HOSPITAL PRICE VARIATIONS: PAYING FOR THE ILLUSION OF QUALITY

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HOSPITAL PRICE VARIATIONS: PAYING FOR THE ILLUSION OF QUALITY

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Abstract

Existing literature on hospital pricing and price variation is split on whether price differentials in hospital billing are demand or supply led. To harmonize this literature, we use data from the Medicare Hospital Compare website to evaluate the interaction between demand and supply factors that influence hospital pricing structure. We use consumers' net willingness-to-pay (net WTP) as the dependent variable to analyze how providers exploit factors that enable a provider to charge high prices to consumers. We find that high prices are reflective of the perceived quality but find no relationship with the actual quality of care. In line with previous literature, our analysis shows no evidence of cross-subsidization between inpatient DRGs. However, we find no interaction of factors that could adequately explain the full extent of observed variation in provider prices. We conclude that the question, "Should I buy here or keep driving?" is complex and cannot be answered by a simple analysis of which healthcare provider is cheaper.

<u>KEYWORDS:</u> (Healthcare, Provider, Willingness-to-pay, Quality)

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Introduction

In the United States, hospital billing varies widely from hospital to hospital. These variations are significant, both for hospitals next to each other and between regions across the country (Skinner, 2011; Cutler et al., 2013). The average charge for a joint replacement surgery, for instance, ranges from $5,300 in Ada, Oklahoma to $223,000 in Monterey Park, California. Even within the same region, there are huge variations. In 2011, Las Colinas Medical Center just outside Dallas billed its patient, on average, $160,832 for lower joint replacements. Five miles away and on the same street, Baylor Medical Center billed its patients an average of $42,632 for the same procedure. Previous studies (Barnato et al., 2007; Cutler et al., 2013; Wennberg et al., 2002) on hospital price variation have focused on either supply or demand induced price variations but not the interaction between the two. This study adds to existing literature by analyzing the interaction between demand and supply factors to inform the price hospitals bill their patients. While most of the existing studies examine the variations between regions, they do little to explain why two hospitals just a few blocks away might charge largely varying prices. Additionally, we offer an explanation as to why the question, "Should I buy here or keep driving?" is more complex in healthcare than in other industries. It cannot be answered by a simple analysis of which healthcare provider is cheaper.

As part of President Obama's administration to make our healthcare system more affordable and accountable, data released by the Centers for Medicare and Medicaid Services shows significant variations across the country in what providers charge for common procedures. This data includes information on the amount billed for the 100 most common inpatient services and 30 common outpatient services for the year 2011.

Since providers determine the amount they bill for items and services that they provide, this data shows huge disparities in hospital billing. These disparities in prices have attracted a lot of media attention but there is no known econometric analysis on the data. In addition, efforts have been renewed to create third party websites that help consumers to price shop and compare hospital prices with the assumption that price shopping would help them make a more informed decision. Our paper uses econometric analysis to shed light on these price variations as well as evaluates government and third party initiatives to bring transparency into the healthcare industry. We also offer insight as to whether hospitals cross-subsidize among inpatient DRGs.

We assume that providers know the underlying consumer utility function as well as the utility a consumer gains from using a given provider. Consumers derive different utilities from each provider depending on the hospital characteristics, their clinical characteristics and preferences, and the interaction between these two factors. Consumers are therefore more willing to pay to access a provider from whom they derive a higher value and providers leverage this consumers' willingness to pay to set their prices (Capps et al., 2003). Depending on the consumer's bargaining power, this could be in form of self-pay consumers or through insurance companies. Capps et al. conclude that willingness-to-pay (WTP) is a highly significant predictor of hospital profits and the provider's goal is to capture as much consumer WTP as possible. In this paper, we define net WTP as the average amount a provider bills for a given DRG minus the average Medicare compensation for a the same DRG in the same hospital. Since hospitals have control over the amount above their costs that they charge to consumers, the net WTP can be used as an indicator of the extend of price variation between hospitals. We then regress net WTP against predictors that are likely to explain its variation across hospitals for a given DRG. Unlike Capps et al. who look at WTP as calculated at the beginning of the year, prior to the consumer getting ill and hospitalized, we use a proxy for consumer's WTP when the consumer is ill. This gives a more accurate estimate of the consumer's actual WTP as the consumers ex ante utility is known to be different from ex post utility (Fenn, 2001; Becker et al., 1986).

Section II of this paper reviews the relevant literature on how hospitals set their prices as well as different arguments that have attempted to explain price variation among hospitals. Section III describes our data set while Section IV explains the calculations and analysis performed on this data. Results of our regression analysis are presented in Section V with implications for policy and future academic research offered in the final section.

Literature Review

In the late 1960s and 1970s, hospital pricing was straightforward. Although markup formula existed, they were generally used to build in a small profit on top of costs. Providers could count on both the government and insurers to pay what they were billed (Zinner et al., 2009). That began to change during the 1980s when Medicare revamped its reimbursement methods and decreed to pay hospitals only a flat rate for specific treatments. During the 1990s, managed care came into play (Gowrisankaran et al., 2013), where organizations acting on behalf of consumers demanded hospitals give them steep discounts off the Chargemaster (a comprehensive listing of items and procedures that could be billed to a patient, payer or healthcare provider). Buffeted by managed care, squeezed by federal and state governments and overrun with patients who either could not pay or lacked coverage, hospitals developed aggressive survival strategies. However, because of antitrust restrictions that kept the Chargemaster proprietary, providers did not know what their rivals charged or the discounts they offered. This led to each provider coming up with their own formulae (Noether, 1988). Given the vast variations on the prices hospitals charge for a given procedure, economists have spent the last two decades trying to demystify hospital price setting practices.

Although many observers speculate that hospital prices are irrationally set, there is a lot of literature that point to hospital pricing strategy as deliberate, presumably to optimize profits, welfare, quality or some weighted average of the three. Dafny (2005) finds that hospitals respond to price changes by "upcoding" patients to diagnosis codes associated with large reimbursement increases, garnering $330-$425 million in extra reimbursement annually. A price increase for a given DRG raises the profitability of that DRG, creating an incentive to attract more patients by increasing the intensity of care provided. This suggests that the observed price variation is provider or supply driven. Indeed, much of the regional price variation has been attributed to treatment intensity such as the number or concentration of diagnostic tests, physician visits, hospitalizations, and procedures.

