

By James Robinson

Hospitals Respond To Medicare Payment Shortfalls By Both Shifting Costs And Cutting Them, Based On Market Concentration

DOI: 10.1377/hlthaff.2011.0220
HEALTH AFFAIRS 30,
NO. 7 (2011): 1265-1271
©2011 Project HOPE—
The People-to-People Health
Foundation, Inc.

ABSTRACT The coverage expansions planned under the Affordable Care Act are to be financed in part by slowing Medicare payment updates to hospitals, thereby reigniting the debate over whether low prices paid by public payers cause hospitals to increase prices to private insurers—a practice known as cost shifting. Recently, the Medicare Payment Advisory Commission (MedPAC) proposed an alternative explanation of hospital pricing and profitability that could be used to support policies that pressure hospitals to reduce overall costs rather than to only raise prices. This study evaluated the cost-shift and MedPAC perspectives using 2008 data on hospital margins for 30,514 Medicare and privately insured patients undergoing any of seven major procedures in markets where robust hospital competition exists and in markets where hospital care is concentrated in the hands of a few providers. The study presents empirical evidence that, faced with shortfalls between Medicare payments and projected costs, hospitals in concentrated markets focus on raising prices to private insurers, while hospitals in competitive markets focus on cutting costs. Policy makers need to examine whether efforts to promote clinical coordination through provider integration may interfere with efforts to restrain overall health care cost growth by restraining Medicare payment rates.

James Robinson (james.robinson@berkeley.edu) is the Leonard D. Schaeffer Professor of Health Economics and director of the Berkeley Center for Health Technology, University of California, Berkeley.

Payment rates from Medicare to hospitals have lagged behind the growth in hospital costs over recent years, leading to negative hospital profit margins on publicly insured patients.^{1,2} These negative Medicare margins have reignited the long-standing debate over whether the public insurance program is partially responsible for the high prices charged to private insurers, as hospitals seek to offset losses on one set of patients with profits from another.³⁻⁷

Recently, however, the Medicare Payment Advisory Commission (MedPAC) staff has proposed an alternative explanation for negative Medicare margins, one that reverses the direc-

tion of causality and interprets Medicare payment slowdowns as a means toward the reduction of hospital costs rather than a shifting of costs from public to private payers.⁸

The policy implications of the MedPAC perspective are different from those flowing from the cost-shift perspective, especially with respect to plans to finance part of the coverage expansion mandated by the Affordable Care Act of 2010 through slowing Medicare payment updates to hospitals.⁹

According to the cost-shift perspective, Medicare should increase its payment rates to hospitals in order to hold down the prices charged by hospitals to private insurers and, thereby, the premiums charged by those insurers to employ-

ers and individuals. According to the MedPAC perspective, Medicare should not increase its payment rates simply because there is evidence of negative hospital margins. Rather, the MedPAC perspective would suggest that private insurers should join Medicare in resisting hospital price increases, thereby increasing pressure on hospitals to improve efficiency.

The choice between revenue enhancement and cost reduction will become more acute as the federal government seeks to reduce its budget deficit in part by reducing Medicare payments to hospitals. The ability of hospitals to charge higher prices to private insurers than to Medicare has been well documented. The influence of market structure on hospital profit margins, which is central to the MedPAC focus on cost reduction, has not received commensurate attention.

This study provides empirical analysis of the cost-shift and MedPAC perspectives by examining data on hospital margins for Medicare and private insurance in competitive and concentrated hospital markets. The detailed patient-level data permit the study to adjust for differences due to patient demographics, diagnoses, comorbidities, and complications, as well as to characteristics of the hospitals themselves and of the markets within which they are located.

Cost And Price Dynamics: Two Views

Two conceptual frameworks seek to explain hospital costs, pricing, and profits for privately insured and Medicare patients. These perspectives do not take directly opposing positions but, rather, emphasize different dynamics in the hospital market and generate different policy implications. Both highlight the hospital's need to cover its costs from a mix of revenue sources, some of which it can influence and some of which it cannot.

