-1.59e-07	3.43e-08	-4.64	0.000	-2.27e-07	-9.19e-08
LnTA	-2.281873	.3415583	-6.68	0.000	-2.951315	-1.612431
Leverage	-.5695055	.4799009	-1.19	0.235	-1.510094	.371083
Percent_Go~s	-4.015043	2.302029	-1.74	0.081	-8.526937	.4968509
Net_Marg	22.02755	8.467436	2.60	0.009	5.431683	38.62342
FiscalYear~d	.4197049	.1803349	2.33	0.020	.0662551	.7731547
PayorCnt_~_3	-.7944862	.6149912	-1.29	0.196	-1.999847	.4108744
PayorCnt_~_4	.7039098	.7504156	0.94	0.348	-.7668777	2.174697
PayorCnt_~_5	-.8767582	1.009993	-0.87	0.385	-2.856307	1.102791
PayorCnt_~_6	-1.213739	1.157262	-1.05	0.294	-3.481931	1.054453
PayorCnt_~_7	-.9846462	1.255808	-0.78	0.433	-3.445984	1.476692
PayorCnt_~_8	-1.105027	1.464367	-0.75	0.450	-3.975132	1.765079
PayorCnt_~_9	1.151586	1.730659	0.67	0.506	-2.240443	4.543615
PayorCnt_~10	-2.473704	1.881198	-1.31	0.189	-6.160784	1.213375
PayorCnt_~11	-.8499334	1.992054	-0.43	0.670	-4.754287	3.054421
PayorCnt_~12	-3.440894	2.655737	-1.30	0.195	-8.646043	1.764255
PayorCnt_~13	-7.031105	3.463672	-2.03	0.042	-13.81978	-.2424331
PayorCnt_~14	.3869989	1.778249	0.22	0.828	-3.098304	3.872302
PayorCnt_~15	-2.276258	3.677803	-0.62	0.536	-9.484621	4.932104
PayorCnt_~16	1.882334	3.150051	0.60	0.550	-4.291652	8.056321
PayorCnt_~17	-11.27527	1.470685	-7.67	0.000	-14.15776	-8.39278
PayorCnt_~18	-11.36945	2.931735	-3.88	0.000	-17.11554	-5.623354
PayorCnt_~19	-2.876996	2.739945	-1.05	0.294	-8.24719	2.493198
PayorCnt_~20	-2.604937	3.517756	-0.74	0.459	-9.499612	4.289737
PayorCnt_~21	5.609239	3.577598	1.57	0.117	-1.402725	12.6212
PayorCnt_~22	-1.237881	2.242157	-0.55	0.581	-5.632429	3.156667
PayorCnt_~23	12.09672	7.622352	1.59	0.113	-2.842812	27.03626
PayorCnt_~24	-7.166011	6.014396	-1.19	0.233	-18.95401	4.621989
PayorCnt_~25	-11.05028	2.657943	-4.16	0.000	-16.25975	-5.840806
PayorCnt_~26	-13.80567	1.716733	-8.04	0.000	-17.1704	-10.44093
PayorCnt_~27	1.758303	3.784448	0.46	0.642	-5.659078	9.175684
PayorCnt_~28	-5.324272	4.627197	-1.15	0.250	-14.39341	3.744868
PayorCnt_~29	-13.02842	2.600624	-5.01	0.000	-18.12555	-7.931293
PayorCnt_~30	-4.28706	1.349263	-3.18	0.001	-6.931566	-1.642553
PayorCnt_~31	4.159428	5.707523	0.73	0.466	-7.027112	15.34597
PayorCnt_~32	-.2357601	2.581991	-0.09	0.927	-5.29637	4.82485
PayorCnt_~33	-5.111546	5.220263	-0.98	0.327	-15.34307	5.119982
PayorCnt_~35	-16.09842	2.354722	-6.84	0.000	-20.71359	-11.48325
PayorCnt_~37	-3.729736	2.464409	-1.51	0.130	-8.559888	1.100416
PayorCnt_~38	4.376198	1.987516	2.20	0.028	.4807388	8.271657
PayorCnt_~39	-19.74678	5.664866	-3.49	0.000	-30.84971	-8.643845
PayorCnt_~41	-18.19559	1.566908	-11.61	0.000	-21.26667	-15.12451
PayorCnt_~42	-1.811335	1.164596	-1.56	0.120	-4.093901	.4712298
PayorCnt_~43	-9.844519	3.6828	-2.67	0.008	-17.06267	-2.626365
PayorCnt_~44	5.820901	7.320395	0.80	0.427	-8.52681	20.16861
PayorCnt_~46	-16.51599	1.689513	-9.78	0.000	-19.82738	-13.20461
PayorCnt_~50	.0405295	1.841856	0.02	0.982	-3.569442	3.650501
PayorCnt_B~w	.8178675	3.431579	0.24	0.812	-5.907904	7.543639
FiscalY~2001	2.753071	1.029123	2.68	0.007	.7360265	4.770115
FiscalY~2002	1.233776	.9010122	1.37	0.171	-.5321753	2.999728
FiscalY~2003	-.3361836	.7541581	-0.45	0.656	-1.814306	1.141939
FiscalY~2004	.5043008	.746121	0.68	0.499	-.9580695	1.966671
FiscalY~2005	.3140344	.6825318	0.46	0.645	-1.023703	1.651772
_cons	-794.3081	361.6525	-2.20	0.028	-1503.134	-85.48231
sigma_u	6.2224535					
sigma_e	9.0789247					
rho	.31960603	(fraction of variance due to u_i)				