One would expect treatment intensity to lead to better outcomes. However, the relationship between treatment intensity and quality has been identified as very weak. For instance, research by Wennberg et al. (2002) examines patients hospitalized between 1993 and 1995 for hip fracture, colorectal cancer and acute myocardial infarction, as well as a representative sample of Medicare enrollees in their last 6 years of life, and determines each cohort member's exposure to different levels of spending on end-of-life care. These researchers have documented significant variation in health care spending and quality across geographic regions in the United States for similar patients. Regions in the highest quantile of Medicare spending have 65 percent more medical specialists per capita but 26 percent fewer general and family practitioners. Furthermore, Medicare beneficiaries who live in high-spending areas receive approximately 60 percent more services than do those who live in low-spending areas. Yet, this increased utilization is not explained by underlying illness rates and is not associated with any gain in life expectancy. Fisher et al. (2007) also find little improvement in survival rates among heart attack patients between 1996 and 2002 despite significant growth in treatment costs. This suggests that some region's practices are not cost effective and has sparked private and public sector policy proposals to reduce unwarranted spending (Burke et al., 2014). Research by Skinner (2011) also shows that utilization of healthcare explains 40% of the interregional variation. Differences in preferences are unlikely to explain regional variations in end of life spending (Barnato et al., 2007). Could intensity of care also explain the variation in prices between hospitals that are just blocks away?

Given that consumers care more about quality and favor providers who offer better quality as opposed to price (Gaynor et al., 2011), one would expect hospitals to be demand driven. This is manifested either through the purchase of newest equipment or through provision of pleasant surroundings to entice patients (Noether, 1988), both of which have an upward pressure on price. Two recent studies (Cooper et al., 2011; Gaynor et al., 2013) examine the impact of competition on hospital quality using a reform in the English National Health Service (NHS). Although they differ in the precise methods employed, both Cooper et al. (2011) and Gaynor et al. (2013) find that, following the reform, risk-adjusted mortality fell more at hospitals in less concentrated markets than at hospitals in more concentrated markets. In such an environment, providers compete on quality and not price. This is in contrast with Cutler et al.'s (2013) conclusion that the single most important factor in explaining healthcare price variations is physician beliefs about treatment and a given hospital is likely to attract physicians who have similar beliefs on treatment. In this study, no associations were observed between patients' treatment preferences and their marital status, education, insurance status, use of religion to cope, cancer type, performance status, medical comorbidities, quality of life, or survival. In another study, Hussey et al. (2013) analyze results from 61 studies that compared health care spending with outcomes on both small, hospital-wide scales and broader state-wide levels. Some of these studies look at whether hospitals that spend more money per patient have fewer in-hospital deaths, or if their doctors and nurses better follow guidelines. Others compare states' Medicare spending with how well their older residents are treated for a range of conditions. The results are unclear on the direction and form of the relationship. Twenty-one of the 61 studies show that higher spending is tied to better outcomes for patients, such as fewer deaths. However, 18 studies find a link between more spending and worse outcomes, and 22 show no difference or an unclear association based on spending. Literature is therefore split on whether the observed price variation is demand or supply driven, leading to confusion on what policy framework would be appropriate. We postulate that the observed price variation is driven by an interaction of both demand and supply side factors and that relevant policy framework should focus on both.

Furthermore, lack of good information on quality makes it difficult for patients to tell which providers are high quality and which are low quality (Cutler, 2010). In a similar vein, Skinner (2011) argues that low productivity producers are unlikely to be shaken out by normal competitive forces, given the patchwork of providers, consumers and third-party payers each of which faces inadequate incentives to improve quality or lower costs. Capps (2005) uses a set of quality indicators developed by the US Agency for Healthcare Research and Quality to examine the effect of increased hospital market power, through mergers, on quality. He compares merging to non-merging hospitals in New York State during 1995-2000. Neither study finds much in the way of significant impacts of hospital mergers on the quality of care. This paper builds on work by Capps (2005) and Capps et al. (2003) that consumer's willingness-to-pay (WTP) is directly related to a provider's profits. We use better measures of quality as established by Capps and build on Capps's model by using a more accurate data set. To accomplish this goal, we suppose that the net amount billed or price is not determined by demand factors alone but by the interaction between the demand and supply factors.

The Model

The following example illustrates our methodology. Suppose patient i with socioeconomic characteristics Y_i should learn that he has urinary infection (DRG690). Patient i is a middle income earner, lives in an urban setting and is keen to get the best care available in his region. From the available hospital options and all factors being equal, patient i will choose hospital j because he/she thinks j is the best urinary infection hospital in the region. Choosing hospital j maximizes consumer i's current expected utility, U_{ij}. If patient i does not get sick and remains healthy, then $U_{ij} = 0$ because such consumer does not value access to hospital j. Congruently, the consumer's change in willingness-to-pay when ill is ΔW_j^{IU} and if not sick then $\Delta W_j^{IU} = 0$. Within a given period and out of the entire population, there are N patients with urinary infections who will seek care from hospital j. The WTP for these N ill consumers, equals the WTP for the entire population— N ill and the rest healthy. WTP for the entire population is therefore the weighted sum of the change in WTPs for each consumer, whether ill or healthy.

Our goal is to calculate the relationship between consumer's willingness-to-pay (WTP) and other factors which include hospital characteristics, DRG specific characteristics and population level factors. This is WTP as calculated when the consumer falls ill and is requiring hospitalization. The expected utility of patient i which has decided to utilize hospital j is;

$$\begin{aligned} \max U_{ij} &= \alpha R_j + H_j' \Gamma X_i + \tau_1 T_i + \tau_2 T_{ij} X_i + \tau_3 T_{ij} R_i - \gamma(Y_i, Z_i) P_j(Z_i) + \varepsilon_{ij} \\ &= U(H_j, X_i, \lambda_i) - \gamma(X_i) P_j(Z_i) + \varepsilon_{ij} \end{aligned} \quad (3.1)$$

$H_j = [H_j, R_j, S_j]$ is a column vector of hospital j's characteristics, where the vector of variables in R_j include features that are common across all patient conditions such as teaching status, ownership, number of beds. The vector in S_j include condition specific service offerings such as whether hospital j has delivery rooms. This structure implies that a particular hospital services benefit part of the patients whose diagnosis is related to that service. The column vector $X_i = [Y_i, Z_i]$ is patient i's characteristics and include both socioeconomic characteristics (household income, education level, dominant occupation, health status using mortality rate), Y_i, and the patient's clinical attributes Z_j. $P_j(Z_i)$ is the out-of-pocket price that patient i with clinical characteristics Z_i pays at hospital j. The variable λ_i is the geographical location of the patient. The function $\gamma(Y_i, Z_i)$ converts money to utils: it is the value in utils that patient i with characteristics (Y_i, Z_i) place on $1. Finally, the error term represents the component of patient i 's evaluation of hospital j that is personal and distinctive. In this setting, individual i will select hospital j if, for all hospitals k ≠j and thus he/she gains higher utility from hospital j. Individuals choose the hospital that provide the highest utility.

