The Effects of Market Concentration and Market Power on Cost Structure

This study investigates the association between market structure and cost structure using a national sample of U.S. hospitals. Cost structure, which is difficult to alter in the short run, determines operating risk; therefore, it is important to understand factors that influence managerial choices on cost structure. Market structure is a potentially important determinant of cost structure because managers' investment decisions are influenced by how the firm interacts with rival firms and suppliers (e.g., Caballero 1991; Grenadier 2002; Novy-Marx 2007). Yet, market structure has received little attention from accounting researchers. We measure market structure with market concentration and market power. Market concentration, which is the same for all market participants, reflects the overall competitiveness of the market. Market power, which varies by market participant, captures each market participant's competitive standing relative to the market. Results indicate that: 1) hospitals in more concentrated markets adopt more rigid cost structures, 2) hospitals with market power adopt more elastic cost structures, and 3) market power magnifies the positive relation between demand uncertainty and cost elasticity. The market concentration result is consistent with the premise that higher margins in more concentrated markets provide a larger incentive for these hospitals to invest. The market power results suggest that hospitals with market power face lower transaction costs, which enable them to maintain more elastic cost structures and alter their cost structures more easily in response to changes in demand uncertainty.

The Effects of Market Concentration and Market Power on Cost Structure

1. INTRODUCTION

This study investigates the association between market structure and cost structure using a national sample of acute-care hospitals in the United States. Cost structure is measured by the degree to which costs change in response to a contemporaneous change in volume, also referred to as cost elasticity. Cost structure, which is difficult to alter in the short run, determines operating risk; therefore, it is important to understand factors that influence managerial choices on cost structure. Market structure is a potentially important determinant of cost structure because managers' investment decisions are influenced by how the firm interacts with rival firms and suppliers (e.g., Caballero 1991; Grenadier 2002; Novy-Marx 2007). Two important characteristics of a market are the degree of competition among market participants and whether some participants possess market power or dominance (Keeler et al. 1999). Market concentration, which is the same for all market participants, measures the overall competitiveness of the market. Market power, which varies by market participant, captures each market participant's competitive standing relative to the market. Extant research on cost structure determinants focuses on risk, particularly the risk arising from demand uncertainty (Kallapur and Eldenburg 2005; Banker et al. 2014; Holzhacker et. al 2015a, 2015b; Chen et al. 2021). We build upon this research by investigating whether cost structure is associated with two previously unexamined aspects of a firm's external environment, market concentration and market power.

Research in accounting has yet to address the effects of market concentration on cost structure; however, the relation between market concentration and investment has long been of interest to economists because the future economic benefit a firm gains from current investments in technology, equipment, and capacity depends upon the actions of its competitors. The theoretical literature on market concentration and investment is mixed (Patel and Seegert 2020). Schumpter (1942) first proposed that

competition can deter investment by reducing future rents in the industry, suggesting a more variable cost structure in more competitive markets. Alternatively, one branch of real options research contends that firms in highly competitive markets must make investments before competitors to increase the likelihood of a positive return on projects (Caballero 1991; Grenadier 2002; Kogan 2001; Trigeoris 1996), resulting in more rigid cost structures. Still, other real options research argues that competition does not necessarily erode a competitor's option to delay investment (Leahy 1993; Dixit and Pindyck 1994; Novy-Marx 2005). These differing predictions amplify the importance of empirical evidence from industries with well-defined markets.

Market power is a feature of market structure that is distinct from market concentration (Keeler, Melnick, Zwanziger 1999). Firms that have a large market share relative to other market participants have market power. We expect that firms with market power in the provision of hospital services are likely to be the dominant purchasers of specialized goods, services, and labor in a geographic area, and thus exercise monopsony power. Transaction cost economic theory (TCE) suggests that monopsony power has the potential to reduce transaction costs for the buyer by reducing the likelihood that suppliers engage in opportunistic behavior. Lower transaction costs facilitate outsourcing and leasing arrangements and the use of short-term labor contracts, all of which reduce fixed investment (Holzhacker et al. 2015b). Therefore, TCE suggests that firms with market power will have a more elastic cost structure.

We also investigate whether market power influences the degree to which demand uncertainty affects cost structure because the demand uncertainty–cost elasticity relationship is an important topic in recent cost structure studies (Banker et al. 2014; Holzhacker et al. 2015b; Chen et al. 2021). Holzhacker et al. (2015b) find a positive relation between demand uncertainty and cost elasticity in California hospitals, suggesting that firms facing higher demand risk prefer a *more* elastic cost structure. We expect

that it will be less costly for hospitals with market power to alter their cost structures in response to changes in demand uncertainty because they will incur lower transactions cost when making resource adjustments. Accordingly, we predict that demand volatility will have a larger impact on cost elasticity for hospitals with market power.

We investigate the effects of market concentration and market power on cost structure using data obtained from Medicare Cost Reports filed by over 2,000 U.S. acute-care hospitals from 2011 to 2015. The U.S. hospital industry is an ideal setting for investigating the effects of market concentration and market power on cost structure because acute-care hospitals offer relatively standardized services in well-defined markets determined by geographic proximity. This setting reduces the inherent measurement error associated with identification of firms' product markets when employing a diverse sample of large publicly traded firms offering differentiated products. It also reduces the likelihood that results will be confounded by differences in technology, regulation, or other factors (Balakrishnan et al. 2014). We measure market concentration with the Herfindahl-Hirschman Index (HHI) of each hospital referral region as defined in the Dartmouth Atlas of Health Care. Following Keeler et al. (1999), market power is determined by comparing a hospital's market share to the (HHI) of the region to identify the relative regional market power of a hospital. We follow prior studies to model cost elasticity (e.g., Holzhacker et al. 2015a, 2015b; Kallapur and Eldenburg 2005).

Multivariate OLS regression results indicate that: 1) hospitals in more concentrated markets adopt more rigid cost structures, 2) hospitals with market power adopt more elastic cost structures, and 3) market power magnifies the positive relation between demand uncertainty and cost elasticity. The market concentration result is consistent with the premise that higher margins in more concentrated markets provide a larger incentive for these hospitals to invest. The market power result suggests that the lower transactions costs incurred by hospitals with monopsony power over suppliers enables them to

maintain more elastic cost structures and alter their cost structures more easily in response to changes in demand uncertainty.

This study makes several contributions to the extant literature on cost structure and investment by documenting direct and moderating relationships between market structure and cost structure (Banker and Hughes 1994; Gox 2002; Grenadier 2002; Kallapur and Eldenburg 2005; Novy-Marx 2007; Banker et al. 2014; Holzhacker et al. 2015a, 2015b; Chen et al. 2021). First, we extend cost structure research by providing evidence that market concentration and market power are distinct, and important, considerations in managers' cost structure decisions. This finding is also relevant to research in finance, which provides competing predictions on the relation between competition and investment (Caballero 1991; Trigeoris 1996; Kogan 2001; Grenadier 2002; Novy-Marx 2007). Second, to our knowledge, this is the first study to consider the effects of supplier relations on cost structure. As such, this research complements a current study by Chen et al. (2021) investigating the bullwhip effect. Third, we identify market power as an important moderator of the demand uncertainty–cost elasticity relationship, and thus extend studies that investigate the effects of demand risk (Banker et al. 2014; Holzhacker et al. 2015a, 2015b; Chen et al. 2021). In particular, we find no direct relation between demand uncertainty and cost elasticity for hospitals without market power in a national sample of U.S. hospitals. Using data from California hospitals, (Holzhacker et al. 2015a) find a strong positive relation positive relation between demand uncertainty and cost elasticity, but do not control for market power.

