



## Addressing Geographic Variation and Health Care Efficiency: Lessons for Medicare from Private Health Insurers

By Darius Lakdawalla, Tomas J. Philipson, and Dana Goldman

*Medicare's attempts to restrain costs center almost exclusively on reducing prices paid for medical services. Private-sector insurance companies are unable to secure similarly sized price discounts but rely more heavily on managing utilization to control costs. Studies find that Medicare spending and utilization vary considerably across U.S. regions, leading some to suggest that Medicare should look at relatively "low-use" regions as a model for decreasing costs in "high-use" regions. This policy prescription may be off the mark. In a new study, we examine spending and utilization for Medicare and private-sector health insurers. While Medicare's market share gives it more leverage to dictate prices than private health insurance companies have, variations in service use across regions are smaller for the private sector than for Medicare, suggesting tighter management of utilization in the private sector. To reduce spending and more appropriately limit geographic variation in utilization among Medicare beneficiaries, the program should consider the utilization-management techniques employed in the private sector as a model.*

On June 24, 2010, Congress passed legislation to postpone automatic cuts in Medicare reimbursements to physicians. Passing this so-called doc-fix legislation prevents the decade-old sustainable growth rate formula (SGR) from taking effect. The SGR was intended to restrain growing Medicare costs by imposing a global limit on physician spending and automatically reducing reimbursements for physicians treating Medicare patients

when this limit is exceeded. Soon after the SGR was implemented, the price controls it calculated

### Key points in this Outlook:

- Recent studies of the Medicare program have assailed the vast, unexplained regional differences in Medicare spending and utilization; many have recommended that Medicare remodel the most expensive, "high-use" regions on "low-use" regions to address this variation.
- Medicare's variation by region for some measures is nearly three times greater than variation in the private sector, which manages utilization better.
- More efficient utilization in Medicare could help reduce geographic variation, limit costs, and improve health care outcomes; for a model, Medicare should look to the private sector.

Darius Lakdawalla (darius.lakdawalla@usc.edu) is the director of research at the Leonard D. Schaeffer Center for Health Policy and Economics at the University of Southern California and a visiting scholar at AEI. Tomas J. Philipson (t-philipson@uchicago.edu) is the Daniel J. Levin Professor of Public Policy at the Irving B. Harris Graduate School of Public Policy Studies at the University of Chicago and a visiting scholar at AEI. Dana Goldman (dana.goldman@usc.edu) is the Norman Topping Chair in Medicine and Public Policy at the School of Policy, Planning, and Development and the director of the Leonard D. Schaeffer Center for Health Policy and Economics at the University of Southern California.

mandated such large cuts in physician reimbursements that policymakers and the public saw them as unacceptable. Rather than allow the SGR to reduce payments, Congress regularly passes doc-fix legislation; the legislation that passed in June—which will expire this November—was nothing but a continuation of a broken payment system.

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Despite the recurring policy debate, further cutting payments paid to physicians would serve as little more than a bandaid for addressing health care costs. In an unfettered fee-for-service environment, Medicare reimbursement cuts do little to ensure that real health care resources—such as hospital beds, advanced technology, and physicians' time—are used efficiently. Cutting provider payments may seem like an expedient way to protect the public coffers, but price cuts simply redistribute funds from health care providers to Medicare. They avoid the more important long-term policy objective of properly allocating health care resources to the right patients at the right time.

Unfortunately, economic theory predicts that when it comes to containing costs, public health insurers like Medicare may tilt toward price restraints and away from utilization management, which is the real boon for efficiency. A large body of existing evidence suggests that Medicare currently does not deploy health care resources efficiently. The Dartmouth Atlas of Health Care project in particular has documented considerable variation in health care utilization and spending across different areas of the United States but has found little evidence of corresponding differences in health outcomes or patients' satisfaction with care.<sup>1</sup> In popular parlance, the researchers have concluded that “more care is not better care,” and in some instances, those receiving a greater number of services may actually be harmed. This has led many to conclude that, to fix what ails the health care system, high-use areas like Miami ought to model themselves after low-use areas like Minneapolis.

