NBER WORKING PAPER SERIES

WHY DON'T COMMERCIAL HEALTH PLANS USE PROSPECTIVE PAYMENT?

Laurence Baker
M. Kate Bundorf
Aileen Devlin
Daniel P. Kessler

Working Paper 22709
http://www.nber.org/papers/w22709

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
October 2016

We would like to thank George Triantis for helpful conversations. All errors are our own. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

At least one co-author has disclosed a financial relationship of potential relevance for this research. Further information is available online at http://www.nber.org/papers/w22709.ack

Why Don't Commercial Health Plans Use Prospective Payment?
Laurence Baker, M. Kate Bundorf, Aileen Devlin, and Daniel P. Kessler
NBER Working Paper No. 22709
October 2016
JEL No. I1,I13

ABSTRACT

One of the key terms in contracts between hospitals and insurers is how the parties apportion the financial risk of treating unexpectedly costly patients. "Prospective" payment contracts give hospitals a lump-sum amount, depending on the medical condition of the patient, with limited adjustment for the level of services provided. We use data from the Medicare Prospective Payment System and commercial insurance plans covering the nonelderly through the Health Care Cost Institute to measure the extent of prospective payment in 303 metropolitan statistical areas during 2008-12. We report three key findings. First, commercial insurance payments are less prospective than Medicare payments. Second, the extent of prospective payment in commercial insurance varies more than in Medicare, both across hospitals and geographic areas. Third, differences in prospective payment across hospitals are positively associated with the extent of hospital competition, the share of the hospital's commercially insured patients covered by managed-care insurance, and the share of the hospital's patients covered by Medicare's Prospective Payment System.

Laurence Baker
Department of Health Research & Policy
HRP Redwood Bldg, Rm T110
Stanford University
Stanford, CA 94305-5405
and NBER
laurence.baker@stanford.edu

M. Kate Bundorf
Health Research and Policy
Stanford University
HRP T108
Stanford, CA 94305-5405
and NBER
bundorf@stanford.edu

Aileen Devlin
Massachusetts Institute of Technology
Department of Economics
50 Memorial Drive
Cambridge, MA 02142
aileendevlin@gmail.com

Daniel P. Kessler
Stanford University
434 Galvez Mall
Stanford, CA 94305
and NBER
fkessler@stanford.edu

Introduction

One of the key terms in contracts between hospitals and insurers is how the parties apportion the financial risk of treating unexpectedly costly patients. At one extreme are contracts that pay on a unit-price basis, depending on the treatments that the hospital and its affiliated physicians determine are medically necessary at the point of service. These payment systems are sometimes described as "fee-for-service" or "low-powered." At the other extreme are contracts that pay on a lump-sum basis, independent of the level of services provided, depending only on the medical condition of the patient. These payment systems are sometimes described as "prospective" or "high-powered."

In practice, payment systems are neither purely fee-for-service nor purely prospective, but some mix of the two. The optimal mix of fee-for-service and prospective payment in any particular case involves a tradeoff. On one hand, more prospective payment gives hospitals incentives to contain costs; on the other hand, it creates incentives to skimp on the care of and avoid patients who are difficult to treat (Newhouse 1996; Ellis 1998).

Prospective payment has been extensively studied in the context of the Medicare program, which has paid hospitals according to its own Prospective Payment System (PPS) since 1984. However, much less attention has been given to the use of prospective payment by commercial insurance plans. This is not surprising. The terms of commercial insurance contracts are the result of confidential bargaining, and until recently, even the most basic information about these contracts was unknown to most researchers.

This paper seeks to fill this gap. We use data from the Health Care Cost Institute (HCCI) on more than 5 million claims from 1,288 hospitals to construct a measure of the

extent of prospective payment for inpatient hospital services supplied to nonelderly commercially-insured patients in 303 metropolitan statistical areas for 2008-12. For each hospital in each year, we estimate a regression of the log of the hospital's allowed amounts (including patient copayments) on a set of Diagnosis-related Group (DRG) fixed effects; the R^2 from these regressions are the hospitals' commercial insurance "prospectivity." We also construct an analogous measure of the extent to which PPS pays hospitals prospectively; because PPS is the largest single hospital payment system in the U.S., it is a natural benchmark against which commercial prospectivity can be compared.