Hospitals are "price takers" with respect to Medicare, which pays according to a formula that includes the patient's primary and secondary diagnoses, major procedures, unusual outlier expenditures, area wages, and other factors but not the structure of the local market.¹⁰ Medicaid programs typically pay hospitals at even lower rates than does Medicare. In contrast, hospitals negotiate prices with private insurers and, in markets where facilities have consolidated into multihospital chains, can be interpreted as "price makers" that can leverage prices not only to cover the costs incurred in the treatment of privately insured patients but also to cover the shortfalls in payments from Medicare.¹¹

COST SHIFTING In the cost-shift perspective, the direction of causality runs from high hospital

costs to negative Medicare margins, since Medicare does not pay adequately to cover the costs incurred by its beneficiaries, and then to high prices charged to private insurers.

Some health economists distinguish between cost shifting and price discrimination. *Price discrimination* is defined as different prices charged to different payers for similar services. *Cost shifting* is defined more narrowly as a dynamic response by hospitals to a reduction in Medicare payments, in the form of a fully or partially compensating increase in prices charged to private insurers.

In the policy debate over Medicare payments, however, *cost shifting* is defined broadly as payments that fall short of the costs incurred by hospitals in the treatment of Medicare beneficiaries, as measured through negative hospital margins on those patients. In this article the term *cost shifting* is used in this broader sense.

Implicit in the cost-shift perspective is the assumption that hospitals have unused bargaining leverage when negotiating with private insurers. In other words, the reasoning goes, when hospitals suffer Medicare payment shortfalls, they are able to raise prices to private insurers because the hospitals have some degree of market power. Furthermore, the cost-shift perspective assumes that costs are not themselves determined by prices and payment rates.

Costs rise as a result of changes in clinical technology, labor-market shortages, governmental regulations, tort liability, and other factors, but not simply because the hospital is able to raise prices to private insurers. Otherwise put, costs drive prices, but prices do not drive costs. This perspective is buttressed by an empirical literature that finds price increases to private insurers when public-payer payment shortfalls become acute.¹²⁻¹⁷

MEDPAC PERSPECTIVE In the perspective articulated by MedPAC, the direction of causality runs from high prices charged to private insurers to high hospital costs and then to negative Medicare margins. In this view, hospitals in concentrated local markets raise the prices they charge to private insurers because they hold strong bargaining positions and are immune to threats that they will be excluded from an insurance company's network of providers. They do this regardless of whether Medicare payments are adequate or inadequate to cover the treatment costs for Medicare beneficiaries.

This MedPAC perspective relies on the empirical literature that documents higher hospital prices charged to private insurers (but not to Medicare) in concentrated local markets, compared to the prices charged by hospitals in competitive markets. The extensive research litera-

ture on hospital market structure and pricing has been reviewed by Robert Town and William Vogt.¹⁸

In the MedPAC view, high revenues from private insurers are used by hospitals in concentrated markets to finance expansions in capacity, acquisition of new clinical technologies, and hiring of additional staff. Costs are directly affected by prices, in that higher revenues permit hospitals to finance cost-increasing investments. Because hospitals are not able to use their bargaining power to raise payment rates from Medicare, the higher hospital costs per patient that are facilitated by higher prices for private insurers result in negative hospital margins for Medicare patients.

KEY DIFFERENCE The key difference between the two perspectives concerns the role of market structure in influencing hospital margins from Medicare patients. The MedPAC staff interprets the concentration of local hospital markets and resulting price increases to private insurers as leading to higher hospital costs and then to negative margins for Medicare patients. It predicts that Medicare margins should be lower in concentrated markets, where hospital bargaining power against private insurers is strong and margins on privately insured patients are high, than in competitive markets.

The cost-shift perspective predicts that hospitals are able to charge higher prices to, and earn larger margins from, private insurers than Medicare, even if the costs of treating Medicare patients are higher because of these patients' age and disease severity. It makes no prediction concerning the association between market structure and Medicare margins, since neither costs nor Medicare payments are expected to vary between concentrated and competitive markets.

Despite differences in focus, the cost-shift and MedPAC perspectives on hospital pricing and profitability should be viewed as complements rather than substitutes. Faced with impending shortfalls in Medicare payments relative to anticipated cost trends, hospitals can pursue both revenue enhancement and cost moderation.