Willingness-to-pay for hospital j: To establish the patient's WTP for hospital j out of all hospitals, we first compute, for each patient type $X_i = [Y_i, Z_i]$, the decrease in i's interim utility when they have no access to j. Thus, given the expected utility specification from above, the expected utility for access to hospital j for patient i with demographics Y_i, clinical attribute Z_i, and location λ_i is;

$$V^{IU}(G, Y_i, Z_i, \lambda_i) = E \max[U(H_g, Y_i, Z_i, \lambda_i] = \ln[\sum_{g \epsilon G} \exp(U(H_g, Y_i, Z_i, \lambda_i))] \quad (3.2)$$

Hospital j's contribution to this interim expected utility is therefore;

$$\Delta V_j^{IU}(G, Y_i, Z_i, \lambda_i) = V^{IU}(G, Y_i, Z_i, \lambda_i) - V^{IU}\left(\frac{G}{j}, Y_i, Z_i, \lambda_i\right) = \quad (3.3)$$

$$\ln\{[\sum_{\frac{k \epsilon G}{j}} \frac{\exp(U(H_k, Y_i, Z_i, \lambda_i)}{\sum_{g \epsilon G} \exp\left(U\left(H_g, Y_i, Z_i, \lambda_i\right)\right)}]^{-1}\} = [\frac{1}{1 - s_j(H_j, Y_i, Z_i, \lambda_i)}]$$

where G/ j is the group of hospitals G with hospital j excluded, and line three follows from the definition of $s_j(G, Y_i, Z_i, \lambda)$ in equation above and the identity $\sum_{g \epsilon G}(s_g) = 1$.

Converting this to monetary terms gives, conditional on patient i being of type X_i , the interim WTP to retain hospital j:

$$\Delta W_j^{IU}(G, Y_i, Z_i, \lambda_i) = \frac{\Delta V_j^{IU}(G, Y_i, Z_i, \lambda_i)}{\gamma(Y_i, Z_i)} \tag{3.4}$$

Let f(Y_i, Z_i , λ) be the joint density of the demographics, clinical indications, and locations of all consumers who will be sufficiently ill during the next year to cause them to require hospitalization. Further, let f(Z_i| Y_i, λ_i) be the conditional density of patient i's clinical characteristics Z_i if the patient has demographics and location (Y_i, λ_i). Given group G and patient i with demographics (Y_i, λ_i), i's WTP to have access to hospital j is;

$$\Delta W_{ij}^{EA}(G, Y_i, \lambda_i) = \int_z^0 \Delta W_j^{IU}(G, Y_i, Z_i, \lambda_i)\ f(Z_i | Y_i, \lambda_i) dZ_i = \int_Z^0 \frac{\Delta V_j^{IU}(G, Y_i, Z_i, \lambda_i)}{\gamma(Y_i, Z_i)}\ f(Z_i | Y_i, \lambda_i) dZ_i \tag{3.5}$$

where Z is the set of all possible clinical indications. Summing this across all patients gives the population's ex ante WTP to include hospital j in group G (abbreviated henceforth as WTP for j):

$$\begin{aligned} \Delta W_j^{EA}(G) &= N \int_{y,\lambda}^{0} \Delta W_j^{IU}(G, Y_i, Z_i, \lambda_i)\ f(Y_i|\lambda_i) dY_i\, d\lambda_i \\ &= N \int_{Y,Z,\lambda}^{0} \frac{1}{\gamma(Y_i, Z_i)} \ln[\frac{1}{1 - s_j(G, Y_i, Z_i, \lambda_i)}] f(Y_i, Z_i, \lambda_i) dY_i\, d\lambda_i\, dZ_i \end{aligned} \tag{3.6}$$

where Y and λ are the range of possible socioeconomic characteristics and geographic locations, f(Y_i, λ_i) is the marginal density of consumers' demographics and locations, and the second line follows from equation the equation above. Having access to hospital j is good for those ill patients who might decide to choose hospital j , but of no consequence for healthy patients. Therefore, as noted above, the changes in interim utilities for healthy consumers are identically zero and drop out of the weighted sum, leaving the above as the aggregate WTP for the population of all consumers in a given population.

Taking a slice of consumer's willingness-to-pay. A necessary condition for the inclusion of hospital j for consideration by any consumer is that the WTP for it exceeds the additional costs its inclusion causes: $\Delta W_j^{EA}(G) > \Delta C_j(G)$. Including hospital j might cause the consumer's total costs to increase if including j causes some patients to pay more. For a Managed Care Organization (MCO) or provider network, for instance, if $\Delta W_j^{EA}(G) < \Delta C_j(G)$ for including hospital j in its network, then this might mean the MCO will have to transfer the extra cost to consumers through higher premiums or it can cause patients to switch from hospitals in its network to others that have lower costs. Alternatively, if j is a relatively low-cost hospital, then $\Delta C_j(G)$ might be negligible or negative. Either way, the gain hospital j is a fraction of population's net willingness-to-pay, α($\Delta W_j^{EA}(G) - \Delta C_j(G)$). In this model, we assume that hospital j accepts to provide a service only if it at least can cover its variable cost, i.e, α($\Delta W_j^{EA}(G) - \Delta C_j(G) \geq 0$). Depending on the parties' relative bargaining power (and neglecting issues of the incomplete information that they have about each other's payoffs), hospital j may capture either a large or small proportion, α, of consumer's net WTP. Hospitals that deliver greater incremental value to consumers can presumably extract more profits from them in the form of higher prices and/or fewer quantity restrictions (Capps et al., 2003).

Adaption of the model to our dataset. Several shortcomings in our dataset require us to add two assumptions into our model to make it estimable. The first challenge is that we do not have sufficient information to accurately calculate $\Delta C_j(G)$, the change in costs caused by adding hospital j into the group, G, of hospitals that the consumer is looking at. Creating such a measure is a difficult exercise, for it would require not only knowing where patients would reallocate themselves if j were not available, but also information on the cost of treating each of those patients at the preferred alternative hospital (Capps et al., 2003). We therefore adopt that $\Delta C_j(G)$ is equal to the average cost Medicare pays for a given DRG in a given hospital. This is a more accurate approximation compared to Capps et al.'s (2003) postulation that the incremental cost of treating a given condition is the same in all hospital and thus $\Delta C_j(G) = 0$ for all hospitals j. We have sufficient data both on the average price paid for a given condition both by the general public and Medicare and the amounts are vastly varied across hospital.