Then, we examine the empirical relationship between our measure of prospectivity and factors that economic theory suggests might affect the terms of incentive contracts. One class of models predicts that competition among hospitals can affect the use of prospective payment, because it may be in the interest of a party with bargaining power to demand changes to contract terms in addition to high prices (Choi and Triantis 2012). Economic theory also predicts that preferred-provider (PPO) insurance products with broad networks, which give insurers less bargaining power with hospitals, can have the same effect. Finally, research on "spillovers" shows how payment systems can influence the care of patients other than those to which they apply (e.g., Chernew, Baicker, and Martin 2010). For this reason, the share of patients at a hospital paid by PPS could affect the extent of prospective payment by commercial insurance.

We test the validity of these theories by matching to our prospectivity indices information on hospital competition, patient insurance mix, and patient demographic and hospital characteristics. We estimate the effect of these factors on our commercial and

Medicare prospectivity indices, holding constant hospital- and time-fixed effects. We evaluate the economic importance, as well as the statistical significance, of these factors.

Our paper proceeds in four parts. Part I discusses the fundamental rationale behind prospective payment and the literature on the extent of variation in and the determinants of contract structure in markets for health care. Part II explains how we use data from HCCI on commercial insurance claims from Aetna, Humana, and UnitedHealthcare to characterize the extent of prospective payment, and how we supplement the HCCI data with other information on hospitals and the concentration of their markets. Part III presents models of the determinants of hospital payment systems and our results, and Part IV concludes.

I. Previous research on prospective payment systems and determinants of contract structure

A large body of theoretical work, summarized by Newhouse (1996), explains the fundamental tradeoff associated with prospective payment for hospital services. Models of hospital payment systems generally assume that the unit prices of treatments are greater than marginal cost, hospital and physician efforts toward cost control are unobservable, and contracts that specify what treatments are appropriate are incomplete. Under these assumptions, purely fee-for-service payment encourages treatments that provide minimal clinical benefit and too little cost control. However, purely prospective payment encourages hospitals to avoid and skimp on the care of those who are costly to treat. The conclusion from these models is that the optimal payment system will be mixed, making hospitals responsible for some, but not all, of the risk of treating unexpectedly costly patients.

The empirical effects of prospective payment have been extensively studied in the context of the Medicare program, which has paid hospitals according to the Medicare PPS since 1984. As McClellan (1997) points out, although PPS is prospective in name, in practice PPS reflects the mixed approach suggested by economic theory. A hospital's PPS payments are primarily based on its patients' DRGs, but many DRGs are related not to diagnoses but to the performance of specific intensive procedures. In addition, PPS provides for additional "outlier" payments that compensate hospitals directly, at least in part, when a patient has unexpected need for costly additional services. Both of these factors lead PPS to have some fee-for-service aspects.

Economists and health policy researchers have generally concluded that PPS has been a success, relative to the almost purely fee-for-service payment system it replaced. According to a review of the literature by Pauly (2000, p. 557), PPS is widely acknowledged to have reduced hospitals' lengths of stay, profit margins, and cost growth without significant adverse consequences for patient health outcomes. In Europe, public insurers have been gradually replacing both global budgets and fee-for-service payment for hospital services with DRG-based systems like PPS (Charlesworth, Davies, and Dixon 2012).

Fewer papers have studied commercial health insurance payment systems. Clemens, Gottlieb, and Molnar (2015) find that the schedule of payments for physician services used by Blue Cross-Blue Shield of Texas is benchmarked to Medicare's Resource Based Relative Value Scale for 65 percent of spending. In an analysis of the hospital payment systems used by four large national insurers in selected metropolitan areas, Ginsburg (2010) finds that commercial insurance payments to hospitals are less prospective than PPS. According to him, commercial insurers pay hospitals by DRGs

(either with or without outlier payments) in approximately one-third of cases, ranging from 6 percent in Los Angeles to 44 percent in Milwaukee; the remainder of payments are made on a per diem or pure fee-for-service basis.

As Ginsburg (2010) observes, this presents a puzzle. In interviews, insurers expressed a preference for DRG-based payment, and because Medicare and almost all Medicaid programs pay in this way, its adoption for commercially-insured patients would reduce hospitals' transaction costs. Previous research on PPS is consistent with this anecdotal evidence: there appears to be unclaimed gains from commercial insurance payment system reform that could be divided among the parties.

One possible explanation is that hospitals with market power can earn higher profits by demanding not only higher prices but also fee-for-service contracts. Although this proposition is inconsistent with standard models in which sellers extract rents purely through higher prices (also known as the "one monopoly profit" hypothesis), these models may not capture the complexities of markets for health services. For example, if people who value health services more would prefer their insurer used lower-powered contracts with providers, then a provider with market power could increase profits by offering a menu of contracts to price discriminate among insurers. And even if people's valuations of health services are homogeneous, it may be in a monopoly seller's interest to offer contract terms that would differ from the competitive ones if doing so affected the price elasticity of demand. Both of these examples can be viewed as special cases of a market for a good with two attributes where the demand for the attributes is interrelated (Spence 1975). If this explanation is correct, then failures of competition in hospital markets might lead not only to high prices – as previous research (e.g., Cooper et al.