As highlighted by the cost-shift literature, the primary locus for revenue enhancement is through increased prices to private insurers. As highlighted by the MedPAC analysis, hospitals also can seek to reduce the rate of growth in costs. The key determinant is the structure of the local hospital market. Hospitals in concentrated markets may focus on revenue enhancement. Hospitals in competitive markets must focus on cost moderation or face declining and ultimately negative profit margins.

Study Data And Methods

Data were obtained on 30,514 patients admitted to any of sixty-one hospitals for total knee replacement, total hip replacement, lumbar spine fusion, cervical spine fusion, coronary angioplasty with drug-eluting stent, insertion of cardiac pacemaker, or insertion of implantable cardioverter defibrillator. These facilities were participants in the value-based purchasing initiative of the Integrated Healthcare Association, a coalition of large hospitals, medical groups, and health insurance plans in California, or worked on value purchasing with Aspen Health Metrics, a hospital consulting firm. They are distributed across twenty-seven local hospital markets in eight states.

The market for each hospital was identified as the Hospital Referral Region, developed for the *Dartmouth Atlas* based on patient-flow data for Medicare patients.¹⁹ The *Dartmouth Atlas* assigns every hospital in the United States to one of 306 markets. The American Hospital Association's 2008 Annual Survey of Hospitals provided data on the number of staffed beds, average annual earnings for hospital staff, and teaching status of each hospital facility.

The concentration of each local hospital market was measured in terms of the Herfindahl-Hirschman Index,²⁰ the standard measure used in economic analyses of market competition.²¹ The market shares of hospitals within each market that belonged to the same chain were combined so as to produce a measure of true competitive potential, instead of treating different facilities that are owned by the same chain as competing with each other. To control for the effect of market size, the population size of the metropolitan regions served by each hospital also was included in the analysis.

The variable of primary interest for this study is the contribution margin earned by each hospital from the care of each individual patient. The *contribution margin* was defined and measured as the difference between the revenue obtained by the hospital from the patient's insurer (Medicare or a private insurer) and the direct costs expended by the hospital in the care of that patient.

Revenues were measured in terms of the amount actually collected by the hospital for each patient, which derived from contracted prices (for the private insurers) and diagnosis-related group payment rates (for Medicare). Revenue included payments made directly by patients according to deductible and coinsurance provisions in their insurance coverage. Revenues were not measured in terms of hospitals' list prices (charges).

Hospital cost data were obtained from each facility's cost accounting system. Cost account-

ing systems are not standardized across hospitals, but there is no reason to assume that accounting methods are systematically correlated with the degree of concentration in each hospital's local market. The contribution margin did not take into account hospitals' overhead expenses, such as administration, capital depreciation, and charity care for uninsured patients; thus, it is not equivalent to a hospital's total profit margin.

Multivariate statistical methods were used to measure the association between contribution margin, on the one hand, and the index of hospital market structure, area population, annual hospital volume for each procedure, staffed beds, hospital teaching status, average annual earnings of hospital staff, principal diagnoses, comorbidities, complications, age, and discharge destination, on the other hand.²²

The calculation of standard errors for the multivariate regression analyses was modified to cluster for within-hospital correlation of prices and margins across patients. It is to be expected that unmeasured determinants of prices and margins will be correlated for patients treated at the same hospital.²³

Study Results

Exhibit 1 presents average hospital costs, revenues, and contribution margins per patient for Medicare and privately insured patients. For all seven procedures examined, the average cost of care was higher for Medicare beneficiaries than for privately insured patients. However, average revenues were higher for privately insured patients by substantial amounts.

All procedures yielded positive contribution margins for Medicare patients, but the margins on privately insured patients were higher by a factor of ten or more.²⁴ If the seven procedures are weighted according to the number of patients treated with each, average costs were 5.4 percent higher for Medicare than for privately insured patients. Average payments were 68 percent higher, and contribution margins, 831 percent higher, for privately insured than for Medicare patients.