Finally, this study is timely in that it contributes to the literature on hospital mergers and acquisitions, as well as the debate over cost efficiency in the U.S. healthcare system. Market structure is of particular interest in the hospital industry because there has been significant industry consolidation over the past two decades (Paul, Quosigk and MacDonald 2016). Given the economic significance of the U.S. hospital industry (Eldenburg et al. 2015; Vansant 2016), it is important to understand how

increased market concentration and market power resulting from consolidation affect cost structure in hospitals.

Section 2 contains background on hospitals markets and cost structure. Section 3 presents hypotheses, and section 4 describes the data and empirical models. Results are contained in section 5 and conclusions are presented in section 6.

2. BACKGROUND ON U.S. HOSPITAL AND COST STRUCTURE

2.1. U.S. Hospital Markets

In the U.S., insurers typically act as intermediaries between hospitals and patients. Hospitals contract with insurers (payors) and insurers contract with individuals directly or through individuals' employers. Hospital demand depends upon the number of contracts a hospital has with insurers and the number of individuals each insurance plan covers. This can lead to large swings in demand if an insurer removes a hospital from its network of providers, or an employer switches insurers. Many insurers contract with multiple hospitals in a region, giving patients some degree of choice. Physicians influence patient choice by referring patients to a hospital at which they, or another physician, has staff privileges.[1] Thus, hospitals can attempt to increase market share by adding skilled physicians to their staff and/or investing in technologies in order to provide higher levels of patient care and specialized services.

2.2 Cost Structure

Cost structure is determined by a firm's relative portion of variable and fixed costs. Cost structure is measured by the degree to which costs change in response to a contemporaneous change in volume, referred to as cost elasticity. Cost structure reflects managers' investment decisions made prior to observing realized demand and price levels (Banker et al. 2014). For two firms of a similar size and

[1] Staff privileges enable the physician to operate on or otherwise treat patients at a hospital, even though the physician is not employed by the hospital. The physician bills the patient separately from the hospital for the services he or she performed.

operations, the firm with the more elastic cost structure will experience a smaller change in profit for the same change in volume. Therefore, a firm with a more elastic cost structure has lower operating risk (Holzhacker et al. 2015b). Given the relation between cost structure and operating risk, both accounting and finance researchers investigate managers' decisions to invest in the face of uncertainty.

Accounting research models the effect of investments in capacity, which in turn, affect cost structure (Banker and Hughes 1994, Gox 2002, Banker et al. 2014). Managers choose capacity levels prior to demand realizations. Investments in capacity are fixed in the sense that they are incurred even when demand is low. Thus, capacity choices affect the mix of variable and fixed costs. When demand is high, capacity can only be expanded at a cost that exceeds the normal cost of acquiring the resources in advance of usage. In choosing cost structures, managers must balance the expected sunk cost of idle capacity in the case of low demand against penalties for procuring capacity on short notice (Banker and Hughes 1994) or the opportunity cost of lost sales (Göx 2002). Thus, demand volatility is a critical factor in cost structure decisions. Banker et al. (2014) demonstrate analytically that managers facing higher demand risk will prefer a *less* elastic short-run cost structure because high demand volatility results in a higher likelihood of unusually high, as well as low, demand. Empirical evidence from publicly traded, for-profit firms supports their model. However, in a sample of California hospitals, Holzhacker et al. (2015b) find that demand uncertainty is positively associated with cost elasticity. Holzhacker et al. (2015b) attribute the difference in findings to the nature of the samples.

Research in finance on real options theory (ROT) also has important implications for cost structure with regard to demand volatility (Kallapur and Eldenburg 2005). ROT characterizes the opportunity to invest in a project, *i.e.,* incur fixed costs, as a real option. Managers decide between committing fixed costs for projects now and postponing expenditures to the future (Dixit and Pindyck 1994). Since the future value of an asset is uncertain, there is an opportunity cost to investing today,

referred to as the "option to wait." The option to wait before investing is a real (American) call option (McDonald and Siegel 1986; Arya and Glover 2001). By waiting, uncertainty regarding future states is resolved, thus reducing the potential for a bad outcome. The value of the option to delay investment is greatest when profit uncertainty is highest and managers, through their actions, can affect outcomes. Even with moderate levels of uncertainty, the opportunity cost can be quite large (McDonald and Siegel 1986). Empirical finance studies generally find that higher output price volatility is associated with reduced investment in projects (e.g., Downing and Wallace 2001; Moel and Tufano 2002; Cunningham 2006, 2007; Bulan et al. 2009).

3. HYPOTHESES

Market concentration and market power are often used interchangeably. Following Keeler et al. (1999), we distinguish between the competitiveness of the market (i.e., market concentration) and an individual firm's competitive standing relative to the market (i.e., market power). Market concentration, which takes the same value for each hospital in a market, is measured with the sum of squares of each hospital's market share. Market power, which varies by hospital, is measured by comparing an individual hospital's market share to the market concentration of the market. We differentiate between these two aspects of competition because we expect that they will have different implications for managers' cost structure decisions.

3.1 Market Concentration and Cost Structure.

Research in accounting has yet to address the effects of market concentration on cost structure; however, the relation between market concentration and investment has long been of interest to economists (Patel and Seegert 2020).[2] One outcome of this research that is relevant to hospital cost

[2] A major branch of this research investigates the relation between competition and innovation, with mixed results. Studies model investments in research and development (R&D) and vary the degree to which the newly invented technology can be appropriated by competitors. See Gilbert (2006) for a review of this literature. Hospitals generally invest in existing technologies, updating facilities, or

structure is the argument that competition can deter investment by reducing future rents in the industry (Schumpeter 1942). The incentive to invest is the difference between the rents a firms can earn if it invests and the rents it earns if it does not invest. Hospitals can charge higher prices in more concentrated markets (Sloan 2000; Gaynor and Town 2012; Gaynor, Ho, and Town 2015); therefore, they can earn greater rewards from investment that attracts additional patients who are not covered by Medicare and Medicaid.[3] This line of reasoning suggests that hospitals in more concentrated markets will have more rigid cost structures.

Alternatively, hospitals in less concentrated markets may have more rigid cost structures if they engage in nonprice competition to a greater degree than hospitals in more concentrated markets. Nonprice competition is prevalent in the hospital industry because the government reimburses hospitals for services provided to Medicare and Medicaid patients at fixed rates. Medicare and Medicaid accounted for 41.4 percent of all payments to acute care hospitals in 2018 (CMS 2018). To attract more patients and insurers, hospital managers can improve quality by, for example, modernizing facilities, increasing technological capability, and employing more nursing personnel. Investments in quality also attract more prominent physicians, who in turn, further contribute to the quality of care provided (Newhouse 1970; Pauly and Redisch 1973).