2015) has shown – but also to fee-for-service payment that may discourage efficient production and contribute to health care cost growth.

Economic theory also suggests that PPO insurance with broad networks will be more likely to use lower-powered payment approaches. An insurer designing a broad-network product has less bargaining leverage with hospitals, thereby enabling them to exercise what market power they have more fully. In addition, by reducing any single hospital's patient volume, broad-network products increase both the risk and the transaction costs to the hospital of payment reform. For these reasons, understanding the extent to which commercial insurance hospital payment systems are prospective, and the determinants of commercial payment systems' prospectivity, are important health policy issues.

Two empirical papers present evidence consistent with this explanation. Gift, Arnould, and DeBrock (2002) analyze 1995 data on contract form from a large insurer in Washington state, matched with data on hospital characteristics from the Washington Department of Health, for 83 acute-care facilities. They found 34 of the 83 hospitals used some form of prospective payment, and that the number of hospitals within 10 miles was positively associated with the probability of prospective payment. Town, Feldman, and Kralewski (2011) analyze data from 83 medical groups that contracted with Minnesota Blue Cross's "Blue Plus" plan in 2001, matched with data on medical group characteristics from the Community Tracking Survey. They found that share of revenue from capitation was positive associated with the number of physicians in the practice relative to the total number of physicians within 15 km, and with physicians' self-reported assessment of their practice's market power.

Although these papers are suggestive, both have significant limitations. Both are based on selected small samples of facilities or practices from a single geographic area, and data from an earlier time period in which markets for health services were different from today. The research design of both is cross-sectional, leaving open the possibility that the observed association between payment system and competition may be due to other, unmeasured characteristics of hospitals or areas. Finally, neither study provides a general way to quantify the extent of prospective payment in commercial insurance and compare it to a practical benchmark like PPS.

Our paper seeks to address these limitations. We use nationwide data on payments to hospitals from HCCI to characterize the payment systems used by Aetna, Humana, and UnitedHealthcare. The HCCI data includes information on the inpatient hospital claims for approximately 40 million individuals from all 50 states from 2008-2012, accounting for 27% of the nonelderly population covered by commercial insurance, making it one of the largest data bases on the privately insured ever assembled. We also use data from the Medicare program in order to compare the extent of prospective payment in HCCI to the extent of prospective payment in PPS, and investigate whether prospective payment is correlated with hospital market competition and patient insurance. We hold constant hospital fixed effects, in order to control for all time-invariant characteristics of hospitals and geographic areas, as well as patient insurance type and a set of time-varying hospital characteristics.

II. Data

We use data from three sources: HCCI, the American Hospital Association (AHA) Survey, and the Medicare program. Each HCCI hospital claim includes the Diagnosis Related Group (DRG) and the "allowed amount," representing the actual amount paid to the facility by the plan plus any deductibles or copayments. The HCCI data also contain information on each patient's age, gender, and type of insurance (health maintenance organization (HMO), preferred provider organization (PPO), or point-of-service (POS)).

We follow McClellan (1997) and characterize the extent of each hospital's prospective payment by the share of its payments' variance that is explained by its patients' DRGs. This approach has several strengths. First, contracts between hospitals and insurers share costs of treating difficult patients in many ways. Although some cost sharing occurs through outlier payments, cost sharing also occurs other terms such as all-inclusive per diem rates. This approach aggregates these different forms of cost sharing into a single index proportional to revenues governed by each. Second, our commercial insurance claims contain information on the DRG of each patient's admission, even for claims not paid on a DRG basis. Because DRGs are the basis for PPS (as well as most states' Medicaid hospital payment systems), they have become a standard claims characteristic. Third, for the same reason, DRG-based payment is a practical option against which commercial insurance contracts can be evaluated.

For each hospital in each year 2008-2012, we calculate two prospective payment indices: one for commercial insurance and one for PPS. For each hospital in each year 2008-2012, we estimate two regressions of payments (including deductibles and copayments made by beneficiaries) on a set of DRG fixed effects. The R^2 from the

regression of the log of commercial payments is the hospital's commercial prospectivity; the R^2 from the regression of the log of PPS payments is the hospital's PPS prospectivity.