As an example, the average cost of treatment for Medicare patients undergoing knee replacement (\$12,617) was higher than that for privately insured patients (\$11,987). However, the average payment obtained by the hospital from Medicare (\$13,372) was lower than that obtained for privately insured patients (\$22,617). Hospitals obtained positive, although modest, contribution margins for Medicare patients (\$755) but substantial contribution margins for privately insured patients (\$10,630). Similar patterns of higher Medicare treatment costs but lower revenues and contribution margins were observed for the other six procedures.

Exhibit 2 presents the association between the structure of the local hospital market and the hospital's contribution margin from Medicare and privately insured patients, respectively.²⁵ These data were adjusted for patient characteristics, including diagnoses, comorbidities, complications, age, and discharge destination, and hospital characteristics, such as bed size, surgical volume, teaching status, area population, and average salary level.

Hospital margins on privately insured patients were significantly higher in concentrated mar-

EXHIBIT 1

Hospital Costs, Revenues, and Contribution Margins For Medicare And Privately Insured Patients

Payer	Knee replacement	Hip replacement	Lumbar fusion	Cervical fusion	Angioplasty with stent	Pacemaker insertion	Defibrillator insertion
COST PER PROCEDURE (\$)							
Medicare	12,617	13,323	25,041	13,281	13,045	13,932	35,395
Private ins.	11,987	12,596	24,395	11,641	11,527	13,486	32,701
REVENUE PER PROCEDURE (\$)							
Medicare	13,372	13,683	25,725	14,647	15,843	16,980	37,499
Private ins.	22,617	23,931	47,085	21,124	26,052	26,353	54,233
CONTRIBUTION MARGIN (\$)							
Medicare	755	360	684	1,366	2,798	3,048	2,104
Private ins.	10,630	11,335	22,690	9,483	14,525	12,867	21,532
NUMBER OF PATIENTS IN STUDY							
Medicare	7,097	3,147	1,430	552	3,070	2,920	968
Private ins.	3,435	2,067	1,589	1,257	2,226	457	299

SOURCE Author's calculations on 2008 data obtained from hospitals as part of the value purchasing initiatives of the Integrated Healthcare Association and Aspen Health Metrics.

EXHIBIT 2
Contribution Margins For Medicare And Privately Insured Patients In Concentrated And Competitive Markets

Payer	Knee replacement	Hip replacement	Lumbar fusion	Cervical fusion	Angioplasty with stent	Pacemaker insertion	Defibrillator insertion
HOSPITALS IN CONCENTRATED MARKETS (\$)							
Medicare	-190	-303	-207	1,818	3,346	1,937	-231
Private ins.	13,731	15,938	28,185	13,020	19,554	16,452	25,694
HOSPITALS IN COMPETITIVE MARKETS (\$)							
Medicare	1,700	1,023	1,575	914	2,250	4,159	4,439
Private ins.	7,529	6,732	17,195	5,946	9,496	9,282	17,370

SOURCE Author's calculations on 2008 data obtained from hospitals as part of the value purchasing initiatives of the Integrated Healthcare Association and Aspen Health Metrics. **NOTES** For definitions of *concentrated* and *competitive markets*, see Note 25 in text. These margin estimates were adjusted for patient-specific differences in age, diagnoses, comorbidities, complications, and discharge destination, plus characteristics of the hospital where the patient was treated (procedure volume, staffed beds, teaching status, wage rate).

kets than in competitive markets for all procedures, indicative of the stronger bargaining power obtained in contexts where private insurers cannot credibly threaten the hospitals with network exclusion.²⁶ The market-related differences ranged from a low of \$6,202 for patients undergoing knee replacement to a high of \$10,990 for patients undergoing lumbar fusion.

The market-related difference in contribution margin was 82 percent for knee replacement, 137 percent for hip replacement, 64 percent for lumbar fusion, 119 percent for cervical fusion, 106 percent for angioplasty, 77 percent for pacemaker insertion, and 48 percent for defibrillator insertion.