The average Medicare payment for a given DRG is constructed using the inpatient prospective payment system which utilizes specific Diagnosis Related Group (DRG) case weights. Each Medicare inpatient claim is costed using the relevant departmental ratio of cost-to-charge (DRCC) values derived from the Medicare Cost Report applied to charges from the inpatient claim. The DRCC values are mapped to specific revenue codes in the claims file and a wage index assigned to the hospital by Medicare is used to restate costs to an index of 1.0. This process results in a unique publicly available number for most hospitals in the US. Although this measure is not a perfect measure of relative inpatient costs, it is better than any other publicly available measure of cost or inpatient cost at the facility level for several reasons. Firstly, the output unit is more comparable than any other. Secondly, there is no application of outpatient equivalent discharges to distort output similarity. Thirdly, the Case Mix Index used to adjust is specific to those patients and is not extended to non-Medicare patients. Finally, cost measures are adjusted using department-specific cost-to-charge ratios, not facility-wide cost-to-charge ratios. Finally, the costs are adjusted for cost-of-living differences. This makes the average cost Medicare pays for a given DRG in a given hospital the best estimate for $\Delta C_j(G)$.

We use the average hospital billing as a proxy for $\Delta W_j^{EA}(G)$, the change in consumers' willingness-to-pay to have access to hospital j. This is a more accurate assumption than Capps et al. assumption that $\Delta W_j^{EA}(G) = \overline{\Delta W_j^{EA}}(G)$. Firstly, Capps assumes that all consumers irrespective of their socioeconomic characteristics or patient characteristics assign the same util, $\gamma(Y_i, Z_i)$, to \$1. The high price variation evident from our data disapproves this claim and vast literature (Backus et al., 2005; Kaplow, 2010; Poterba, 1987) in consumer theory agrees that the value in utils, a consumer places on \$1 differs from consumer to consumer. This function is important in determining consumer's WTP and explaining price variation among hospitals. It is therefore important that we use a more accurate proxy than Capps et al. assumption that the value of a util is constant for all consumers. Our use of the average billing takes into consideration that consumers assign different utility to \$1.

The Equation we estimate is;

$$(\Delta W_j^{EA}(G) - \Delta C_j(G) = (\alpha R_j + H_j' \Gamma X_i + \tau_1 T_i + \tau_2 T_{ij} X_i + \tau_3 T_{ij} R_i - \gamma(Y_i, Z_i) P_j(Z_i) \quad (3.7)$$

Equation 3.7 models net willingness-to-pay against the interaction of factors that determine the supply and demand of hospital services and products. This helps us identify factors that given providers the power to charge large differential prices.

Data

We use data from the 2011 hospital compare database provided by the Centers for Medicare & Medicaid Services. As part of President Obama administration's work to make our healthcare system more affordable and accountable, this data was released to help consumers compare and choose providers who offer lower price for a given diagnosis. Each diagnosis is categorized into Diagnosis-Related Group (DRG), a statistical system of classifying any outpatient service or inpatient stay into groups for the purposes of payment (Centers for Medicare & Medicaid Services, 2001). A comparison of inpatient and outpatient charge variation shows that the variation is very small for outpatient DRGs. We therefore focus on inpatient DRGs where the variation is significant. Creating a matrix for all the 4000 hospitals and the 100 DRGs is computationally exhausting and is unlikely to reveal the variation that we aim to discuss. Additionally, most DRGs only have a few observations.

We therefore limit our study to 5 most common inpatient DRGs as indicated by the number of observations. The 5 DRGs that we analyze are DRG194: Simple pneumonia and pleurisy, DRG292: Heart failure and shock, DRG392: Esophagitis, gastroent and misc. digest disorders, DRG641: Disorders of nutrition and metabolism, DRG690: Kidney and urinary tract infections. The dataset includes information on Average Charges, the amount each of the 3254 providers bills its patients for a given DRG; Average Total Payments, the amount Medicare actually pays to the provider; and the Number discharged, the number of patients discharged in a given DRG from a given hospital for the full year 2011. For Medicare patients, the provider has an agreement with Medicare to accept the insurer's payment and the difference between what is billed and what is paid is not paid by Medicare or any other.

In order to capture the socioeconomic characteristics of a population living near a given hospital, we geo-coded the addresses of each provider to a precise latitude and longitude. With this information, we buffered each hospital location to a 10 mile radius using the 2010 USA census data linked the hospital with the population's socioeconomic characteristics. The resulting sample is a dataset with all the 3254 hospital addresses linked to the corresponding 10 mile radius total population, race distribution, poverty level and median household income. We use this to construct the demand factors that might influence the willingness-to-pay for a given provider.

To capture hospital-level characteristics, we use data from the Centers for Medicare & Medicaid Services (CMS)'s Hospital Quality Initiative. The Hospital Quality Initiative uses a variety of tools to help stimulate and support improvements in the quality of care delivered by hospitals. The intent of the initiative is to help improve hospitals' quality of care by distributing objective, easy to understand data on hospital performance, and quality information from consumer perspectives. From the all 20 measures of quality provided, we choose two measures of quality; the Patient Experience of Care Domain Score and Risk Standardized Readmission Rate (RSRR). The Patient Experience of Care Domain Score is the sum of the HCAHPS Base Score (0 – 80 points) and HCAHPS Consistency Points score (0 – 20 points), thus ranges from 0 to 100 points, and comprises 30% of the Hospital VBP Total Performance Score. The second measure, hospital's Risk Standardized Readmission Rate (RSRR) is estimated based on unplanned readmissions, for any cause, within 30 days of discharge. Each admission is assigned to one of five specialty cohort groups consisting of related conditions or procedures. The measure adjusts for case and service mix, accounting for differences in the types of conditions and procedures by each provider. Other hospital characteristics include; hospital ownership, location of the provider in a rural or urban area, and presence or absence of emergency services. We use these hospital characteristics to inform our supply led composition of our analysis.