To each index, we match data on the distribution of the hospital's patients' age, gender, and insurance type; on hospital characteristics from AHA; and on hospital markets derived from Medicare claims. AHA hospital characteristics include teaching status, ownership (private nonprofit, private for-profit, or public), number of beds (<100, 100-300, >300), system status, and vertical integration with physicians. Following previous work (Baker, Bundorf, and Kessler 2014), we divide vertically integrated hospitals into four groups: fully integrated organizations, closed physician/hospital organizations, open physician/hospital organizations, and independent practice associations. We use Medicare inpatient hospital claims from 2008-2012 to construct a measure of hospital market competitiveness, equal to the patient-flow-weighted average of the Hirschman-Herfindahl indices of admissions in each patient residential zip code served by the hospital, according to the method in Kessler and McClellan (2000). We limit our analysis to general medical/surgical, non-federal hospitals in metropolitan statistical areas outside of Maryland[1] with at least 100 HCCI admissions in all of the years 2008-2012.

Tables 1 and 2 report the mean, standard deviation, and percentiles (for selected variables) of the variables used in analysis. All of these variables are measured at the hospital level; all descriptive statistics are weighted by the number of admissions. Table 1 shows that the extent of prospectivity in commercial insurance payments to hospitals is lower and more variable than the extent in PPS. In 2008, for example, the average R^2

[1] Hospitals in Maryland are exempt from Medicare PPS. Medicare and commercial insurance hospital reimbursement schedules in Maryland are determined by an all-payer system governed by the Maryland Health Services Cost Review Commission.

from a regression of commercial claims' allowed amounts on a set of DRG indicator variables is 0.747; by comparison, the average R^2 from a regression of total payments under Medicare PPS on DRG indicators is 0.952. Even those hospitals with the most prospective commercial payments were not paid by commercial insurers as prospectively as they were paid by PPS: the 90th percentile of commercial prospectivity across hospitals is 0.841, whereas the 10th percentile of PPS prospectivity is 0.939. This is not surprising: Medicare uses a single nationwide reimbursement system that is based on DRGs, whereas commercial insurers use multiple reimbursement systems which may or may not be DRG-based. By 2012, the level of commercial prospectivity had increased by almost one-half of a standard deviation, to 0.776; this occurred primarily because of increases in prospectivity at the bottom of the distribution.

Table 1 also reports the 2008 and 2012 distributions of the hospital Hirschman-Herfindahl index; the share of commercial admissions attributable to HMO, POS, and PPO enrollees; the share of Medicare admissions (the number of Medicare admissions divided by the total as reported to AHA); and the number of commercial and Medicare PPS admissions per DRG. The most striking trend in these variables is the shift among the commercially insured from HMO and PPO to POS insurance. The prevalence of POS insurance increased by 11.5 percentage points, whereas the prevalence of HMO and PPO insurance each decreased by around 6 percentage points. Table 2 reports 2012 means and standard deviations of the other independent variables, including the characteristics of commercial and Medicare PPS patients and of hospitals.

Table 3 shows that the extent of prospectivity in hospital reimbursement varies not only across hospitals but also across geographic areas. The table reports selected characteristics of the five largest CBSAs, in terms of commercial admissions, in each

quartile of the prospectivity distribution. The table shows that the weighted-average share of hospital payment variance explained by DRG dummies ranges from 70-73% in low-prospectivity areas (such as Miami-Fort Lauderdale-West Palm Beach, FL) to 80-84% in high-prospectivity areas (such as Minneaspolis-St. Paul-Bloomington, MN). The table also shows that Medicare PPS prospectivity is roughly constant across areas, ranging from 94-96% nationwide. Finally, the table shows that the extent of prospectivity is not obviously related to the average commercial price of a hospital admission. According to the fourth column, some CBSAs in both the lowest and the highest prospectivity quartiles have high commercial prices, and some have low commercial prices. However, this simple, cross-sectional bivariate analysis does not account for variation across areas or over time in insurance types or the characteristics of patients, hospitals, or hospital markets, and so does not indicate whether there is an association between hospital competitiveness and the extent of prospective payment.