In contrast to the margins earned from privately insured patients, margins from Medicare patients were positive for all seven procedures in competitive markets but negative for four procedures in concentrated markets.²⁷ For the two orthopedic joint procedures, Medicare margins were negative and were lower in concentrated than in competitive markets by \$1,890 (knee replacement) and \$1,326 (hip replacement). For the cardiac device insertion procedures, Medicare margins were positive but were still lower in concentrated than in competitive markets by \$2,222 (pacemaker) and \$4,670 (defibrillator).²⁸ Medicare margins did not vary significantly between concentrated and competitive markets for lumbar and cervical fusion procedures and for coronary angioplasty with stent.

Discussion

This paper presents empirical support for both the cost-shift and the MedPAC perspectives on hospital price and profitability dynamics. The data in Exhibit 1 provide strong evidence that Medicare payment rates fall well below those for privately insured patients, even though Medi-

care beneficiaries incur higher costs of treatment. Hospitals therefore earn much higher contribution margins from privately insured than from publicly insured patients. This result is consistent with the cost-shift perspective.

The data in Exhibit 2, however, indicate that contribution margins from Medicare were significantly lower in concentrated than in competitive markets for four of the seven procedures studied. This result is consistent with the MedPAC perspective. Medicare margins from the other three procedures did not differ according to local market structure.

The empirical support for both the cost-shift and MedPAC perspectives is consistent with the view that these conceptual frameworks are complements rather than substitutes. They represent two different but not incompatible hospital responses to constrained Medicare payments. Faced with shortfalls between payments and projected costs, hospitals can either increase prices to private insurers or reduce costs, or both.

It generally is more desirable, from a hospital management perspective, to increase revenues than to reduce costs, because the former merely alienates insurers, but the latter alienates employees, physicians, and potential patients. The cost-shift perspective highlights the revenue-enhancement hospital response to Medicare payment shortfalls.

The hospital's ability to pursue revenue enhancement over cost reduction will depend, however, on the degree of competition in the local market. Hospitals in competitive markets will be less able than those in concentrated markets to raise prices and hence must either reduce costs or suffer erosion in their profitability. The MedPAC perspective highlights the importance of this cost-reduction strategy and the consequences of a hospital's inability to successfully implement it.

The cost-shift and MedPAC perspectives gain increased importance in light of the proposed reduction in Medicare payments relative to projected trends in hospital costs. The growing federal budget deficit focuses policy attention on Medicare spending—the largest single contributor to rising expenditures over time—which in turn focuses policy attention on payments to hospitals—the largest single contributor to rising Medicare costs.

To the extent that Medicare is able to implement serious payment slowdowns, hospitals will be under strong pressure to find other revenue streams or reduce their own expenditures, or both. The key enabling factor is likely to be the degree of concentration or competition in the local hospital market.

The consolidation of hospitals into local and regional chains started in response to efforts in the 1980s by managed care firms to extract price discounts under threat of network exclusion. It has continued under the impetus by hospitals to reduce their supply costs, capital borrowing costs, and excess bed capacity. Some hospitals have emphasized vertical integration through employment of physicians or affiliation with physician organizations.

The Affordable Care Act encourages the integration of physicians and hospitals as account-

able care organizations under the principle that such integration will increase efficiency and thereby reduce cost and price growth over time. However, federal antitrust enforcement agencies express concern that further consolidation will increase hospitals' bargaining power.²⁹

Conclusion

The two inevitabilities in life are said to be death and taxes. Within the narrower scope of the health care sector, the two inevitabilities are Medicare payment cutbacks and further hospital consolidation. The key policy question is whether hospital consolidation will reduce costs through better management of capacity, technology, and staffing or, rather, increase costs by facilitating the price increases that permit continued inattention to these cost drivers.

This article suggests that differing markets will emphasize different strategies and that a determining factor will be hospital market concentration. Public policy seeks both to restrain Medicare spending and encourage provider coordination. Whether these two strategies lead to a lowering of overall cost trends or an accelerating shift in costs from public to private insurers is the question that remains open. ■

This study was supported by the California HealthCare Foundation.