Herfindahl Hirschman Index: Model 7

Model 7: payor_count >=1 binary control for size, time, and payor count. The binary variables for payor_count were (2-50), with 50 and above in one variable. Standard Error was adjusted for clustering in the model.

```
. xtreg real_fcf2 hhi  Bi_Hosp_Size_2 Bi_Hosp_Size_3 Bi_Hosp_Size_4 Bi_Hosp_Size_5 Capital_Cost_Proxy Capex_2 LnTA Leverag
> e Percent_Gov_Business Net_Marg FiscalYear_Reported PayorCnt_Bi_2 PayorCnt_Bi_3 PayorCnt_Bi_4 PayorCnt_Bi_5 PayorCnt_Bi_
> 6 PayorCnt_Bi_7 PayorCnt_Bi_8 PayorCnt_Bi_9 PayorCnt_Bi_10 PayorCnt_Bi_11 PayorCnt_Bi_12 PayorCnt_Bi_13 PayorCnt_Bi_14 P
> ayorCnt_Bi_15 PayorCnt_Bi_16 PayorCnt_Bi_17 PayorCnt_Bi_18 PayorCnt_Bi_19 PayorCnt_Bi_20 PayorCnt_Bi_21 PayorCnt_Bi_22 P
> ayorCnt_Bi_23 PayorCnt_Bi_24 PayorCnt_Bi_25 PayorCnt_Bi_26 PayorCnt_Bi_27 PayorCnt_Bi_28 PayorCnt_Bi_29 PayorCnt_Bi_30 P
> ayorCnt_Bi_31 PayorCnt_Bi_32 PayorCnt_Bi_33 PayorCnt_Bi_34 PayorCnt_Bi_35 PayorCnt_Bi_36 PayorCnt_Bi_37 PayorCnt_Bi_38 P
> ayorCnt_Bi_39 PayorCnt_Bi_40 PayorCnt_Bi_41 PayorCnt_Bi_42 PayorCnt_Bi_43 PayorCnt_Bi_44 PayorCnt_Bi_45 PayorCnt_Bi_46 P
> ayorCnt_Bi_47 PayorCnt_Bi_48 PayorCnt_Bi_49 PayorCnt_Bi_50 PayorCnt_Bi_Other_New FiscalYear_Bi_2001 FiscalYear_Bi_2002 F
> iscalYear_Bi_2003 FiscalYear_Bi_2004 FiscalYear_Bi_2005, re vce(cluster  prvdr_num)
note: PayorCnt_Bi_34 dropped because of collinearity
note: PayorCnt_Bi_36 dropped because of collinearity
note: PayorCnt_Bi_40 dropped because of collinearity
note: PayorCnt_Bi_45 dropped because of collinearity
note: PayorCnt_Bi_47 dropped because of collinearity
note: PayorCnt_Bi_48 dropped because of collinearity
note: PayorCnt_Bi_49 dropped because of collinearity

Random-effects GLS regression                   Number of obs      =      3503
Group variable: prvdr_num                       Number of groups   =      1243

R-sq:  within  = 0.0747                         Obs per group: min =         1
       between = 0.0964                                        avg =       2.8
       overall = 0.1001                                        max =         7

Random effects u_i ~ Gaussian                   Wald chi2(53)      =         .
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =         .

                           (Std. Err. adjusted for 1243 clusters in prvdr_num)
```