Real options studies also provide insight into the relation between market concentration and cost structure. ROT research contends that firms consider the investment strategies of their competitors when making their own investment decisions (e.g., Caballero 1991; Grenadier 2002; Novy-Marx 2007). Several studies argue that competition limits the value of the option to delay investment until uncertainty

expanding capacity, and there is little risk that the fruits of their investment can be appropriated by competitors. Therefore, we focus on literature that addresses investments that are unrelated to innovation.

[3] A deep empirical literature generally concludes that both nonprofit and for-profit hospitals respond to decreased competitive pressure by increasing prices (for literature reviews, see Sloan 2000; Gaynor and Town 2012; Gaynor, Ho, and Town 2015).

about future returns is resolved (Caballero 1991; Grenadier 2002; Kogan 2001; Trigeoris 1996). The amount of future economic benefit a firm gains from investments in technology, equipment, and facilities depends upon the actions of its competitors. A firm facing significant competition can increase the likelihood of earning a positive return on projects by making investments before competitors. Grenadier (2002) demonstrates analytically that in highly competitive markets, the value of the option to delay investment falls to zero. Firms in very competitive environments must commit to projects early, resulting in a less elastic cost structure, whereas monopolistic firms can delay investment. This line of reasoning suggests firms in more concentrated markets will have a more elastic (i.e. less rigid) cost structure.

Despite the intuitive appeal of the notion that competition erodes option values, this result has not been unequivocally accepted (Leahy 1993; Dixit and Pindyck 1994; Novy-Marx 2007). In particular, Novy-Marx (2007) argues that this result arises when researchers assume firms can add capacity in arbitrarily small increments without incurring opportunity costs, firms' individual investment decisions do not affect aggregate capacity, and development costs are only undertaken once. Relaxing these assumptions, Novy-Marx (2007) shows that real option values remain significant, investment decisions are delayed, and investment is lumpy and intermittent.[4] The intuition behind Novy-Marx's model is that competition not only erodes option premia, but it also erodes the value of cash flows from assets in place. Repeated opportunities to invest lead to higher option values and firms developing sooner, but to lower capacities, than they would if they were only able to develop once. Novy-Marx's model implies that market concentration will have little effect on cost elasticity.

[4] The opportunity cost Novy-Marx refers to arises from foregone revenues or inefficiencies that arise while the asset or technology is being developed. For example, when a hotel renovates a block of rooms, it incurs the direct costs of materials and labor required by the renovation and the opportunity cost of the lost rent while the rooms are being renovated.

Empirical evidence on the direct relation between competition and non-R&D investments is limited to two studies of which we are aware. Patel and Seegert (2020) investigate whether an exogenous reduction in the cost of capital affects investment by for-profit hospitals. A tax policy change implemented in 2002 enabled for-profit firms to accelerate depreciation deductions on capital investments, thereby creating an incentive for for-profit firms to increase investment. They find that for-profit hospitals in concentrated markets increased investment after the tax policy change while those in competitive markets did not. Their results suggest that hospitals in more concentrated markets invest more, and therefore, should have more rigid cost structures. A second study by Bulan et al. (2009) investigates the impact of return volatility and market concentration on the timing of real estate developers' investments in condominium projects. They do not find a direct relation between competition and investment timing. Competition, however, significantly reduces the magnitude of the positive relation between return volatility and investment delays. They conclude that, even when outcomes are extremely uncertain, developers in highly competitive locations (i.e. less concentrated locations) make immediate investments to avoid being preempted by competitors.

Given the mixed theoretical and empirical research on market concentration and investment, we do not provide a direction on the following hypothesis.

H1: Market concentration is associated with cost structure.

3.2 Market Power and Cost Structure

Firms that have a large market share relative to other firms in the same market have market power. Firms with market power are likely to be the dominant purchasers of specialized goods, services, and labor in an area, and thus exercise monopsony power. Hospitals can reduce fixed costs by outsourcing services, leasing equipment, and hiring labor with short-term contracts instead of long-term employment contracts (Holzhacker et al. 2015b). All of these arrangements, however, generate

transactions cost for the hospital. Transaction costs economics (TCE) proposes that contract incompleteness arising from bounded rationality, uncertainty about performance, and unobservable or unverifiable outcomes creates the potential for opportunistic behavior in interfirm transactions (e.g., Williamson 1985; Milgrom and Roberts 1992; Shelanksi and Klein 1995). Monopsony power has the potential to reduce transactions cost for the buyer by reducing the likelihood that suppliers engage in opportunistic behavior. With few alternative purchasers of their products, suppliers of monopsony firms will be reticent to shirk or undersupply effort, and they will be more likely to share information on costs and outcomes. Thus, for a hospital with market power, it is likely that transactions costs for outsourcing both clinical services (e.g., surgery, radiology, intensive care) and nonclinical services (e.g., laundry, janitorial, billing) are reduced, thereby increasing the attractiveness and use of outsourcing. Similarly, if a monopsonist can negotiate more favorable lease terms, this will lead to more leasing. Finally, the monopsonist can hire individuals on short-term contracts while firms in competitive labor markets must offer full-time employment to obtain qualified personnel.

In summary, we assume that hospitals with market power will have lower transactions costs, and thus more elastic cost structures, as stated in the following hypothesis.

H2: Hospitals with market power with have a more elastic cost structure than hospitals without market power.

3.3. Market Power as a Moderator in the Demand Uncertainty-Cost Elasticity Relationship

The relation between external demand uncertainty and cost structure is a major focus of recent cost structure studies (Banker et al. 2014; Holzhacker et al. 2015b; Chen et al. 2021). We build upon these studies by examining whether market power moderates the relation between demand risk and cost elasticity. As previously discussed, Holzhacker et al. (2015b) find that California hospitals facing greater demand risk adopt more variable cost structures. This result is consistent with their assertion that firms

facing higher demand risk will prefer a *more* elastic cost structure because elasticity helps offset the volatility in income and cash flows arising from higher demand uncertainty.

If firms with market power incur lower transactions cost for activities that determine cost structure (leasing, outsourcing, and hiring contract labor), it follows from H2 that these firms' costs will be more responsive to demand uncertainty. As demand uncertainty increases, it will be less costly for hospitals with market power to increase their use of leasing, outsourcing, and contract labor compared to hospitals without market power. Monopsonists can use their market power to negotiate contracts with greater flexibility and shorter durations than hospitals with little market share. Therefore, the monopsonist can adjust cost structure more frequently in response to changes in demand conditions. Accordingly, we expect that demand volatility will have a bigger impact on cost elasticity in hospitals with market power because it is less costly for these hospitals to alter their cost structures.

H3: The magnitude of the relation between demand risk and cost elasticity is larger for hospitals with market power.