III. Models and Results

For this reason, we model the commercial payment prospectivity of hospital *i* in year *t*, Y_{it}, as linear functions of the following variables, weighting each observation in the regression by the number of commercial admissions:

$$Y_{it} = \alpha_i + \theta_t + HHI_{it}\beta + X_{it}\gamma + V_{it}\delta_1 + W_{it}\delta_2 + Z_{it}\delta_3 + \varepsilon_{it},$$

with

α_i hospital fixed effects;

θ_t time fixed effects;

HHI_{it} Hirschman-Herfindahl index;

X_{it} insurance mix -- the proportion of commercial patients with HMO, POS, or PPO insurance (reference category is proportion PPO) and the proportion of all patients who are Medicare PPS[2];

V_{it} age and gender mix -- the proportion of patients aged 0-17, 18-24, 25-34, 35-44, 45-54, and 55-64 years (reference category is proportion aged 55-64) and female;

W_{it} hospital characteristics (described above);

Z_{it} number of admissions per DRG[3]; and

ε_{it} an error term which we allow to be arbitrarily correlated within each hospital over time.

We also estimate the parameters in the equation above substituting hospitals' PPS prospectivity for their commercial prospectivity as a placebo test. If the estimates of the effects of HHI_{it} and X_{it} from the commercial models are causal, then those variables should have no impact on PPS prospectivity: PPS is a single, national program that is defined by statute, so market factors should not affect it. In the models that use PPS prospectivity as the dependent variable, we omit the proportion of commercial patients with HMO, POS, or PPO insurance; substitute the proportion of patients aged 65-69, 70-74, 80-89, and 90-99 years in Medicare (reference category is proportion aged 75-79) for the commercial patient age mix; and weight each observation by the number of PPS admissions.

Table 4 presents estimates of the hospital HHI, insurance type, and time on the extent of commercial and PPS prospectivity. According to the leftmost two columns,

[2] We include the proportion of patients who are Medicare PPS to test for the presence of spillovers from Medicare to commercial insurance.

[3] We include the number of admissions per DRG to account for the possibility of a mechanical relationship between our measure of prospectivity and the concentration of admissions across DRGs within a hospital, which could bias our results if the concentration of admissions across DRGs within a hospital were correlated with the concentration of admissions across hospitals.

hospital market competition is significantly associated with increases in commercial prospectivity, holding constant hospital- and time-fixed effects, insurance type, and the characteristics of patients and hospitals. In particular, moving a hospital from the 75th to the 25th percentile of the 2012 HHI would lead to an increase in commercial prospectivity of 1.2 percentage points.[4] Insurance type also has a statistically significant effect on commercial prospectivity. For plausible shifts in the mix of a hospital's commercial payors, the effect of insurance type is small: moving half of the average hospital's 2012 PPO patients to HMO or POS insurance (i.e., 6 percentage points) would lead to an increase in commercial prospectivity of 0.4 percentage points.[5] The effect of the proportion of patients paid under PPS is somewhat larger. For example, increasing the proportion of PPS patients from the 25th to the 75th percentile (i.e., by 10 percentage points) would lead to an increase in commercial prospectivity of 1 percentage point.[6] Taken together, these three factors explain an economically important (although not a majority) of the differences in prospectivity across hospitals. In 2012, for example, plausible shifts in hospital market competitiveness and insurance type could account for approximately 2.6 percentage points of the 8.9-percentage-point difference between the 25th and 75th percentile of the prospectivity distribution, or approximately 30 percent.

By contrast, according to the rightmost two columns of Table 4, hospital HHI and the proportion of patients paid under PPS do not have a statistically significant or economically important effect on PPS prospectivity. This is consistent with a causal interpretation of the estimated effects of HHI and insurance type on commercial prospectivity; the observed correlation between these variables in the commercial context

[4] $0.012 \approx (0.408 - 0.235) * -0.068$.
[5] $0.004 \approx 0.06 * 0.060$.
[6] $0.010 \approx 0.10 * 0.097$.

is not due to an artifact of our prospectivity measure, or to differential trends in case mix or hospital payments across hospitals over time, at least insofar as these trends would be reflected in Medicare PPS payments.

IV. Conclusion

Health economists have analyzed extensively the implications of "prospective" or "high-powered" payment for hospital services. A vast literature has modeled theoretically the tradeoffs associated with prospective payment, and many studies have investigated the empirical consequences of Medicare's adoption of its own particular Prospective Payment System (PPS). Wide agreement in the health policy community that PPS successfully lowered relatively unproductive health spending has led researchers to propose extending the principles underlying it, in the form of "bundled payment" systems (Miller et al. 2011).

Despite this, much less attention has been given to the determinants, or even the extent, of prospective or high-powered payment by commercial insurance plans. This gap is important. There is some evidence that commercial plans make less use of high-powered payment incentives than Medicare, and theoretical reasons to believe that this is due at least in part to failures in markets for hospital services or health insurance. Yet, little work has sought to test whether these hypotheses are correct, or even to assess the extent of prospective payment in commercial insurance at all.