real_fcf2	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
hhi	-2.819972	1.254893	-2.25	0.025	-5.279517	-.3604268
Bi_Hosp_Si~2	.4140993	.5592943	0.74	0.459	-.6820973	1.510296
Bi_Hosp_Si~3	2.801098	.9932411	2.82	0.005	.8543812	4.747815
Bi_Hosp_Si~4	6.388939	2.080755	3.07	0.002	2.310734	10.46714
Bi_Hosp_Si~5	4.29351	3.078214	1.39	0.163	-1.739679	10.3267
Capital_Co~y	.7571171	.4975404	1.52	0.128	-.2180441	1.732278
Capex_2	-1.74e-07	3.05e-08	-5.71	0.000	-2.34e-07	-1.14e-07
LnTA	-2.102105	.2642452	-7.96	0.000	-2.620016	-1.584194
Leverage	-.6644917	.4207146	-1.58	0.114	-1.489077	.1600938
Percent_Go~s	-5.301605	1.735829	-3.05	0.002	-8.703768	-1.899442
Net_Marg	22.11875	6.168397	3.59	0.000	10.02891	34.20859
FiscalYear~d	.2060823	.1209313	1.70	0.088	-.0309386	.4431033
PayorCnt_~_2	-.2881746	.4902564	-0.59	0.557	-1.249059	.6727102
PayorCnt_~_3	-1.040766	.6037075	-1.72	0.085	-2.224011	.1424786
PayorCnt_~_4	.5241562	.7714336	0.68	0.497	-.9878259	2.036138
PayorCnt_~_5	-.9996961	1.020951	-0.98	0.327	-3.000723	1.001331
PayorCnt_~_6	-1.431907	1.214966	-1.18	0.239	-3.813196	.9493825
PayorCnt_~_7	-1.011645	1.253705	-0.81	0.420	-3.468862	1.445572
PayorCnt_~_8	-1.164051	1.442162	-0.81	0.420	-3.990636	1.662535
PayorCnt_~_9	1.491006	1.751595	0.85	0.395	-1.942057	4.924069
PayorCnt_~10	-2.497127	1.7619	-1.42	0.156	-5.950389	.9561342
PayorCnt_~11	-1.198571	2.109234	-0.57	0.570	-5.332594	2.935452
PayorCnt_~12	-3.425387	2.524934	-1.36	0.175	-8.374166	1.523392
PayorCnt_~13	-6.342086	3.558726	-1.78	0.075	-13.31706	.6328885
PayorCnt_~14	.5879253	1.939563	0.30	0.762	-3.213548	4.389398
PayorCnt_~15	-2.11841	3.640458	-0.58	0.561	-9.253576	5.016757
PayorCnt_~16	1.817993	3.000647	0.61	0.545	-4.063166	7.699153
PayorCnt_~17	-12.40509	1.325356	-9.36	0.000	-15.00274	-9.807439
PayorCnt_~18	-11.38905	2.672264	-4.26	0.000	-16.6266	-6.151514
PayorCnt_~19	-3.690554	2.699331	-1.37	0.172	-8.981145	1.600037
PayorCnt_~20	-1.98451	3.894976	-0.51	0.610	-9.618522	5.649503