4. METHODS

4.1 Data and Sample Selection

We obtained sample data from the Healthcare Provider Cost Reporting Information System (HCRIS). HCRIS is a publicly available database provided by the Centers for Medicare and Medicaid Services (MCS) which includes hospital-specific financial and nonfinancial information from Medicare Cost Reports (MCRs). All United States hospitals (regardless of ownership structure) that accept Medicare reimbursements are required to file an MCR annually (MCS 2007).

To our knowledge, no prior studies in accounting research have utilized MCR data to examine hospital cost behavior. Most studies have relied on U.S. data from a single firm, municipality, or state (e.g., Noreen and Soderstrom 1994, 1997; Kallapur and Eldenburg 2005; Balikrishnan and Gruca 2008; Holzhacker et al. 2015b). Since market power is a central construct in our study, a national sample of

MCRs is more appropriate and provides a robust setting because hospital markets are principally defined by geographical proximity.

Our sample includes information for years 2011 to 2015 from MCRs for acute-care, nonprofit and for-profit hospitals for which there is no missing data for any of the variables included in our empirical models. We exclude all government-owned hospitals because they differ from for-profit and nonprofit hospitals in two interrelated and important ways relevant to our study: 1) their demand volume-related risk is muted since they are rarely allowed to fail (Holzhacker et al. 2015b), and 2) their need to respond to market-based pressures is minimized through soft-budget constraints (Duggan 2000; Bertero and Rondi 2000; Eldenburg and Krishnan 2010; Holzhacker et al. 2015b). We also exclude rural hospitals from our analysis given that certain characteristics of these types of hospitals make them ill-suited to the line of inquiry in this study. Rural hospitals are often the only hospitals in their service areas, and therefore, must maintain ample capacity despite demand fluctuations. Further, again because they are often the only hospital in a service area, they have little market-based competitive pressures. Our final sample consists of 2,124 firms with 7,611 firm-years. Table 1 summarizes the sample selection.

[Insert Table 1 here]

4.2. Model Specification

Our model employs a log change specification that is standard in the accounting and economics literatures for cost functions (Holzhacker et al. 2015a, 2015b). This specification estimates cost elasticity as the slope coefficient on the relationship between log change in cost and log change in volume (Kallapur and Eldenburg 2005; Balikrishnan et al. 2014). [5] Consistent with prior research that examines

[5] Prior research has also employed a specification of cost elasticity using the logged level of cost regressed on logged level of volume (e.g., Noreen and Soderstrom 1994; Banker, Potter, and Schroeder 1995, Kallapur and Eldenburg 2005). However, we follow Holzhacker (2015a, 2015b) and employ log changes, as this specification eliminates potential bias from heterogeneity and serial correlation of the error term (Wooldridge 2013).

cost behavior in the hospital setting, we use inpatient days as our measure of volume (e.g., Balikrishnan and Gruca 2008; Holzhacker et al. 2015a, 2015b). The interaction of log change in volume with another independent variable represents the effect on cost elasticity of that variable. To test H1 and H2 we estimate the following equation using ordinary least squares regression:

$$\ln\left(\frac{C_t}{C_{t-1}}\right) = \beta_0 + \beta_1 \ln\left(\frac{V_t}{V_{t-1}}\right) + \beta_2\, HHI + \beta_3\, HHI * \ln\left(\frac{V_t}{V_{t-1}}\right) + \beta_4\, Market\_Power + \beta_5 Market\_Power * \ln\left(\frac{V_t}{V_{t-1}}\right) + \beta 6\, Demand\_Risk + \beta_7\, Demand\_Risk * \ln\left(\frac{V_t}{V_{t-1}}\right) + \sum\beta_{8-15}\, Controls + \sum\beta_{16-22}\, Controls * \ln\left(\frac{V_t}{V_{t-1}}\right) + Year\ Dummies + Year\ Dummies * \ln\left(\frac{V_t}{V_{t-1}}\right) + State\ Dummies + State\ Dummies * \ln\left(\frac{V_t}{V_{t-1}}\right) + error$$

(1)

where C is equal to total operating costs for firm *i* and V is equal to adjusted patient days for firm *i*. To measure market concentration (*HHI)* and market power (*Market_Power*), we begin by defining a hospital market as a hospital referral region as determined by the Dartmouth Atlas of Health Care. We then determine a hospital's market share (or the overall system's market share if an individual hospital is part of a system) by dividing a hospital's adjusted discharges in year *t* by the total adjusted discharges for all hospitals in the same market. [6] We measure market concentration (*HHI*) with the sum of squared market shares of all hospitals in a market, i.e., the Herfindahl-Hirschman Index (HHI). We measure market power by subtracting the market's HHI from a hospital's market share. If this difference is positive, *Market_Power (Continuous)*, is equal to the difference, otherwise, this variable is zero. We also calculate a second measure, *Market_Power (Dummy),* which is equal to one if a hospital's market share is greater than its market HHI, and zero otherwise. Following Holzhacker et al. (2015b), demand uncertainty (*Demand_Risk*) is measured with the firm-level standard deviation of the log change in adjusted patient days during the sample period. We control for nonprofit status, financial risk, asset

[6] Calculating a hospital's market share based on system affiliation avoids treating two hospitals with common governance/ownership from being treated as competitors in our model.

intensity, and other likely determinants of cost structure as identified by prior literature (Holzacker et al. 2015a, 2015b). All control variables are defined in Table 2.

To test H3, we partition the sample based on whether a hospital has market share or not. And re-estimate Equation 1. We then compare the coefficients on *Demand_Risk* across the two regression equations to determine whether they significantly differ from each other. We partition the sample in order to allow the remaining coefficients to vary based on whether a hospital has market share or not.

[Insert Table 2]

5. RESULTS

5.1. Descriptive Statistics and Variable Correlations

Table 3 provides descriptive statistics for the sample. As shown in Panel A, the mean (median) hospital generates net revenues of approximately $275 million ($186 million) and has 232 (182) beds. Mean (median) *HHI* is 0.21 (0.17), indicating that hospital markets are in the U.S. are moderately concentrated.[7] Forty-six percent of hospitals in the sample have market power and 70 percent are nonprofits.

Panel B of Table 3 partitions the sample by market power. On average, hospitals with market power generate net revenue of $385 million and have 306 beds, while those without market power average $181 million in net revenue and have 169 beds. Mean and median demand risk are lower for hospitals with market power (0.07 and 0.05, respectively) compared with hospitals without market power (0.09 and 0.07, respectively). Financial risk, as measured with the Altman Z-score (higher scores indicate lower risk), is lower for hospitals with market power (mean = 0.35) relative to those without market power (mean = 0.29). Seventy-seven percent (65 percent) of hospitals with (without) market

[7] The Antitrust Division of the U.S. Department of Justice considers a market with an HHI between 0.15 and 0.25 to be moderately concentrated, and a market with an HHI in excess of 0.25 to be highly concentrated. These benchmarks serve as general guidelines when merger transactions are being evaluated by the Federal Trade Commission (U.S. Department of Justice and FTC, 2010).

power are nonprofits. We control for these differences in size, demand risk, financial risk, and ownership status in our empirical tests the hypothesized relationships between market concentration and market power with cost elasticity.