The sample database therefore comprises of 3254 observations, which incorporates data from 574 government owned hospitals (Hospital District or Authority, local, state and federal), 712 private owned (physicians and proprietary) and 1970 not-for-profit (voluntary nonprofit, church, other). This is a representative of all 4973 hospital in the US where 20% are government owned, 22% private and 58% non-profit owned and operated. Of the 3254 providers in our sample, 30% are located in rural areas while the rest are in urban or densely populated areas.

Descriptive statistics for the main hospital characteristics and DRG level summary are presented in table 4.1 below.

Table 4.1:

Summary statistics for population characteristics, hospital and top 5 DRG level characteristics

Variable	**Mean**	**Std.Dev**	**Min**	**Max**	**No. of Obs**
		Hospital Level Characteristics(N=3254)			
Per capita MCare	0.98	0.086	0.54	1.54	3204
Performance Score	46.55	11.52	4.2	81.36	2721
Readmission Rate	15.99	1.13	11.1	23.7	3230
		DRG Level summary			
DRG194:No.Discharged	66.27	47.83	11	537	2958
DRG194: Ave. Billing	24606.75	14300.3	5092.60	124050.7	2958
DRG194: Ave. Medicare Comp.	6966.89	1648.87	4719.20	23257.21	2958
DRG292:No.Discharged	75.95	66.32	11	774	2892
DRG292: Ave. Billing	23538.55	13632.72	4622.8	121079.5	2892
DRG292: Ave. Medicare Comp.	6961.92	1650.081	4563.83	16916.5	2892
DRG392:No.Discharged	83.79	76.89	11	1344	2895
DRG392: Ave. Billing	19123.64	10430.25	2521.38	96216.73	2895
DRG392:Ave. Medicare Comp.	5046.13	1176.597	3432	12548.57	2895
DRG641:No.Discharged	53.45	40.74	11	454	2843
DRG641: Ave. Billing	16735.92	9539.54	3320.13	91222.20	2843
DRG641: Ave. Medicare Comp.	4783.51	1169.23	3286.11	17033.44	2843
DRG690:No.Discharged	69.83	58.51	11	807	2928
DRG690: Ave. Billing	18294.76	10426.28	3637.93	91695	2928
DRG690: Ave. Medicare Comp.	5356.15	1285.53	3652.27	16108.06	2928
		Population Socioeconomic characteristics			
% of Pop. White	0.65	0.27	0	1	3252
% of Pop. Black	0.14	0.20	0	1	3252
% of Pop. Latino	0.13	0.18	0	1	3252
% of Pop. Improvished	18.64	13.29	0	100	3253
% of Kids Improvished	23.68	19.49	0	100	3253

The average billing for simple pneumonia and pleurisy (DRG194) is $24,607 with the cheapest hospital charging $5,092 and the most expensive charging $124,050; an average difference of almost $120,000. For this DRG, Medicare pays an average of $6,966, a rate well below the average of $24, 067 and just above the lowest billing hospital. DRG292, heart failure and shock, has an average of $23,538 with the most expensive provider charging 30 times more than the cheapest one. Medicare payment for this DRG is $$6,961 and the highest payment is only about 3 times more. For esophagitis, gastroent and misc. digest disorders (DRG392), a similar trend is observed where the average billing is $19,123 and the highest billing hospital bill is 38 times the lowest. The same trend is observed for DRG641, misc. disorders of nutrition, metabolism and electrolytes as well as kidney and urinary tract infections (DRG690). Hospitals have defended themselves by asserting that the billing variation are reflective of either the high cost related to teaching hospitals or treating sicker patients. However, since our data uses averages it takes into account the case mix. There is only 26% correlation between hospital billing and the amount Medicare pays to the providers. Since Medicare payment has been identified as a good indicator of hospital costs, this point to little relationship between hospital charges and the actual cost of providing that procedure.

At the hospital level, the average Medicare payment for all patients in a given hospital is 98 cents, with the lowest being 54 cents and the highest $1.54. These payments are reflective of the different costs incurred by different providers. Although we expect the two measures of quality to be highly correlated, the observed correlation of 7% is insignificant. Although they are the best measures of quality available, much has to be done to develop more accurate and consistent measures of quality.

Results and Discussion

Table 5.1 displays the results of regression of net willingness-to-pay against all the identified explanatory variables. The first column provides the variables while the rest of the columns provide the coefficients of the variables for each DRG. For the 5 selected DRGs, our model explains about 50% of the price variation. This is not surprising given the complex and varied nature of hospital charge setting practices. The results are insensitive to which DRG is examined, reflecting the fact that hospitals use similar formulae to set prices for major DRGs. Dobson et al. (2005) observe that hospital charges are set within the context of hospitals' broader communities, including their competitors, payers, regulators, and customers. These factors vary significantly depending on an individual hospital's market power, mission and cost estimation strategies among others. Our analysis does not include these broader factors and this could explain why our model only explains half of the price variation. In a comparison analysis using Capps et al.'s assumption that $\Delta C_j(G) = 0$ gives us a pseudo R^2 of 30% with most of the predictors being insignificant. Thus our model better fits the data and an assumption that the cost differential is zero will lead to misleading conclusion.

Table 5.1:
Parameter estimates (and standard errors) for each DRG Net WTP equations