PayorCnt_~21	5.51943	3.794629	1.45	0.146	-1.917905	12.95677
PayorCnt_~22	-1.473535	2.240974	-0.66	0.511	-5.865763	2.918694
PayorCnt_~23	12.53385	8.12399	1.54	0.123	-3.388879	28.45657
PayorCnt_~24	-6.636527	6.459553	-1.03	0.304	-19.29702	6.023964
PayorCnt_~25	-10.92357	2.908792	-3.76	0.000	-16.6247	-5.222444
PayorCnt_~26	-13.76232	1.55347	-8.86	0.000	-16.80707	-10.71758
PayorCnt_~27	1.034251	3.954578	0.26	0.794	-6.716579	8.785081
PayorCnt_~28	-6.258881	4.796827	-1.30	0.192	-15.66049	3.142728
PayorCnt_~29	-15.70899	2.274833	-6.91	0.000	-20.16758	-11.2504
PayorCnt_~30	-4.095672	1.213186	-3.38	0.001	-6.473474	-1.717871
PayorCnt_~31	3.204792	4.886873	0.66	0.512	-6.373304	12.78289
PayorCnt_~32	.0860434	2.145022	0.04	0.968	-4.118122	4.290209
PayorCnt_~33	-5.921308	6.057179	-0.98	0.328	-17.79316	5.950546
PayorCnt_~35	-17.18462	1.994532	-8.62	0.000	-21.09384	-13.27541
PayorCnt_~37	-3.892487	2.390762	-1.63	0.103	-8.578294	.7933202
PayorCnt_~38	4.138105	2.188148	1.89	0.059	-.1505857	8.426796
PayorCnt_~39	-19.3586	5.440825	-3.56	0.000	-30.02242	-8.694781
PayorCnt_~41	-17.46933	1.233328	-14.16	0.000	-19.88661	-15.05205
PayorCnt_~42	-2.35852	.9475945	-2.49	0.013	-4.215771	-.5012687
PayorCnt_~43	-9.453109	4.411611	-2.14	0.032	-18.09971	-.8065105
PayorCnt_~44	5.265068	7.247503	0.73	0.468	-8.939777	19.46991
PayorCnt_~46	-15.31294	1.426433	-10.74	0.000	-18.1087	-12.51718
PayorCnt_~50	-.6303428	2.007579	-0.31	0.754	-4.565125	3.30444
PayorCnt_B~w	.3219108	3.425352	0.09	0.925	-6.391656	7.035478
FiscalY~2001	1.469391	.6327748	2.32	0.020	.2291753	2.709607
FiscalY~2002	.8640418	.620855	1.39	0.164	-.3528116	2.080895
FiscalY~2003	.2185834	.555177	0.39	0.694	-.8695436	1.30671
FiscalY~2004	.7243343	.5626771	1.29	0.198	-.3784925	1.827161
FiscalY~2005	.9084199	.5480397	1.66	0.097	-.1657182	1.982558
_cons	-368.4784	242.412	-1.52	0.128	-843.5973	106.6404
sigma_u	5.4285936					
sigma_e	9.2708149					
rho	.25533037	(fraction of variance due to u_i)				