Table 4 reports correlations among the variables included in our empirical model. The continuous measure of market power is positively correlated with *System* ($r = 0.371$, $p < 0.01$) and *Size* ($r = 0.343$, $p < 0.01$), indicating that hospitals with market power tend to be members of systems and are larger. Recall that market share is determined on a system-wide basis. We note that correlations between *Market_Power* and both *HHI* ($r = 0.166$, $p < 0.01$) and *Demand_Risk* ($r = -0.211$, $p < 0.01$) are low, and therefore, should not confound the results. The low correlation also provides evidence that market power and market concentration measure different constructs. *Demand_Risk* is negatively correlated with *Utilization* ($r = -0.404$, $p < 0.01$) and *Size* ($r = -0.463$), indicating that hospitals facing greater demand risk have lower utilization rates and are smaller. All other correlations among independent variables of interest are below 0.30.

[Insert Tables 3 & 4]

5.2. Test of Hypothesis 1 and 2

OLS regression results of Equation 1, which tests both H1 and H2, are reported in Table 5. All models are highly significant and explanatory power ranges from 28.40 percent to 28.70 percent. For comparison, we exclude market concentration and market power from model 1. Models 2 – 4 contain different measures of market power. *Market_Power* in model 2 is a continuous measure equal to the extent a hospital's market share exceeds the market *HHI* and is equal to zero if the market share is less than *HHI*.[8] In model 3, *Market_Power* equals 1 if a hospital's market share exceeds the market *HHI*, and

[8] Alternatively, a continuous measure of market power could be constructed that is not bounded by zero, where negative values would indicate the extent a firm's market share is less than the market HHI. However, we contend that assigning such firms a value of zero has greater intuitive appeal given that there is no theoretical support for "negative market power." However, for robustness, we estimate our model using this alternative measure and find consistent results (not tabulated).

0 otherwise. For Model 4, we start with the market power measure computed in Model 2, which is positive for hospitals with a market share the exceeds the HHI, and zero otherwise. We then split the hospitals with a positive market power measure at the mean into two groups and assign a value of one to hospitals in the upper half and drop the lower half from the sample. Hospitals in the top half of all hospitals with market power are then compared to hospitals without market power.

H1 predicts that market concentration will be associated with cost structure. In model 2, which includes a continuous measure of market power, the coefficient on the interaction term of *HHI * ln(vt/vt-1)* is negative and significant ($\beta_3 = 0.2587$, $p < 0.05$). This result is robust to alternative measures of market power being included (models 3 and 4). Thus, the results support H1 and suggest hospitals in more concentrated markets have more rigid cost structures. This finding is consistent with the premise that hospitals in more concentrated markets reap larger future rents from investments in capacity, technology, and equipment than those in less concentrated markets (Schumpeter 1942).

H2 predicts that hospitals with market power will have more elastic cost structures. Results support H2, as the coefficient on the interaction term of *Market_Power * ln(vt/vt-1)* is positive and significant in all three models (models 2-4). In model 3, the coefficient ($\beta_5 = 0.0897$, $p < 0.01$) indicates that cost elasticity is 0.8654 for hospitals with market power, compared to 0.7757 for hospitals without market power. This suggests that hospitals with market power incur lower contracting costs, and therefore, make greater use of leasing, outsourcing, and contract labor.

Importantly, we find support for H1 and H2 after controlling for cross-sectional variation in demand and financial risk. Variables measuring demand (*Demand_risk*) and financial risk (*Altman*) are interacted with the log change in volume (*ln(vt/vt-1*). The coefficient on the *Demand_risk* ln(vt/vt-1)* is positive and significant in all specification, except model 4, which omits hospitals with continuous market power measures below the mean. These results suggest hospitals with greater demand risk have a

more variable cost structure (i.e., adjust costs for changes in demand to a greater extent). The coefficient on *Altman * ln(vt/vt-1)* is negative, but only significant at the 10 percent level in two of the specifications. The negative relation indicates that firms with greater financial risk (smaller values for *Altman*) have more elastic cost structures. These results are consistent with the findings of Holzhacker et al. (2015b), who utilize a sample of California hospitals.

[Insert Table 5]

5.2 Test of Hypothesis 3

H3 predicts that the magnitude of the positive relation between demand uncertainty and cost elasticity will be larger for hospitals with market power compared to those without market power. To test H3, we classify hospitals whose market share exceeds the HHI in their market as having market power, and the remaining hospitals as not having market power.[9] Results, contained in Table 6, support H3. The coefficient on *Demand_risk* ln(vt/vt-1)* is positive and significant for hospitals with market share ($\beta_5 = 0.7250$, $p < 0.01$), while it is not significant for those without market share ($\beta_5 = 0.0732$, $p > 0.10$). A formal test of the difference in coefficients indicates that demand risk has a significantly ($p < 0.01$) larger impact on cost structure for hospitals with market share. This result is consistent with the premise that hospitals with market share incur lower costs in altering their cost structures.

We note several differences across the partitions when comparing coefficients on the control variables, although we do not perform test of the differences in coefficients. When hospitals have market power, their cost structures are unaffected by market concentration, financial risk, and nonprofit status. Conversely, the cost structure of hospitals without market power is significantly affected by market concentration ($\beta_3 = -0.3279$, $p < 0.05$) and nonprofit status ($\beta_8 = -0.1785$, $p < 0.01$).

[Insert Table 6]

[9] Note that this is the same classification rule we apply to construct the *Market_Power* dummy variable, model 3 specification reported in Table 5.

6. CONCLUSION

This study investigates the association between market structure and cost structure using a national sample of over 2,000 U.S. hospitals. Market structure is a potentially important determinant of cost structure because managers' investment decisions are influenced by how the firm interacts with rival firms and suppliers (e.g., Caballero 1991; Grenadier 2002; Novy-Marx 2007). Specifically, we investigate two key factors that may influence how a firm interacts with other participants within a market, market concentration and market power. Market concentration reflects the overall competitiveness of the market, and market power captures an individual hospital's competitive standing relative to other market participants.

Multivariate OLS regression results indicate that hospitals in more concentrated markets adopt more rigid cost structures, that hospitals with market power adopt more elastic cost structures, and that market power magnifies the positive relation between demand uncertainty and cost elasticity. The market concentration result is consistent with the premise that higher margins in more concentrated markets provide a larger incentive for these hospitals to invest. The market power result suggests that the lower transactions costs incurred by hospitals with monopsony power over suppliers enables them to maintain more elastic cost structures and alter their cost structures more easily in response to changes in demand uncertainty.