In this paper, we use data from HCCI, the Medicare program, and the American Hospital Association survey to investigate the association between the extent of prospective payment in commercial insurance, patient insurance mix, and hospital market competitiveness. We report three key findings. First, the extent of prospectivity in

commercial insurance payments to hospitals is lower and more variable than the extent in PPS, although the extent of commercial insurance prospectivity has been slowly increasing over time. Second, the extent of prospectivity in payment systems varies not only across hospitals but also across geographic areas. Third, differences in hospital-level payment prospectivity is positively associated with three factors: the extent of hospital competition, the share of the hospital's commercially insured patients covered by managed-care insurance, and the share of the hospital's patients covered by PPS. We show that plausible differences in these three factors can explain around 30 percent of the variation in hospital-level prospectivity that we observe.

Our results have important implications for economic theory and public policy. The fact that hospitals facing less competition are more likely to be paid on a fee-for-service basis means that the "one monopoly profit" hypothesis does not accurately characterize markets for hospital services. This result also indicates a channel other than price through which hospital market power may affect social welfare: the terms of contracts with insurers. Although (as we discuss below) we are not able to say definitively whether the reduction in commercial payment prospectivity in uncompetitive hospital markets is harmful to consumers, the fact that even in competitive markets commercial payment prospectivity is significantly below that of PPS – which is widely viewed as a success – is cause for concern.

We also find that insurance mix significantly affects the extent of commercial payment prospectivity. Hospitals serving patients with HMO or POS insurance have higher-powered incentives than do those serving patients with PPO insurance. This finding is consistent with both economic theory and anecdotal evidence. PPOs generally have broader hospital networks than do HMO or POS products, which gives each

participating hospital less patient volume, thereby reducing insurers' bargaining power and increasing transaction and risk-bearing costs to hospitals. Recent analysis of a demonstration project to implement higher-powered payment incentives in commercial insurance contracts in California cited inadequate patient volume as the single largest reason the project did not succeed (Ridgely et al. 2014). In addition, we find that hospitals with a higher proportion of patients paid by PPS have higher-powered commercial payment incentives. This is consistent with evidence that changes to incentives for treatment of one patient population "spillover" to outcomes of other populations (e.g., Chernew, Baicker, and Martin 2010), and that changes in Medicare payment systems can facilitate private payment reform (Clemens and Gottlieb, forthcoming).

Our analysis has at least three limitations. First, we do not observe any actual contracts between insurers and hospitals; our analysis is based on a measure of contracts' payment incentives that we construct from claims data. Although there are strong reasons to believe that our measure is correlated with the terms of the underlying agreements, this is an assumption that we cannot test. Second, because our analysis is observational in nature, the association we observe between prospectivity, hospital market competition, and insurance mix may be due to an unobserved factor rather than a causal connection. To address this concern, we control for hospital- and time-fixed effects and the time-varying characteristics of hospitals and patient populations; nonetheless, we cannot rule out the possibility of an unobserved time-varying characteristic of hospitals or geographic areas that is correlated with both prospectivity and market structure. Third, because we do not examine patient health outcomes or health spending, we cannot make a definitive welfare assessment of the reduced

prospectivity we observe in uncompetitive hospital markets. Although previous empirical work on PPS suggests that the use of low-powered payment in commercial insurance is inefficient, future research should consider this hypothesis directly.

Table 1: Distribution of Selected Variables, 2008 and 2012

	mean	standard deviation	percentile 10	25	75	90
2008						
Commercial prospectivity	0.747	0.075	0.647	0.697	0.802	0.841
Medicare PPS prospectivity	0.952	0.015	0.939	0.949	0.968	0.974
Hospital HHI	0.371	0.131	0.238	0.273	0.428	0.536
Commercial % HMO	0.245	0.159	0.086	0.138	0.319	0.470
Commercial % POS	0.570	0.170	0.344	0.467	0.706	0.764
Commercial % PPO	0.184	0.148	0.062	0.088	0.228	0.372
% Medicare PPS	0.249	0.099	0.145	0.184	0.297	0.361
Commercial admits/DRG[1]	6.574	3.909	2.776	3.675	8.292	11.836
Medicare PPS admits/DRG[1]	11.979	5.408	6.479	8.307	14.422	18.751
Number of commercial admits[1]	960	1178	181	296	1135	2142
Number of Medicare PPS admits[1]	4051	2787	1269	2120	5249	7574
2012						
Commercial prospectivity	0.776	0.067	0.689	0.734	0.823	0.860
Medicare PPS prospectivity	0.957	0.015	0.939	0.949	0.968	0.974
Hospital HHI	0.359	0.124	0.235	0.271	0.408	0.514
Commercial % HMO	0.187	0.128	0.055	0.097	0.253	0.371
Commercial % POS	0.685	0.167	0.460	0.595	0.807	0.867
Commercial % PPO	0.128	0.141	0.028	0.045	0.149	0.291
% Medicare PPS	0.225	0.098	0.123	0.167	0.268	0.319
Commercial admits/DRG[1]	6.123	3.582	2.604	3.521	7.577	11.204
Medicare PPS admits/DRG[1]	11.322	5.221	6.225	7.862	13.562	17.596
Number of commercial admits[1]	836	1023	160	253	976	1909
Number of Medicare PPS admits[1]	3607	2541	1053	1865	4712	6689