There is little doubt that curbing wasteful variation in health care utilization would have significant benefits, but our knowledge about the causes of this regional variation remains in its infancy. For example, despite the

prominent role regional health care variations played in the health reform debate, evidence for them is limited, almost exclusively, to the Medicare population. As a result, it is unknown whether differences in utilization are unique to Medicare or driven by factors that cut across the entire health care system. If Medicare is different from the private sector, the evidence regarding variations within the Medicare system may have correspondingly different policy implications.

To address this gap in current knowledge, we recently conducted a study investigating whether geographic variation in utilization and spending differed between Medicare and the private sector.<sup>2</sup> We found that Medicare's variation between high- and low-use areas like Miami and Minneapolis is often two to three times larger than the variation for the private health insurance sector. In contrast, Medicare seems more likely than private insurers to attempt to restrain spending by holding down prices for care rather than by managing health care utilization. This finding is consistent with the economic understanding of differences in incentives for efficiency between public and private enterprises.

From a health policy perspective, our findings suggest the possibility that the private sector more effectively manages utilization in areas that might otherwise be high use. They also call into question the approach of transforming “Miamis” into “Minneapolis” wholesale: Medicare patients in Miami may look very different from their privately insured neighbors. Instead, the results suggest the importance of exploring a different question: how could we reform Medicare so that it manages utilization more like a private health insurer?

## Conceptual Framework and Key Assumptions

A venerable body of literature in economics suggests that private firms and their managers have stronger incentives to restrain costs and boost efficiency than their public counterparts.<sup>3</sup> For example, Medicare does not face competition over premiums that might otherwise restrain its costs. Moreover, Medicare, unlike private-sector firms, does not have employees or shareholders whose compensation or return on investment improves with the efficiency of the enterprise. As a result, efforts to control costs within a region are likely to translate into differences in care across regions and between sectors. On the other hand, Medicare does have more bargaining power with health care providers than any single private health insurer in the United States. This

allows it to restrain prices more aggressively than its private counterparts.

These differences in incentives suggest a new theoretical basis for studying how health care varies across regions in both the public and private sectors:<sup>4</sup>

- Private payers have stronger incentives to restrain costs and manage utilization than a public payer such as Medicare. Unlike public enterprise, private firms have to restrain costs in order to compete on price, and their inefficiencies directly affect the welfare of their owners and employees.<sup>5</sup>
- In contrast, public payers benefit from greater price leverage, which is their primary tool for controlling spending. This results in a greater restraint on prices instead of restraints on utilization in the public sector.

Since spending is based on a combination of utilization and price, these two differences in incentives have countervailing effects on spending. However, while spending varies with price and utilization, efficiency is most directly related to utilization. This is because overuse—too much care in terms of unnecessary procedures, tests, and medications—can put patients at risk for lower-quality care and wasted resources, while underuse—too little care—can also mean poor quality and insufficient resources. In contrast, price governs the amount of money transferred from customers to providers and says nothing about the real resources used in the process.

Our study uses data on regional variation in health care to test two empirical hypotheses suggested by the logic above:

1. Private health insurers manage utilization more effectively than their public counterparts; this leads to less regional variation in utilization within the private sector;
2. Public health insurers restrain prices better than their private counterparts; this leads to lower prices per unit of care in the public sector.

If proved true, these hypotheses would suggest that the private sector is better positioned to allocate health care resources efficiently, by managing the utilization of health care resources. Private payers have multiple tools at their disposal to constrain utilization and achieve more uniform

provision of care by affecting either supply or demand. For example, with respect to supply, private payers may explicitly manage care and pressure providers through utilization review and case management. They can also selectively contract with lower-cost providers and exclude inefficient doctors or hospitals from their networks (although not always easily). In addition, prior authorization of large expenditures requires that major costs be reviewed for medical appropriateness and necessity.