This study makes several important contributions to the literature on the determinants of cost structure and investment (e.g., Grenadier 2002; Novy-Marx 2007; Banker et al. 2014; Holzhacker et al. 2015a, 2015b). First, we extend cost structure research by providing evidence that market concentration and market power are distinct, and important, considerations in managers' cost structure decisions (Banker et al. 2014; Holzhacker et al. 2015a, 2015b; Chen et. al.). This finding is also relevant to research in finance, which provides competing predictions on the relation between competition and

managers' decisions to invest in projects (Caballero 1991; Trigeoris 1996; Kogan 2001; Grenadier 2002; Novy-Marx 2007). Second, to our knowledge, this is the first study to consider the effects of supplier relations on cost structure. As such, this research complements a current study by Chen et al. (2021) investigating how the bullwhip effect influences cost structure. Third, we identify market power as an important moderator of the relationship between demand uncertainty and cost elasticity, and thus provide further insight into the results of prior studies that examine the effects of demand risk (Banker et al. 2014; Holzhacker et al. 2015a, 2015b; Chen et al. 2021). Finally, our study should be of interest to hospital managers and national healthcare policymakers. Given the significant number of hospital mergers and acquisitions that have taken place in the past decade (Paul, Quosigk and MacDonald 2016), it is important to understand how increased market power resulting from consolidation affects cost structure in hospitals.

This study is subject to limitations that may be addressed by future research. We assume that hospitals with market power also have monopsony power over suppliers. Although we do not have a direct measure of monopsony power, our results provide empirical support for the assumption. Conducting this study in the hospital industry reduces the inherent measurement error associated with identification of firms' product markets and provides assurance that results are not driven by industry-level differences. Consequently, the generalizability of these results to other industries is limited. Studies examining the relation between market structure and cost structure in industries that manufacture and/or carry inventory would be a useful extension. Endogeneity may confound the results if investment by incumbent firms deters market entrants. We contend that endogeneity is unlikely to be a major concern because we measure changes in costs as a function of changes in volume and not the level of investment. Despite these limitations, this provides important evidence on the role of market structure in managers' cost structure decisions.

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TABLE 1

Sample Selection

	Firm Years
Initial Sample	17,835
Less government owned hospitals	(3,899)
	13,936
Less rural hospitals	(4,271)
	9,665
Less observations with missing values on any variables included in empirical models	(2,045)
Final sample	7,611

TABLE 2 **Variable Definitions**	
Altman	Altman Z-score calculated as the unweighted average of the following ratios in year *t* for firm *i* (Altman 1968; Holzhacker 2015b): 1) current assets divided by total assets, 2) totals assets minus total liabilities, divided by financial risk as the unweighted average of the following accounting ratios in year t for total assets, and 3) net income divided by total assets.
Asset_intensity	Total assets divided by total net revenues in year *t* for firm *i.*
CON_Law	Equal to one if a hospital is in a state that has a Certificate of Need (CON) Law, zero otherwise.
Demand_Risk	Firm-level standard deviation of the log change in adjusted patient days during the sample period.
Employee_intensity	Total personnel costs divided by total net revenues in year *t* for firm *i.*
GDP_growth	Price deflated growth in national domestic product in year *t.*
HHI	Hierfendahl index for firm *i* in year *t* scaled by 1,000, where market share is based on adjusted discharges. Markets are the geographic hospital referral region (HRR) published in the Dartmouth Atlas of Health Care.
$ln(c/c_{t-1})$	Log change from previous year in total operating costs. Where C is equal to total operating costs for firm i.
$ln(v_t/v_{t-1})$	Log change from previous year in total volume. Where V is equal to total adjusted patient days for firm i.
Demand_risk	Firm-level standard deviation of the log change in adjusted patient days during the sample period.
Market_Power (Continuous)	Market share for firm i minus *HHI,* if a firm's market share exceeds *HHI;* and 0, otherwise.
Market_Power (Dummy)	One if market share for firm i exceeds *HHI;* and 0, otherwise.
Nonprofit	Equal to one if hospital is a private nonprofit, zero otherwise.
Utilization	Total hospital patient days divided by total available patient days in year *t* for firm *i.*
Size	Log of total available hospital beds in year *t* for firm *i.*
Wage_index	Ratio of a hospital 's metropolitan statistical area average hourly wage to the national average hourly wage in year t.

TABLE 3 - Panel A
Descriptive Statistics - Full sample

(n = 7,611 firm years) Variable	Mean	Std. Dev	P25	P50	P75
Net Revenue (000s)	275,377	281,811	97,365	185,745	347,299
Operating Cost (000s)	273,181	269,355	280,084	92,038	181,369
Hospital Beds	232	182	107	183	311
Adj. Patient Days	54,185	51,731	18,035	38,681	73,014
$ln(c_t/c_{t-1})$	0.03	0.09	(0.01)	0.03	0.07
$ln(v_t/v_{t-1})$	(0.02)	0.12	(0.06)	(0.01)	0.04
Market Power (Dummy)	0.46	0.50	-	-	1.00
Market_Power (Continuous)	0.05	0.08	-	-	0.09
HHI	0.21	0.13	0.11	0.17	0.27
Nonprofit	0.70	0.46	-	1.00	1.00
System	0.70	0.46	-	1.00	1.00
Con Law	0.65	0.48	-	1.00	1.00
Demand_risk	0.08	0.07	0.04	0.06	0.09
Altman	0.32	0.34	0.19	0.29	0.40
Employee_intensity	0.36	0.09	0.29	0.35	0.41
Utilization	0.57	0.19	0.44	0.59	0.70
Asset intensity	0.38	0.75	0.16	0.27	0.44
Size (i.e. log of beds)	5.12	0.91	4.67	5.21	5.74
Wage_index	0.70	0.46	-	1.00	1.00
GDP_growth	2.34	0.45	1.70	2.20	2.60

TABLE 3 - Panel B
Descriptive Statistics by Market Power

	Market Power = 1 (n = 3,506 firm years)					Market Power = 0 (n = 4,105 firm years)				
Variable	Mean	Std. Dev	P25	P50	P75	Mean	Std. Dev	P25	P50	P75
Net Revenue (000s)	385,380	345,214	145,669	278,113	482,896	181,426	162,227	73,533	139,766	239,700
Operating Cost (000s)	372,776	343,626	136,812	263,366	461,652	181,024	166,366	72,248	136,642	240,745
Hospital Beds	306	211	149	255	415	169	121	84	143	229
Adj. Patient Days	75,590	61,411	30,806	59,883	102,708	35,904	31,869	13,073	27,720	50,816
$ln(c_t/c_{t-1})$	0.03	0.09	(0.00)	0.03	0.07	0.03	0.10	(0.01)	0.03	0.07
$ln(v_t/v_{t-1})$	(0.00)	0.10	(0.04)	(0.00)	0.04	(0.03)	0.13	(0.07)	(0.02)	0.04
Market_Power (Cont)	0.12	0.08	0.05	0.11	0.18	-	-	-	-	-
HHI	0.22	0.14	0.12	0.17	0.28	0.20	0.13	0.11	0.17	0.26
Nonprofit	0.77	0.42	1.00	1.00	1.00	0.65	0.48	-	1.00	1.00
System	0.89	0.31	1.00	1.00	1.00	0.53	0.50	-	1.00	1.00
Con_law	0.63	0.48	-	1.00	1.00	0.66	0.47	-	1.00	1.00
Demand_risk	0.07	0.06	0.03	0.05	0.08	0.75	0.43	1.00	1.00	1.00
Altman	0.36	0.36	0.22	0.31	0.42	0.29	0.32	0.17	0.27	0.38
Employee_intensity	0.34	0.08	0.29	0.34	0.39	0.37	0.10	0.30	0.37	0.43
Utilization	0.62	0.17	0.53	0.64	0.73	0.52	0.20	0.39	0.53	0.66
Asset_intensity	0.40	0.81	0.16	0.27	0.44	0.37	0.69	0.15	0.27	0.44
Size	5.45	0.84	5.00	5.54	6.03	4.83	0.87	4.43	4.96	5.43
Wage_index	1.01	0.17	0.90	0.97	1.07	1.02	0.17	0.90	0.97	1.11
GDP_growth	2.35	0.45	2.20	2.60	2.60	2.34	0.45	1.70	2.20	2.60