Notes: 1. Number of admissions are the average for 1,288 general medical/surgical, non-federal hospitals in metropolitan statistical areas outside of Maryland with at least 100 HCCI and Medicare admissions in all of the years 2008-2012. All statistics except number of admissions are admissions-weighted.

Table 2: Descriptive Statistics for Other Variables Used in Analysis, 2012

	Mean (std dev)		Mean (std dev)
Patient demographic characteristics		Hospital characteristics	
Commercial claims		teaching	0.366
age 0-17	0.164 (0.077)	non-profit	0.770
age 18-24	0.070 (0.026)	for-profit	0.152
age 25-34	0.216 (0.065)	public	0.077
age 35-44	0.157 (0.032)	<100 beds	0.025
age 45-54	0.172 (0.052)	100-300 beds	0.307
age 55-64	0.222 (0.079)	>300 beds	0.668
female	0.641 (0.065)	fully-integrated with MDs	0.467
Medicare PPS claims		closed PHO	0.023
age 65-69	0.192 (0.041)	open PHO	0.070
age 70-74	0.190 (0.026)	system hospital	0.811
age 80-89	0.332 (0.048)		
age 90-99	0.081 (0.027)		
female	0.568 (0.036)		

Notes: See table 1.

Table 3: Five Largest Metropolitan Areas, By Prospectivity Quartile, 2012

CBSA Name	Commercial Prospectivity	Medicare PPS Prospectivity	Commercial Price Quartile	Number of Hospitals
Quartile 1 (lowest)				
Houston-The Woodlands-Sugar Land, TX	0.706	0.956	4	32
Miami-Fort Lauderdale-West Palm Beach, FL	0.701	0.966	3	38
St. Louis, MO-IL	0.728	0.960	1	20
San Antonio-New Braunfels, TX	0.709	0.961	2	7
San Jose-Sunnyvale-Santa Clara, CA	0.716	0.959	4	7
Quartile 2				
New York-Newark-Jersey City, NY-NJ-PA	0.752	0.962	4	63
Philadelphia-Camden-Wilmington, PA-NJ-DE	0.739	0.949	4	34
Orlando-Kissimmee-Sanford, FL	0.742	0.951	4	10
Tucson, AZ	0.733	0.967	1	6
San Francisco-Oakland-Hayward, CA	0.744	0.946	4	14
Quartile 3				
Chicago-Naperville-Elgin, IL-IN-WI	0.784	0.957	4	61
Dallas-Fort Worth-Arlington, TX	0.770	0.950	4	38
Atlanta-Sandy Springs-Roswell, GA	0.761	0.953	3	31
Phoenix-Mesa-Scottsdale, AZ	0.787	0.953	3	23
Washington-Arlington-Alexandria, DC-VA-MD-WV	0.765	0.948	3	17
Quartile 4 (highest)				
Minneapolis-St. Paul-Bloomington, MN-WI	0.811	0.950	4	21
Cincinnati, OH-KY-IN	0.819	0.947	3	16
Columbus, OH	0.838	0.948	3	12
Kansas City, MO-KS	0.802	0.958	2	17
Seattle-Tacoma-Bellevue, WA	0.826	0.941	4	17

Notes: see Table 1.