	lnnetwtp194	**lnnetwtp292**	**lnnetwtp392**	**lnnetwtp641**	**lnnetwtp690**
Constant	6.56***	6.79***	7.38***	7.24***	7.06**
	(-3.12 x 10^{-1})	(-3.85 x 10^{-1})	(-4.01 x 10^{-1})	(-3.82 x 10^{-1})	(-4.26 x 10^{-1})
Gov. Owned Hosp.	-2.40 x 10^{-1}***	-2.02 x 10^{-1}***	-2.65 x 10^{-1}***	-2.32 x 10^{-1}***	-2.33 x 10^{-1}***
	(-3.01 x 10^{-2})	(-3.31 x 10^{-2})	(-3.22 x 10^{-2})	(-3.56 x 10^{-2})	(-3.38 x 10^{-2})
Priv. Owned Hosp.	3.13 x 10^{-1}***	2.82 x 10^{-1}***	2.38 x 10^{-1}***	2.42 x 10^{-1}***	2.51 x 10^{-1}***
	(-2.88 x 10^{-2})	(-3.05 x 10^{-2})	(-2.69 x 10^{-2})	(-2.99 x 10^{-2})	(-3.20 x 10^{-2})
EM. Service	-7.26 x 10^{-2}	-1.60 x 10^{-2}	-4.19 x 10^{-2}	-7.26 x 10^{-2}	-1.20 x 10^{-1}
	(-8.39 x 10^{-2})	(-9.12 x 10^{-2})	(-7.04 x 10^{-2})	(-8.30 x 10^{-2})	(-7.36 x 10^{-2})
Per capita MCare	2.067***	2.141***	1.821***	1.972***	1.918***
	(-1.86 x 10^{-1})	(-2.42 x 10^{-1})	(-2.39 x 10^{-1})	(-2.49 x 10^{-1})	(-2.46 x 10^{-1})
Performance Score	4.17 x 10^{-3}***	4.11 x 10^{-3}***	4.19 x 10^{-3}***	4.42 x 10^{-3}***	5.07 x 10^{-3}***
	(-9.23 x 10^{-4})	(-9.81 x 10^{-4})	(-9.42 x 10^{-4})	(-9.90 x 10^{-4})	(-9.78 x 10^{-4})
Readmission Rate	2.59 x 10^{-2}*	2.49 x 10^{-2}*	-2.05 x 10^{-2}*	-1.46 x 10^{-2}	3.03 x 10^{-3}
	(-1.04 x 10^{-2})	(-1.10 x 10^{-2})	(-1.03 x 10^{-2})	(-1.16 x 10^{-2})	(-1.08 x 10^{-2})
% White	3.19 x 10^{-1}*	-2.68 x 10^{-2}	3.10 x 10^{-2}	1.04 x 10^{-2}	8.92 x 10^{-2}
	(-1.34 x 10^{-1})	(-1.9 x 10^{-1})	(-2.14 x 10^{-1})	(-2.15 x 10^{-1})	(-2.22 x 10^{-1})
% Black	5.99 x 10^{-1}***	2.11 x 10^{-1}	5.73 x 10^{-1}**	4.22 x 10^{-1}	4.21 x 10^{-1}
	(-1.45 x 10^{-1})	(-1.99 x 10^{-1})	(-2.22 x 10^{-1})	(-2.29 x 10^{-1})	(-2.30 x 10^{-1})
% Latino	5.45 x 10^{-1}***	2.38 x 10^{-1}	4.55 x 10^{-1}*	2.92 x 10^{-1}	2.45 x 10^{-1}
	(-1.42 x 10^{-1})	(-1.99 x 10^{-1})	(-2.17 x 10^{-1})	(-2.20 x 10^{-1})	(-2.30 x 10^{-1})
Location: Urban	-2.18 x 10^{-2}	-3.80 x 10^{-2}	-3.16 x 10^{-2}	-4.02 x 10^{-2}	-2.29 x 10^{-2}
	(-2.20 x 10^{-2})	(-2.34 x 10^{-2})	(-2.13 x 10^{-2})	(-2.33 x 10^{-2})	(-2.26 x 10^{-2})
M. Income	3.17 x 10^{-6}***	4.03 x 10^{-6}***	3.27 x 10^{-6}***	3.24 x 10^{-6}***	3.20 x 10^{-6}***
	(-6.21 x 10^{-7})	(-6.24 x 10^{-7})	(-5.96 x 10^{-7})	(-6.47 x 10^{-7})	(-6.71 x 10^{-7})
% poor	3.20 x 10^{-3}*	5.54 x 10^{-3}***	5.56 x 10^{-3}***	6.02 x 10^{-3}***	5.04 x 10^{-3}***
	(-1.49 x 10^{-3})	(-1.68 x 10^{-3})	(-1.42 x 10^{-3})	(-1.33 x 10^{-3})	(-1.42 x 10^{-3})
% kids poor	-2.05 x 10^{-3}*	-3.17 x 10^{-3}***	-2.97 x 10^{-3}***	-3.12 x 10^{-3}***	-2.95 x 10^{-3}**
	(-9.05 x 10^{-4})	(-9.61 x 10^{-4})	(-8.56 x 10^{-4})	(-8.88 x 10^{-4})	(-9.00 x 10^{-4})
No. Discharged	2.10 x 10^{-3}***	1.55 x 10^{-3}***	1.17 x 10^{-3}***	2.50 x 10^{-3}***	1.93 x 10^{-3}***
	(-2.25 x 10^{-4})	(-1.84 x 10^{-4})	(-1.80 x 10^{-4})	(-2.80 x 10^{-4})	(-2.30 x 10^{-4})
R-squared	0.54	0.51	0.51	0.49	0.51
adj. R-squared	0.53	0.50	0.50	0.48	0.50
Rmse	0.51	0.53	0.48	0.52	0.52

Note. Standard errors in parentheses
* p<0.05, **p<0.01, *** p<0.001

For all 5 DRGs, there is a mixed relationship between measures of quality and the net amount billed. For the two measures of quality, Patient Experience of Care Domain Score and readmission rate, the coefficients are highly significant for the performance score while generally insignificant for readmission rate. Patient Experience of Care Domain Score is patient supplied data that focuses factors such as communication with nurses, communication with doctors, staff responsiveness, pain management, and communication about medicines, discharge information and hospital cleanliness. This illustrates how a high Patient Experience of Care Domain Score translates into increased WTP and therefore higher billing from the hospital. This also underscores the difference between the perceived quality and the actual quality of care. While the Patient Experience of Care Domain Score measures the perceived quality, the readmission rate captures the actual quality provided. This could explain why most literature on the direction of association between health care cost and quality has been uneven – most analysis have lumped together perceived and actual measures of quality. Skinner (2011) find that the association between cost and quality is negligible to moderate, regardless of whether the direction is positive or negative. Our analysis shows no relationship between the net price and the actual quality. Our findings that the readmission rate for all 5 DRG including pneumonia and heart failure is insignificant is consistent with Chen et al. (2010) who, using 2006 data on Medicare patients, find that there is no relationship between cost and readmission rate for these DRGs. However, due to lack of good information on quality(Cutler et al., 2010) and accurate measures of cost (Capps et al., 2003), previous studies have been limited to inadequate and inaccurate estimates of both cost and quality (Hussey et al., 2013). Our study bridges this gap by taking hospital charges as given and using simple but more accurate measures of actual and perceived quality, namely risk adjusted readmission rates and Patient Experience of Care Domain Score. However, to shed more light on the optimal allocation of scarce health care resources to achieve the best health outcomes, future studies should focus on what types of spending are most effective in improving quality and what types represent waste.