NOTES

- Hackbarth GM, Ebeler JC, Miller ME. Report to the Congress: Medicare payment policy [Internet]. Washington (DC): Medicare Payment Advisory Commission; 2009 Mar 17 [cited 2010 Dec 30]. Available from: http://www.medpac.gov/documents/Mar09_March%20report%20testimony_WM%20FINAL.pdf
- American Hospital Association. Chart 4.6: aggregate hospital payment-to-cost ratios for private payers, Medicare, and Medicaid, 1988–2008. In: *Trendwatch chartbook 2010: trends in hospital financing* [Internet]. Chicago (IL): AHA; 2011 [cited 2011 Jan 2]. Available from: <http://www.aha.org/aha/trendwatch/chartbook/2011/chart4-6.pdf>
- Dranove D, Satterthwaite MA. The industrial organization of health care markets. In: Culyer AJ, Newhouse JP, editors. *Handbook of health economics*. Amsterdam: Elsevier; 2000. p. 1123–4.
- Morrisey MA. Hospital cost shifting, a continuing debate [Internet]. Washington (DC): Employee Benefit Research Institute; 1996 Dec [cited 2010 Dec 30]. (Issue Brief No. 180). Available from: <http://www.ebri.org/pdf/briefspdf/1296ib.pdf>
- Dobson A, DaVanzo J, Sen N. The cost-shift payment “hydraulic”: foundation, history, and implications. *Health Aff (Millwood)*. 2006; 25(1):22–33.
- Sasseen J, Arnst C. Why business fears the public option. *Bloomberg Businessweek* [serial on the Internet]. 2009 Oct 1 [cited 2011 Jan 6]. Available from: http://www.businessweek.com/magazine/content/09_41/b4150026723556.htm
- Ginsburg PB. Can hospitals and physicians shift the effects of cuts in Medicare reimbursement to private payers? *Health Aff (Millwood)* 2003;22:w472–9. DOI: 10.1377/hlthaff.w3.472
- Stensland J, Gaumer ZR, Miller ME. Private-payer profits can induce negative Medicare margins. *Health Aff (Millwood)*. 2010; 29(5): 1045–51.
- Davis PA, Hahn J, Morgan PC, Stone J, Tilton S. Medicare provisions in the Patient Protection and Affordable Care Act (PPACA): summary and timeline [Internet]. Washington (DC): Congressional Research Service; 2010 Nov 3 [cited 2010 Nov 12]. Available from: <http://healthreform.kff.org/~media/Files/KHS/docfinder/CRS%20Report%20on%20Medicare%20Provisions%20in%20PPACA%20and%20Timeline.pdf>
- Centers for Medicare and Medicaid Services. Acute inpatient PPS: overview [Internet]. Baltimore (MD): CMS; [cited 2011 Apr 24]. Available from: <http://www.cms.gov/AcuteInpatientPPS/>
- Melnick GA, Keeler EB. The effects of multi-hospital systems on hospital prices. *J Health Econ*. 2007;26(2): 400–13.
- Zwanziger J, Bamezai A. Evidence of cost-shifting in California hospitals. *Health Aff (Millwood)*. 2006;25(1): 197–203.
- Cutler DM. Cost shifting or cost cutting? The incidence of reductions in Medicare payments. In: Poterba