Table 4: Effect of Hospital Market Competition and Insurance Type on Prospective Payment

		Dependent Variable			
		Commercial Prospectivity		Medicare PPS Prospectivity	
Hospital HHI		-0.074 **	-0.068 **	0.008	0.004
		(0.034)	(0.035)	(0.007)	(0.006)
% HMO		0.044 *	0.060 **		
		(0.024)	(0.024)		
% POS		0.057 ***	0.057 ***		
		(0.015)	(0.016)		
% Medicare PPS		0.079 *	0.097 **	0.005 *	0.001
		(0.046)	(0.047)	(0.003)	(0.003)
Year					
	2009	-0.002	-0.002	0.006 ***	0.006 ***
		(0.002)	(0.002)	(0.000)	(0.000)
	2010	0.009 ***	0.008 ***	0.008 ***	0.008 ***
		(0.002)	(0.003)	(0.000)	(0.000)
	2011	0.017 ***	0.015 ***	0.009 ***	0.010 ***
		(0.003)	(0.003)	(0.000)	(0.000)
	2012	0.025 ***	0.022 ***	0.006 ***	0.007 ***
		(0.003)	(0.004)	(0.001)	(0.001)
Other independent variables		Hospital fixed effects	All	Hospital fixed effects	All

Notes: See table 1. N = 6440 = 1288 hospitals counties x 5 years. Heterscedasticity-consistent standard errors allowing for hospital-level clustering in parentheses. *, **, *** denote statistical significance at the 10, 5, and 1 percent levels, respectively.

References

Baker, Laurence, M. Kate Bundorf, and Daniel P. Kessler, 2014, Vertical Integration: Hospital Ownership of Physician Practices Is Associated With Higher Prices and Spending, Health Affairs 33(5):756-63.

Charlesworth, Anita, Alisha Davies, Jennifer Dixon, 2012, Reforming payment for health care in Europe to achieve better value, Nuffield Trust Research Report, available at http://www.nuffieldtrust.org.uk/sites/files/nuffield/publication/120823_reforming-payment-for-health-care-in-europev2.pdf, accessed July 28, 2016.

Chernew, Michael, Katherine Baker, Carina Martin, 2010, Spillovers in Health Care Markets: Implications for Current Law Projections, CMS Research Report, available at https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/ReportsTrustFunds/downloads/spillovereffects.pdf, accessed July 28, 2016.

Choi, Albert and George Triantis, 2012, The Effect of Bargaining Power on Contract Design, Virginia Law Review 98(8):1665-1743.

Clemens, Jeffrey P. and Joshua Gottlieb, forthcoming, In the Shadow of a Giant: Medicare's Influence on Private Payment Systems, Journal of Political Economy.

Clemens, Jeffrey P., Joshua Gottlieb, Timea Molnar, 2015, The Anatomy of Physician Payments: Contracting Subject to Complexity, NBER Working Paper 21642.

Cooper, Zack, Stuart Craig, Martin Gaynor, John Van Reenen, 2015, The Price Ain't Right? Hospital Prices and Health Spending on the Privately Insured, NBER Working Paper 21815.

Ellis, Randall P., 1998, Creaming, skimping, and dumping: provider competition on the intensive and extensive margins, Journal of Health Economics 17:537-55.

Gift, Thomas L., Richard Arnould, Larry DeBrock, 2002, Is Healthy Competition Healthy? New Evidence of the Impact of Hospital Competition, Inquiry 39:45-55.

Ginsburg, Paul, 2010, Wide Variation in Hospital and Physician Payment Rates Evidence of Provider Market Power, Center for Studying Health System Change Issue Brief No. 16.

Kessler, Daniel P. and Mark McClellan, 2000, Is Hospital Competition Socially Wasteful? Quarterly Journal of Economics 115(2):577-615.

McClellan, Mark, 1997, Hospital Reimbursement Incentives: An Empirical Analysis, Journal of Economics and Management Strategy 6(1):91-128.

Newhouse, Joseph, 1996, Reimbursing Health Plans and Health Providers: Efficiency in Production Versus Selection, Journal of Economic Literature 34:1236-63.

Miller, David C., Cathryn Gust, Justin B. Dimick, Nancy Birkmeyer, Jonathan Skinner, John D. Birkmeyer, 2011, Large Variations in Medicare Payments for Surgery Highlight Savings Potential From Bundled Payment Programs, Health Affairs 30(11):2107-15.

Pauly, Mark V., 2000, Insurance Reimbursement, Chapter 10, in Handbook of Health Economics, eds. A.J. Culyer and J.P. Newhouse, Amsterdam: Elsevier.

Ridgely, M. Susan, David de Vries, Kevin J. Bozic, Peter S. Hussey, 2014, Bundled Payment Fails to Gain a Foothold in California: The Experience of the IHA Bundled Payment Demonstration, Health Affairs 33(8):1345-52.

Spence, A. Michael, 1975, Monopoly, Quality, and Regulation, Bell Journal of Economics 6(2):417-29.

Town, Robert, Roger Feldman, John Kralewski, 2011, Market power and contract form: evidence from physician group practices, International Journal of Health Care Finance and Economics 11:115-32.