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The main analysis suggests that variation in the public sector exceeds variation in the private sector by about 2.8 times for outpatient visits and 3.9 times for hospital days.

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Private payers can affect demand by steering patients toward preferred providers who deliver more efficient care using benefits management or through preferred networks. For example, insurers may alter cost sharing and deductibles to reduce incentives for services, or they may decide not to cover certain services unless some clinical criteria are met. This *Outlook* uses “utilization management” (UM) to refer to all of the practices private insurers use to affect either provider or patient decisions. UM is interpreted as limiting the provision of treatments for which the costs exceed the benefits. This may still lead to some regional variation in utilization because the efficacy of different treatments can differ substantially among seemingly similar patients. What would be considered excessive and unnecessary care for one patient may be the most effective and appropriate treatment for another.

## Study Design

To develop the implications of these incentive differences, the study we conducted analyzed how regional variations in health care differ across the public and private sectors. The main objects of interest are the regional variations in utilization and spending across sectors that cannot be explained by variations in patient characteristics or other covariates such as disease and demographics.

**Variation in Utilization.** First, the study examines conceptually how private efforts to control costs within a region, through selection of doctors or providers, translate into differences in care across regions. The main prediction is that utilization management within regions in the

private sector will lead to lower regional variation in the private sector than in Medicare.

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The study suggests that private payers are better able to manage utilization because of the myriad tools at their disposal for directing health care resources.

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**Variation in Spending.** The theoretical predictions for variation in spending are less clear, however, because Medicare may also be able to control prices through its greater pricing leverage as the sole purchaser of services on behalf of the Medicare program. Consequently, if the private sector is better able to control utilization while the public sector is better able to control (that is, set) prices, then the result will be a less clear, more ambiguous prediction for variation in spending.

### Empirically Testing Predictions

The study calculates three important measures for testing several empirical predictions rooted in the key assumptions related to private-sector UM and public-sector pricing power. First, we establish a measure of utilization such that efficient utilization is defined as the level at which marginal benefit equals marginal cost. Private payers are likely to use UM to keep utilization from surpassing this level, and so establish an upper bound on utilization.

Second, we calculate the private- and public-sector means for utilization within a region. Within any given region is a distribution of medical providers who vary in the level of care they would deliver to an identical patient. Since private payers have a greater incentive to limit utilization, our hypothesis predicts that the results will show a truncated or “constrained” mean utilization level that is lower than the unconstrained public-sector mean utilization level. The means are determined for the following types of utilization:

1. Number of hospitalizations
2. Total hospital days (across all hospitalizations)
3. Number of outpatient visits
4. Number of thirty-day equivalent prescriptions

The study framework for comparing regional variation in utilization predicts that private provision leads to lower mean utilization levels for all measures and less variance

in mean utilization across regions, but not necessarily lower mean spending. In addition, the difference in the mean utilization levels of the private and public sectors is likely to rise as the mean level of public-sector utilization rises. It is important to note that, for all these predictions, patient health status is held constant, so it is unlikely to play a substantial role in explaining regional differences.

The study also considers how mean utilization levels for each sector vary across regions. This can be determined by measuring and comparing the variance in regional means between the two sectors. The difference between sectors will be larger when the public sector provides more care above the level of efficient utilization. The theory predicts that the public-sector variance in regional means will exceed the variance in the regional means for private-sector utilization due to UM's ability to rein in high-use areas.

Similar to utilization, the spending measures used to compare variation within a region and between sectors are straightforward and include calculating means for the following:

1. Total spending (inpatient plus outpatient)
2. Inpatient spending
3. Outpatient spending
4. Prescription drug spending

### Sample

The study examines these theoretical implications empirically, using individual-level data on patients with ischemic heart disease to mitigate differences in health status across sectors and regions. To compare patients with private insurance to similar patients within Medicare, we examine patients with a history of heart disease in a large database of private-sector medical claims and compare those with similar patients in the Medicare Current Beneficiary Survey (MCBS). Both data sets include patient-level demographics and comorbidities, which allowed us to identify regional variation distinct from individual characteristics, such as health.