Provider level characteristics such as hospital ownership and average Medicare payment across all hospital patients and DRGs in a given hospital are all significant at the 0.1% confidence level. The presence or absence of emergency services and the provider location – urban or rural – has no significant effect on the average net per patient billing. As expected, government owned hospitals are likely to bill 20-23% less across all 5 DRGs while private for profits are likely to bill patients about 26% higher compared to private nonprofit hospitals. These results are consistent with Sloan's (1998) analysis on hip fracture, stork, coronary heart disease and congestive heart failure. His findings illustrates that the cost of care in for-profit hospitals is, on average, the highest with private nonprofits exhibiting a similar trend. Patients admitted to government hospitals incurred less costs on average. Horwitz et al. (2009) and Newhouse (1970) find evidence that not-for-profit hospitals may in fact maximize output in this manner, enabling them to maximize both on quality and profits. Additionally, the insignificance of emergency services further supports our claim that providers are less likely to be cross-subsidizing as we would expect the presence of emergency services to result to increased prices across all DRGs. This is in contrast with David et al.'s (2011) research, which uses patient-level data from general short-term hospitals in Arizona and Colorado, of cross-subsidization between unprofitable services and highly profitable ones. However, Altman et al.'s (2006) study on long term hospital cross-subsidization strategies revealed a decreasing desire to cross-subsidize and more focus on profitable services.

The number discharged for each of the 5 DRGs is highly significant. A one point increase in amount billed leads to between 0.1% and 0.2% increase in the number patients for the given DRG. This points to a case where with a lack of clear quality signals, consumers associate quality with price. Since provision of such quality is expensive, consumers presume that higher quality hospitals will evidence higher expenses and since providers assume consumers to be price insensitive, higher price will be evident (Noether, 1988).

Interesting but consistent patterns emerge on the population's socioeconomic factors. Providers located in areas with high percentage of white population bill lower prices while there is no significant effect for populations with high percentages of African Americans and Latinos. Median household income has a small but significant positive effect on amount billed. This is consistent with Ray et al. (2006) finding that patients' preferences and hence their WTP are influenced the patient's socio-demographic characteristics (e.g. age, sex, race, income) and prognostic understanding (Wright et al., 2010). This allows providers to effectively price discriminate and depending on the consumer's or their representative's bargaining power, the provider can charge different prices along the demand curve. Medicare has the highest bargaining power and therefore is able to negotiate very low prices. MCOs have a high bargaining power while self-paying patients have low to no bargaining power and are therefore made to pay the full price as indicated in the Chargemaster. We find evidence that providers take a slice of the consumer's willingness-to-pay or surplus depending on the consumer's vulnerability (Capps et al., 2003).

This establishes support for antitrust laws which prevent mergers and acquisition, since big hospitals, although we expect them to have economies of scale, instead use their market power to charge high prices or negotiate favorable deals. The major antitrust statutes of the United States are the Sherman Act (1890), the Clayton Act (1914), and the Federal Trade Commission Act (1914). The Sherman Act prohibits attempts to restrain trade and attempts to monopolize. The Clayton Act prohibits price discrimination, tying, or exclusive dealing that substantially lessen competition or create a monopoly. It also prohibits mergers or other combinations that could reasonably be expected to reduce competition or create a monopoly. Ho et al. (2013) find that increasing competition reduces hospital prices on average, but that the most attractive hospitals can leverage increased competition to negotiate higher rates. This bargaining effect creates incentives for further hospital consolidation and implies that hospital market power can impact prices even in markets with many insurers. All these policies are focused on regulating the supply side of the healthcare industry.

The hospital market is faced with a combination of a heterogeneous product with heterogeneous preferences which bestows the provider with market power (Dranove et al., 1992). Patients choose sellers who produce the type of services and have characteristics which best match their preferences and give them the highest utility. This gives the provider market power as switching to another seller reduces a patient's utility. The lesser substitutable are sellers for one another, the greater the degree of market power, i.e., the lower the elasticity of demand a provider faces (Gaynor et al., 1999). However, this result is suggestive, but not definite, since there is no insurance in their formulation. Capps et al. (2003) offer a more definitive analysis by examining how providers use their market power to exploit consumers' willingness-to-pay (WTP) in their negotiations with healthcare providers. He concludes that hospitals that deliver greater incremental value to Managed Care Organizations (MCOs) and therefore to consumers can presumably extract more profits from these negotiations in the form of higher prices and/or fewer quantity restrictions. Our findings show that providers further exploit consumer's (both insured and uninsured) willingness-to-pay (WTP) by charging them differential prices. Hospitals in places with populations with high median income and larger numbers of patients discharged are generally billed high. Whether the reason for this is to cross-subsidize, maximize on quality and/or profits is a subject for further research.