- JM, editor. Tax policy and the economy. Vol. 12. Cambridge (MA): MIT Press; 1998. p. 1–28.
- 14 Dranove D. Pricing by non-profit institutions: the case of hospital cost-shifting. *J Health Econ.* 1988; 7(1):47–57.
 - 15 Clement JP. Dynamic cost shifting in hospitals: evidence from the 1980s and 1990s. *Inquiry.* 1998;34(4): 340–50.
 - 16 Kessler D. Cost shifting in California hospitals: what is the effect on private payers? [Internet]. Palo Alto (CA): California Foundation for Commerce and Education; 2007 Jun 6 [cited 2011 Jan 17]. Available from: http://www.cornerstone.com/files/Publication/6cca4b4e-468d-4d30-a3fd-eclb51bd2936/Presentation/PublicationAttachment/c4fe8ac5-4894-484b-8739-eed9154ebbec/Kessler_CFCE_Cost_Shift_Study%206-6-07.pdf
 - 17 Wu V. Hospital cost-shifting revisited: new evidence from the balanced budget act of 1997. *Int J Health Care Finance Econ.* 2010;10(1):61–83.
 - 18 Town R, Vogt WB. How has hospital consolidation affected the price and quality of hospital care? [Internet]. Princeton (NJ): Robert Wood Johnson Foundation; 2006 Feb [cited 2010 Oct 2]. (Research Synthesis Report No. 9). Available from: <http://www.rwjf.org/files/research/no9researchreport.pdf>
 - 19 Wennberg JE. The quality of medical care in the United States: a report on the Medicare program. In: Cooper MM, editor. *Dartmouth atlas of health care in the United States.* Chicago (IL): AHA Press; 1999. p. 6.
 - 20 Department of Justice, Federal Trade Commission. Horizontal merger guidelines [Internet]. Washington (DC): DOJ; 2010 Aug [cited 2010 Sep 29]. p. 18–9. Available from: <http://www.justice.gov/atr/public/guidelines/hmg-2010.pdf>
 - 21 The Herfindahl-Hirschman Index is constructed by dividing the number of staffed beds for each facility by the total number of beds within the market to obtain each hospital's share. The share of each facility then is squared, and the shares of all hospitals are summed to create an index that potentially ranges from 0 (many competitors, each with a negligible share) to 10,000 (one facility, with 100 percent market share). For ease of interpretation, the index is scaled here so it ranges from a potential low of 0 to a potential high of 100.
 - 22 For hip and knee replacement procedures, coded diagnoses included osteoarthritis, rheumatoid arthritis, aseptic necrosis, and fractures. For lumbar and cervical spine fusion, diagnoses included fracture, spondylolisthesis, and intervertebral disk disorder. For angioplasty, the analysis was limited to patients receiving a drug-eluting stent (as distinct from a bare-metal stent or no stent) and adjusted for the number of stents used in the case. For pacemaker and defibrillator insertion, respectively, the statistical analyses were adjusted for whether the implant included a single or dual chamber and whether the device included cardiac resynchronization therapy capability. *Comorbidities* were defined as preexisting conditions that result in an increase in the length-of-stay by at least one day. For orthopedic joint replacement and spine procedures, complications were in-hospital events serious enough to result in at least one extra day of hospital stay. For angioplasty, pacemaker insertion, and implantable cardioverter-defibrillator insertion, complications were events serious enough to cause a shift in the patient's diagnosis-related group (DRG) assignment (each of these procedures has multiple DRG categories depending on whether the patient has major complications and comorbidities, minor complications and comorbidities, or none).
 - 23 Greene WH. *Econometric analysis.* 6th ed. Upper Saddle River (NJ): Pearson Education Inc.; 2008.
 - 24 The difference in revenues and contribution margins was statistically significant for all procedures ($p < 0.05$). The differences for costs per case were statistically significant at the $p < 0.05$ level for all procedures except lumbar fusion and pacemaker insertion, for which they were statistically significant only at the $p < 0.15$ level.
 - 25 For purposes of this analysis, *concentrated markets* were defined as those with a Herfindahl-Hirschman Index one standard deviation above the mean, while *competitive markets* were defined as those with an index one standard deviation below the mean. The market-related differences were calculated by multiplying the coefficient on the Herfindahl-Hirschman Index variable in the multivariate statistical regression of contribution margin by twice the standard deviation in the variable.
 - 26 The difference in hospital margin between concentrated and competitive markets was statistically significant at the $p < 0.05$ level for all seven procedures.
 - 27 The market-related Medicare margin differences were statistically significant at the $p < 0.05$ level for knee replacement, hip replacement, pacemaker insertion, and defibrillator insertion, but not statistically different from zero for the other three procedures studied.
 - 28 These differences in Medicare margins between concentrated and competitive local markets were statistically significant ($p < 0.05$).
 - 29 Leibowitz J. Remarks of FTC Chairman Jon Leibowitz as prepared for delivery, FTC/CMS workshop on Accountable Care Organizations [Internet]. Baltimore (MD): Centers for Medicare and Medicaid Services; 2010 Oct 5 [cited 2011 Jan 17]. Available from: <http://www.ftc.gov/speeches/leibowitz/101005acoremarks.pdf>