Lerner's Index: Model 1

Model 1: DV= Lerner's Index   IV= Real FCF

Binary control for size and time. Standard Error was adjusted for clustering in the model.

```
. xtreg real_fcf2  li  Bi_Hosp_Size_2 Bi_Hosp_Size_3 Bi_Hosp_Size_4 Bi_Hosp_Size_5 Capital_Cost_Proxy C
> apex_2 LnTA Leverage Percent_Gov_Business Net_Marg FiscalYear_Reported  FiscalYear_Bi_2001 FiscalYear
> _Bi_2002 FiscalYear_Bi_2003 FiscalYear_Bi_2004 FiscalYear_Bi_2005, re vce(cluster  prvdr_num)

Random-effects GLS regression                   Number of obs      =      1254
Group variable: prvdr_num                       Number of groups   =       453

R-sq:  within  = 0.1611                         Obs per group: min =         1
       between = 0.2383                                        avg =       2.8
       overall = 0.2325                                        max =         7

Random effects u_i ~ Gaussian                   Wald chi2(17)      =    145.80
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000

                             (Std. Err. adjusted for 453 clusters in prvdr_num)
```

real_fcf2	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
li	-.0427535	.009118	-4.69	0.000	-.0606245	-.0248824
Bi_Hosp_Si~2	1.414423	3.945032	0.36	0.720	-6.317698	9.146544
Bi_Hosp_Si~3	-8.280589	6.171817	-1.34	0.180	-20.37713	3.815949
Bi_Hosp_Si~4	-33.41622	13.25473	-2.52	0.012	-59.39502	-7.437424
Bi_Hosp_Si~5	161.795	82.78411	1.95	0.051	-.4588348	324.0489
Capital_Co~y	.7287221	6.387819	0.11	0.909	-11.79117	13.24862
Capex_2	-3.04e-07	1.29e-07	-2.35	0.019	-5.58e-07	-5.08e-08
LnTA	-4.133715	1.977951	-2.09	0.037	-8.010427	-.2570026
Leverage	.031512	1.941936	0.02	0.987	-3.774613	3.837636
Percent_Go~s	1.362973	11.7487	0.12	0.908	-21.66406	24.39001
Net_Marg	120.0879	24.02219	5.00	0.000	73.00528	167.1705
FiscalYear~d	-.8164543	1.355821	-0.60	0.547	-3.473814	1.840905
FiscalY~2001	1.560297	9.763459	0.16	0.873	-17.57573	20.69633
FiscalY~2002	-3.083524	5.904363	-0.52	0.601	-14.65586	8.488815
FiscalY~2003	-5.84609	4.49839	-1.30	0.194	-14.66277	2.970593
FiscalY~2004	.8560525	3.797454	0.23	0.822	-6.586821	8.298926
FiscalY~2005	1.404589	3.300931	0.43	0.670	-5.065117	7.874295
_cons	1711.312	2714.653	0.63	0.528	-3609.311	7031.935
sigma_u	28.151361					
sigma_e	34.346331					
rho	.40184127	(fraction of variance due to u_i)				

Lerner's Index Model 2

Model 2: DV= Lerner's Index   IV= Net Income from Services to Patients

Binary control for size and time. Standard Error was adjusted for clustering in the model.

```
. xtreg  net_income_from_svc_to_patients2 li  Bi_Hosp_Size_2 Bi_Hosp_Size_3 Bi_Hosp_Size_4 Bi_Hosp_Size
> _5 Capital_Cost_Proxy Capex_2 LnTA Leverage Percent_Gov_Business Net_Marg FiscalYear_Reported  Fiscal
> Year_Bi_2001 FiscalYear_Bi_2002 FiscalYear_Bi_2003 FiscalYear_Bi_2004 FiscalYear_Bi_2005, re vce(clus
> ter  prvdr_num)

Random-effects GLS regression                   Number of obs      =      1269
Group variable: prvdr_num                       Number of groups   =       454

R-sq:  within  = 0.3249                         Obs per group: min =         1
       between = 0.2649                                        avg =       2.8
       overall = 0.2776                                        max =         7

Random effects u_i ~ Gaussian                   Wald chi2(17)      =     82.53
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000

                             (Std. Err. adjusted for 454 clusters in prvdr_num)
```

net_income~2	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
li	.0039882	.0016261	2.45	0.014	.000801	.0071754
Bi_Hosp_Si~2	-.2099495	1.412734	-0.15	0.882	-2.978857	2.558958
Bi_Hosp_Si~3	5.617467	2.907799	1.93	0.053	-.0817148	11.31665
Bi_Hosp_Si~4	-10.66408	8.077534	-1.32	0.187	-26.49576	5.167596
Bi_Hosp_Si~5	-121.1134	124.365	-0.97	0.330	-364.8644	122.6375
Capital_Co~y	-.2136986	1.98724	-0.11	0.914	-4.108618	3.681221
Capex_2	-1.07e-07	4.81e-08	-2.23	0.026	-2.01e-07	-1.30e-08
LnTA	-.4059566	.9876097	-0.41	0.681	-2.341636	1.529723
Leverage	-1.013522	1.495551	-0.68	0.498	-3.944748	1.917705
Percent_Go~s	5.396817	6.776293	0.80	0.426	-7.884473	18.67811
Net_Marg	223.1625	48.27511	4.62	0.000	128.545	317.78
FiscalYear~d	-.0479383	.7643484	-0.06	0.950	-1.546034	1.450157
FiscalY~2001	.8914405	3.58207	0.25	0.803	-6.129287	7.912168
FiscalY~2002	.6661878	3.126132	0.21	0.831	-5.460919	6.793294
FiscalY~2003	.3996427	2.446591	0.16	0.870	-4.395588	5.194873
FiscalY~2004	1.476432	2.061085	0.72	0.474	-2.563221	5.516085
FiscalY~2005	.3397996	1.308645	0.26	0.795	-2.225097	2.904696
_cons	96.55552	1532.167	0.06	0.950	-2906.437	3099.548
sigma_u	25.106324					
sigma_e	14.535562					
rho	.74895433	(fraction of variance due to u_i)				