Table 5.2:
State dummies with Colorado as the reference state

State	lnnetwtp194	lnnetwtp292	lnnetwtp392	lnnetwtp641	lnnetwtp690
Alabama	-0.19	-0.475***	-0.313**	-0.494***	-0.374***
Arkansas	-0.44	-0.670***	-0.500***	-0.679***	-0.589***
Arizona	0.1	0.07	0.11	0.09	0.09
California	0.625***	0.479***	0.572***	0.450***	0.524***
Alaska	0.23	0.32	0.1	-0.24	0.05
Connecticut	-0.658***	-0.607***	-0.558***	-0.637***	-0.615***
Delaware	-0.733**	-0.761***	-0.565**	-0.680***	-0.756**
Florida	0.07	-0.12	0.09	-0.07	-0.01
Georgia	-0.19	-0.413***	-0.17	-0.353***	-0.287***
Hawaii	0.07	-0.19	0.09	0	0.11
Iowa	-0.451***	-0.492***	-0.339***	-0.562***	-0.468***
Idaho	-0.616***	-0.483***	-0.472**	-0.611***	-0.594***
Illinois	-0.207*	-0.326***	-0.236**	-0.381***	-0.270***
Indiana	-0.392***	-0.562***	-0.418***	-0.598***	-0.436***
Kansas	-0.13	-0.295**	-0.242*	-0.373**	-0.280**
Kentucky	-0.527***	-0.645***	-0.504***	-0.625***	-0.583***
Louisiana	-0.230*	-0.497***	-0.368**	-0.594***	-0.383***
Massachusetts	-1.607***	-1.638***	-1.327***	-1.522***	-1.662***
Maine	-0.600***	-0.661***	-0.578***	-0.689***	-0.615***
Michigan	-0.849***	-0.975***	-0.746***	-0.900***	-0.842***
Minnesota	-0.419***	-0.382***	-0.367***	-0.455***	-0.464***
Missouri	-0.15	-0.306**	-0.18	-0.351***	-0.268**
Mississippi	-0.15	-0.401***	-0.354**	-0.446***	-0.344**
Montana	-0.645***	-0.667***	-0.563***	-0.650***	-0.622***
North Carolina	-0.477***	-0.654***	-0.394***	-0.554***	-0.491***
North Dakota	-0.960***	-1.154***	-0.814***	-1.096***	-1.063***
Nebraska	-0.14	-0.352*	-0.369*	-0.492***	-0.376**
New Hampshire	-0.603***	-0.637***	-0.482***	-0.530***	-0.547***
New Jersey	0.511***	0.410***	0.472***	0.471***	0.497***
New Mexico	-0.24	-0.362*	-0.34	-0.320*	-0.26
Nevada	0.320*	0.188*	0.259**	0.16	0.241**
New York	-0.627***	-0.617***	-0.615***	-0.559***	-0.556***
Ohio	-0.580***	-0.622***	-0.503***	-0.629***	-0.660***
Oklahoma	-0.304**	-0.473***	-0.405***	-0.609***	-0.470***
Oregon	-0.25	-0.311**	-0.222*	-0.277*	-0.273**
Pennsylvania	-0.275**	-0.416***	-0.340***	-0.396***	-0.357***
Rhode Island	-0.541**	-0.582***	-0.510**	-0.604**	-0.579***
South Carolina	0.02	-0.214*	-0.13	-0.286**	-0.187*
South Dakota	-0.25	-0.309*	-0.286*	-0.450**	-0.275*
Tennessee	-0.370***	-0.562***	-0.368***	-0.503***	-0.476***
Texas	-0.04	-0.15	-0.04	-0.248*	-0.174*
Utah	-0.660***	-0.638***	-0.573***	-0.799***	-0.664***
Vermont	-1.360***	-1.062***	-0.727***	-0.967***	-1.244***
Virginia	-0.470***	-0.642***	-0.406***	-0.540***	-0.522***
Washington	-0.19	-0.22	-0.09	-0.15	-0.15
West Virginia	-0.897***	-0.987***	-0.844***	-0.946***	-0.973***
Wisconsin	-0.452***	-0.506***	-0.352***	-0.459***	-0.507***
Wyoming	-0.28	-0.604**	-0.287*	-0.25	-0.14

To capture the ability of different regions to charge varying prices, we include state dummies using Colorado as the reference state. The results are presented in table 5.2. All but 18 of the 50 regions are highly significant meaning that they on average charge prices that are significantly different from Colorado. The general trend is that in certain states, the net charge is high and the per capita spending is low or vice versa. Most states have a lower price compared to Colorado with just a few with higher billing. Compared to Colorado, Massachusetts has the lowest price differentials, with the net billing for simple pneumonia and pleurisy almost 160% lower. These findings are puzzling given that Massachusetts has the second highest per person health spending per capita (Centers for Medicare and Medicaid Services, 2011). This is reflective of the 2006 Massachusetts health care reform law that among other things, established the Commonwealth Health Insurance Connector Authority which acts as an insurance broker to offer free, highly subsidized and full-price private insurance plans to Massachusetts residents. This reduces the price differential that providers can charge by exploiting the consumer's willingness to pay. However, as demonstrated by Massachusetts' high spending per capita, this results to providers charging high uniform prices. While the Massachusetts health care reform has succeeded in expanding coverage to nearly all state residents, provider payment reforms are needed to bring the growing prices under control. The trend in Massachusetts is also observed in other states such as Vermont, California and New Jersey where despite the amount billed above the cost been lower than Colorado, the average per capita spending is very high. In the case of California, consolidated efforts to force providers to compete on price have compelled providers to charge similar prices that are high but uniform across the region.

Conclusion

In an article in the *Wall Street Journal (2004),* William McGowan, the chief financial officer of UC Davis, a nonprofit hospital in Sacramento California, is quoted saying that the nonprofit sets her prices on the principle that the higher the unit price of a pharmaceutical or supply, the lower the markup. Given this principle, expensive DRGs, such as the ones analyzed here are expected to have very small to no mark up. One would also expect that the price not vary a lot from one provider to another. Our analysis shows price differentials of as much as 40 times exist even within expensive DRGs such as kidney diagnosis and heart failure. This has led to an influx of campaigns aimed at increasing the information available to consumers in an effort to make consumers price shop and providers compete on price. Third party organizations such as Healthcare BlueBook analyze and post average prices that each provider charges for a given DRG. Other platforms such as PricingHealthcare.com use user supplied bills to offer its users average prices across hospitals. Whether this will save the healthcare industry remains unknown. Initiatives such as price transparency could have severe negative consequences by forcing hospitals to run high deficits (Altman et al., 2006) and forgo quality in pursuit of low prices.

Although providers claim to heavily cross-subsidize (Wall Street Journal, 2004), our analysis does not find any evidence of cross-subsidization. Through cross-subsidization, hospitals can treat Medicare and Medicaid patients at less than cost, care for the uninsured, and provide other money-losing services. However, if their ability to do so is diminished, the U.S healthcare industry could begin to resemble the airline industry: severely cutting costs, eliminating services, and suffering financial instability. Relevant policy framework might benefit from encouraging this practice.

Establishing a range of prices that hospitals can charge their customers could help bring hospital prices under control. Since competition on price reduces quality, policy makes should aim to shift competition away from pricing and into quality. Our results also serve to caution many initiatives, both by the private and public sector, to force providers to compete on prices. These increased campaigns to sensitize consumers on hospital prices might have further detrimental effects if they result in lower quality. This is in line with findings by Dranove et al. (1992) that increased price information can either decrease or increase welfare depending on which effect outweighs the other. This opposing effect on price seems intuitive since although customers are price insensitive, there is a constraint in price and as providers produce a more costly output and push prices up, standard competitive pressure pushes them down. The USA health care market exhibits a trend where increased information on prices variations has little effect on consumers' decisions, in large partly due to insurance coverage (Pauly, 1997). Additionally, such policy will dissuade hospitals from capitalizing on consumer's vulnerability to charge high prices. In fact, this is in agreement with Cooper et al. (2011) findings that hospital competition in markets with fixed prices can lead to improvements in clinical quality. However, it is important to emphasize that this will work only if regulatory authorities try (and succeed) to set prices that compensate providers for their costs.

Our analysis explains only 52% of the price variation. Future research that includes physician characteristics might better explain hospital price variations. Another limitation of our study is that we do not use patient level data. This study can be enriched by examining how patients' preferences might influence their decision-making while also factoring healthcare system characteristics such as Medicare reimbursement policies, the density of hospice services and medical specialists.

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