TABLE 4
Correlation Matrix for Full Sample
(7,611 firm years)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. $ln(c_t/c_{t-1})$															
2. $ln(v_t/v_{t-1})$	**0.394**														
3. *Market_power (Dummy)*	0.037	0.113													
4. *Market_Power (Cont)*	0.043	0.121	**0.940**												
5. *HHI*	0.004	0.022	0.069	0.166											
6. *Nonprofit*	0.010	-0.033	0.133	0.152	-0.002										
7. *System*	-0.014	0.064	**0.388**	**0.371**	0.144	-0.124									
8. *Con law*	-0.048	-0.017	-0.030	-0.042	0.092	0.115	-0.092								
9. *Demand_risk*	-0.035	-0.055	**-0.211**	**-0.218**	-0.042	-0.196	-0.069	-0.035							
10. *Altman*	0.058	0.118	0.120	0.140	0.104	-0.137	0.179	-0.079	-0.116						
11. *Employee_intensity*	-0.119	-0.176	-0.147	-0.158	-0.136	**0.348**	**-0.325**	0.107	-0.010	**-0.404**					
12. *Utilization*	0.134	**0.267**	**0.274**	**0.265**	-0.088	**0.262**	0.051	0.113	**-0.413**	0.059	0.050				
13. *Asset_intensity*	0.038	0.014	0.012	0.030	0.015	**0.488**	-0.197	0.102	-0.114	-0.085	0.183	0.143			
14. *Size*	0.046	0.110	**0.358**	**0.343**	-0.025	0.254	0.112	0.072	**-0.463**	0.041	0.054	**0.557**	0.095		
15. *Wage_index*	0.029	-0.025	-0.013	-0.030	**-0.227**	0.152	-0.085	**-0.207**	-0.073	-0.105	**0.330**	0.183	0.099	0.077	
16. *GDP_growth*	0.167	0.151	0.020	0.022	0.034	0.017	0.043	0.009	0.006	0.022	-0.047	0.051	-0.038	0.022	-0.009

Significant correlations ($p < 0.01$) are in **bold.**

TABLE 5

Market Power, Market Concentration, and Cost Elasticity (*Dependent Variable = ln(ct/ct-1)*)

	(1)				(2)			
					Market Power = Continuous			
Variable	Coeff.	Error	*t*-stat		Coeff.	Error	*t*-stat	
Constant	0.0461	0.0095	4.88	***	0.0454	0.0097	4.68	***
ln(v_t/v_{t-1})	0.7470	0.1055	7.08	***	0.8024	0.1146	7.00	***
HHI					0.0094	0.0082	1.16	
*HHI * ln(v_t/v_{t-1})*					-0.2587	0.1195	-2.17	**
Market_Power					-0.0347	0.0134	-2.60	***
*Market_Power * ln(v_t/v_{t-1})*					0.4009	0.1960	2.05	**
Demand_risk	-0.0041	0.0210	-0.19		-0.0022	0.0209	-0.10	
*Demand_risk * ln(v_t/v_{t-1})*	0.2821	0.1385	2.04	**	0.2632	0.1370	1.92	**
Altman	-0.0145	0.0036	-3.99	***	-0.0141	0.0036	-3.92	***
*Altman * ln(v_t/v_{t-1})*	-0.0651	0.0417	-1.56		-0.0699	0.0408	-1.71	*
Nonprofit	0.0104	0.0028	3.77	***	0.0112	0.0028	4.00	***
*Nonprofit * ln(v_t/v_{t-1})*	-0.1241	0.0331	-3.74	***	-0.1354	0.0331	-4.09	***
System	-0.0115	0.0024	-4.85	***	-0.0102	0.0025	-4.16	***
*System * ln(v_t/v_{t-1})*	-0.0242	0.0323	-0.75		-0.0388	0.0344	-1.13	
CON_law	-0.0027	0.0082	-0.33		-0.0023	0.0085	-0.28	
*CON_law * ln(v_t/v_{t-1})*	-0.1686	0.1276	-1.32		-0.1874	0.1273	-1.47	
Employee_intensity	-0.1420	0.0178	-7.96	***	-0.1433	0.0179	-8.01	***
*Employee_intensity * ln(v_t/v_{t-1})*	-0.1151	0.1700	-0.68		-0.0986	0.1659	-0.59	
Utilization	0.0000	0.0001	0.31		0.0000	0.0001	0.52	
*Utilization * ln(v_t/v_{t-1})*	0.0019	0.0010	1.97	**	0.0019	0.0009	2.05	**
Asset_intensity	0.0027	0.0039	0.68		0.0031	0.0039	0.80	
*Asset_intensity * ln(v_t/v_{t-1})*	-0.0087	0.0469	-0.19		-0.0180	0.0464	-0.39	
Size (i.e. log of beds)	-0.0009	0.0015	-0.60		-0.0004	0.0015	-0.23	
*Size * ln(v_t/v_{t-1})*	0.0990	0.0194	5.11	***	0.0963	0.0188	5.11	***
Wage_index	0.0106	0.0094	1.12		0.0105	0.0095	1.11	
*Wage_index * ln(v_t/v_{t-1})*	0.2659	0.1886	1.41		0.1779	0.1851	0.96	
GDP_growth	-0.0089	0.0054	-1.64		-0.0089	0.0054	-1.64	
*GDP_growth * ln(v_t/v_{t-1})*	0.2423	0.0723	3.35	***	0.2503	0.0719	3.48	***
Year dummies	Yes				Yes			
State dummies	Yes				Yes			
R^2	28.40%				28.62%			
Observations (firm years)	7,611				7,611			
Clusters (by firm)	2,124				2,124			

***, **, and * denote two-tailed significance levels of 0.01, 0.05, and 0.10, respectively.

TABLE 5 Continued

Market Power, Market Concentration, and Cost Elasticity (*Dependent Variable = ln(ct/ct-1)*)