The private data come from a large database of health insurance claims. The data capture all health care claims for prescription drug, inpatient, emergency, and ambulatory services from employees of thirty-five Fortune 500 firms. The analytic database integrates component data sets of medical claims, pharmacy claims, and enrollment records.

The MCBS, which provides the Medicare data, is a nationally representative sample that includes aged

(sixty-five years of age or older), disabled, and institutionalized Medicare beneficiaries. There is oversampling of the disabled (under sixty-five years of age) and elderly (eighty-five years of age or older). The MCBS includes detailed information on self-reported health status, health care use and expenditures, coverage, and demographic characteristics. Additional Medicare claims data for beneficiaries enrolled in fee-for-service plans are also incorporated to provide more accurate information on health care use and expenditures. All information on prescription drug spending and utilization in the MCBS is self-reported, which leads to a known undercount of drug spending.<sup>6</sup>

The study analyzes 240,028 private patients and 24,800 public patients overall,<sup>7</sup> using information from 2000 to 2006. The study corrects for the effects of the smaller public-patient sample size on the estimates. Table 1 provides some summary statistics comparing the demographic characteristics in the public and private samples. As expected, the average age in the private sample is lower than in the sample of Medicare patients, most of whom are over sixty-five years old. The private sample contains a greater fraction of males, in part because it is influenced by current or past employment status.<sup>8</sup> The average income is also higher in the private sample. The greater variance in income for the public sample is likely due to the fact that income is reported individually in the MCBS but inputted at the local level in the private sample.

Table 1 also compares the health of individuals in the two samples. Since both samples are based on individuals with a history of heart disease, we include a variable indicating the fraction of individuals who are diagnosed with heart disease in that particular year. In the public sample, disease is self-reported, while in the private sample, disease is measured from claims data. The incidence of heart disease is similar in the two samples: 0.32 in the private sample and 0.37 in the public sample.

In addition, the average number of adverse health conditions (out of the total of thirty measured in the data, including heart disease) is captured. Unsurprisingly, the elderly individuals in the public sample are much sicker on average, with 2.87 adverse health conditions in the year compared to 1.35 in the private sample.

The primary geographic unit of analysis for our study is the Metropolitan Statistical Area (MSA) as defined by the U.S. Office of Management and Budget. Because MSAs are somewhat larger than the Hospital Referral Regions (HRRs) used in many prominent studies, using MSAs may reduce the variation for both sectors in our data, compared to studies using HRRs.

TABLE 1  
SUMMARY OF DEMOGRAPHIC CHARACTERISTICS,  
PRIVATE AND PUBLIC SAMPLES

	Private		Public	
	Mean	Std. Dev.	Mean	Std. Dev.
Age (years)	55.36	7.05	78.29	7.88
Male (percent)	65	48	46	5
Income (dollars)	42,775	10,766	28,539	46,832
Heart disease in year (percent)	32	47	37	48
Number of conditions	1.35	1.48	2.87	2.42

SOURCE: Authors' calculations. The data on private patients come from a modified version of the Ingenix Touchstone product. The data on public patients come from the Medicare Current Beneficiary Survey.

NOTE: Summary statistics for individuals with a history of heart disease. History of heart disease is self-reported in the public sample and identified using medical claims in the private sample. The private sample has 240,028 observations. The public sample has 24,800 observations.

There are limitations to both analyses that the data cannot address, especially the empirical questions raised by the underlying health differences of privately and publicly insured patients. The link between health insurance and employment adds further complexity. Finally, there may be analytical issues related to using data based on employees from Fortune 500 firms.