	(3) *Market_Power = 1, if s > HHI*				*(4)* *Market_Power = 1, if in top half of (s > HHI) group*			
Variable	Coeff.	Error	*t*-stat		Coeff.	Error	*t*-stat	
Constant	0.0469	0.0098	4.80	***	0.0581	0.0121	4.82	***
ln(v_t/v_{t-1})	0.7757	0.1138	6.82	***	0.8414	0.1277	6.59	***
HHI	0.0060	0.0080	0.76		0.0078	0.0097	0.8	
*HHI * ln(v_t/v_{t-1})*	-0.2201	0.1151	-1.91	*	-0.2758	0.1281	-2.15	**
Market_Power	-0.0043	0.0022	-1.98	**	-0.0048	0.0029	-1.67	*
*Market_power * ln(v_t/v_{t-1})*	0.0897	0.0347	2.58	***	0.1157	0.0433	2.67	***
Demand_risk	-0.0020	0.0210	-0.09		-0.0157	0.0233	-0.67	
*Demand_risk * ln(v_t/v_{t-1})*	0.2751	0.1352	2.04	**	0.1841	0.1525	1.21	
Altman	-0.0143	0.0036	-3.97	***	-0.0153	0.0044	-3.45	***
*Altman * ln(v_t/v_{t-1})*	-0.0699	0.0404	-1.73	*	-0.0748	0.0459	-1.63	
Nonprofit	0.0110	0.0028	3.93	***	0.0104	0.0034	3.04	***
*Nonprofit * ln(v_t/v_{t-1})*	-0.1377	0.0329	-4.19	***	-0.1660	0.0373	-4.45	***
System	-0.0099	0.0025	-3.9	***	-0.011	0.0028	-3.91	***
*System * ln(v_t/v_{t-1})*	-0.0576	0.0372	-1.55		-0.0544	0.0386	-1.41	
CON_law	-0.0039	0.0085	-0.45		-0.0116	0.0110	-1.05	
*CON_law * ln(v_t/v_{t-1})*	-0.1719	0.1260	-1.36		-0.1396	0.1247	-1.12	
Employee_intensity	-0.1429	0.0179	-7.98	***	-0.1608	0.0209	-7.71	***
*Employee_intensity * ln(v_t/v_{t-1})*	-0.0905	0.1658	-0.55		-0.1330	0.1756	-0.76	
Utilization	0.0000	0.0001	0.48		0.0001	0.0001	0.71	
*Utilization * ln(v_t/v_{t-1})*	0.0019	0.0009	2.02	**	0.0013	0.0010	1.29	
Asset_intensity	0.0031	0.0039	0.79		0.0036	0.0048	0.75	
*Asset_intensity * ln(v_t/v_{t-1})*	-0.0184	0.0462	-0.40		0.0164	0.0507	0.32	
Size (i.e. log of beds)	-0.0004	0.0016	-0.23		-0.0014	0.0019	-0.74	
*Size * ln(v_t/v_{t-1})*	0.0920	0.0186	4.93	***	0.1000	0.0216	4.62	***
Wage_index	0.0089	0.0094	0.94		0.0097	0.0116	0.84	
*Wage_index * ln(v_t/v_{t-1})*	0.1922	0.1836	1.05		0.0709	0.2026	0.35	
GDP_growth	-0.0088	0.0054	-1.62		-0.0063	0.0064	-0.97	
*GDP_growth * ln(v_t/v_{t-1})*	0.2464	0.0719	3.43	***	0.2882	0.0785	3.67	***
Year dummies	Yes				Yes			
State dummies	Yes				Yes			
R^2	28.70%				28.40%			
Observations (firm years)	7,611				5,650			
Clusters (by firm)	2,124				1,777			

***, **, and * denote two-tailed significance levels of 0.01, 0.05, and 0.10, respectively.

TABLE 6

Cost Elasticity - Firms with Market Power vs. Firms without Market Power

Dep. Variable = $ln(c_t/c_{t-1})$	Market Power = 1				Market Power = 0			
Variable	Coeff.	SE	*t*-stat		Coeff.	SE	*t*-stat	
Constant	0.0158	0.0137	1.16		0.0576	0.0151	3.82	***
$ln(v_t/v_{t-1})$	0.7226	0.2110	3.42	***	0.9235	0.1446	6.38	***
HHI	0.0117	0.0105	1.12		-0.0074	0.0122	-0.61	
HHI * $ln(v_t/v_{t-1})$	-0.1812	0.1655	-1.09		-0.3279	0.1494	-2.19	**
Demand_risk	0.0117	0.0272	0.43		-0.0199	0.0266	-0.75	
Demand_risk * $ln(v_t/v_{t-1})$	0.7250	0.2132	3.40	***	0.0732	0.1705	0.43	
Altman	-0.0176	0.0040	-4.37	***	-0.0111	0.0058	-1.91	*
Altman * $ln(v_t/v_{t-1})$	0.0010	0.0461	0.02		-0.0880	0.0553	-1.59	
Nonprofit	0.0098	0.0041	2.39	**	0.0080	0.0041	1.95	*
Nonprofit * $ln(v_t/v_{t-1})$	-0.0364	0.0583	-0.62		-0.1785	0.0425	-4.20	***
System	-0.0011	0.0043	-0.26		-0.0095	0.0032	-3.00	***
System * $ln(v_t/v_{t-1})$	-0.1452	0.0922	-1.57		-0.0629	0.0407	-1.54	
CON_law	0.0067	0.0104	0.65		-0.0146	0.0136	-1.07	
CON_law * $ln(v_t/v_{t-1})$	-0.2127	0.1763	-1.21		-0.1570	0.1600	-0.98	
Employee_intensity	-0.1006	0.0256	-3.94	***	-0.1594	0.0245	-6.51	***
Employee_intensity * $ln(v_t/v_{t-1})$	0.0905	0.2958	0.31		-0.2032	0.1900	-1.07	
Utilization	0.0001	0.0001	0.80		0.0000	0.0001	-0.02	
Utilization * $ln(v_t/v_{t-1})$	0.0036	0.0013	2.83	***	0.0011	0.0011	1.04	
Asset_intensity	0.0104	0.0056	1.84	*	0.0042	0.0061	0.69	
Asset_intensity * $ln(v_t/v_{t-1})$	-0.1265	0.0998	-1.27		0.0435	0.0553	0.79	
Size (i.e. log of beds)	0.0032	0.0022	1.48		-0.0020	0.0024	-0.81	
Size * $ln(v_t/v_{t-1})$	0.0733	0.0298	2.46	**	0.1094	0.0247	4.43	***
Wage_index	0.0215	0.0136	1.58		0.0072	0.0129	0.55	
Wage_index * $ln(v_t/v_{t-1})$	0.1382	0.2420	0.57		0.1119	0.2478	0.45	
GDP_growth	-0.0184	0.0074	-2.48	**	0.0040	0.0078	0.52	
GDP_growth * $ln(v_t/v_{t-1})$	0.1059	0.1011	1.05		0.3408	0.0883	3.86	***
Year dummies	Yes				Yes			
State dummies	Yes				Yes			
R^2	33.67%				29.71%			
Observations (firm years)	3,506				4,105			
Clusters (by firm)	1,067				1,288			

***, **, and * denote two-tailed significance levels of 0.01, 0.05, and 0.10, respectively.