### Key Findings regarding Utilization

Table 2 presents descriptive statistics showing that utilization is lower for private patients in terms of the number of hospitalizations, hospital days, and outpatient visits. However, prescription utilization is greater among private patients and, thus, an exception to the pattern. This is significant, as prescription drugs are privately provided to both Medicare and non-Medicare patients. Similarity in prescription utilization is to be expected if the key distinction is between public and private provision of health insurance, rather than some unrelated factor.

Figure 1 shows the extent of variation from the mean utilization for the private sector compared to the public sector for hospital days and outpatient visits. For the private sector, the distribution around the mean is tighter, meaning utilization varies less. However, the numbers here are not yet adjusted for differences in sample size, disease, or demographics.

Figure 2 plots the relationship between the MSA-level means for public and private hospital days. Each dot represents the average number of hospital days in one MSA;

TABLE 2  
MEANS AND VARIATION OF HEALTH CARE UTILIZATION  
ACROSS U.S. CITIES, PUBLIC AND PRIVATE SECTORS

Utilization	Sector	Mean	Std. Dev.	Median
Hospitalizations	Private	0.36	1.15	0
	Public	0.57	1.14	0
Days	Private	1.23	7.13	0
	Public	2.93	8.59	0
Outpatient visits	Private	5.56	5.86	4
	Public	8.59	11.05	5
Prescriptions	Private	45.78	42.20	36
	Public	35.45	29.93	29

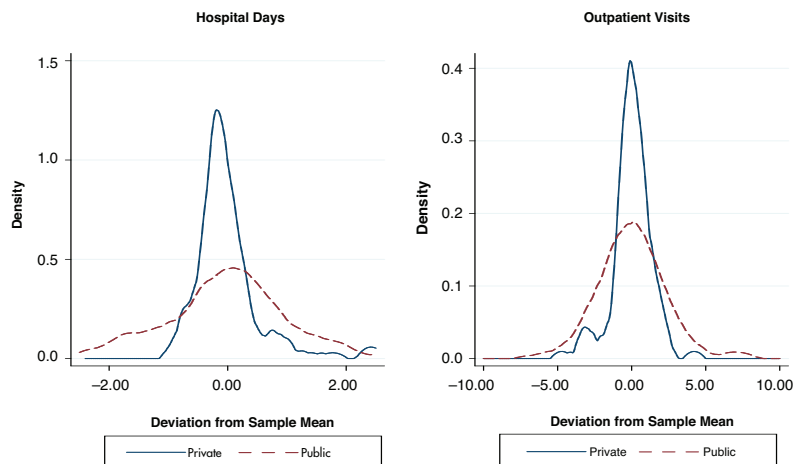
SOURCE: Authors' calculations. The data on private patients come from a proprietary health insurance claims database developed and held at the University of Southern California Schaeffer Center. The data on public patients come from the Medicare Current Beneficiary Survey.

NOTE: The figures in the table show yearly averages of utilization during the years 2000–2006 for patients with a history of heart disease. For the prescription drug utilization numbers, however, the period measured is 2000–2005, to exclude the implementation of Medicare Part D. History of heart disease is self-reported in the public sample and identified using medical claims in the private sample. For hospitalizations, hospital days, total spending, inpatient spending, and outpatient spending, the private sample has 240,028 observations, and the public sample has 24,800 observations. For prescription utilization, 2006 is dropped, such that the private sample has 231,802 observations, and the public sample has 21,140. Finally, the outpatient visits variable in the public-sector data has 3,769 missing cases due to incomplete survey responses, which are used to cross-validate the claims data. This leads to 21,031 public outpatient visit observations.

the average for public is on the x-axis and private is on the y-axis. The dashed line represents the fitted regression line through the data. The figure suggests that mean private hospital days increase slightly with mean public hospital days, but much less than they would if the increase were proportional. This is consistent with the notion that UM leads to less regional variation and more uniform provision of care in the private sector despite the similar pressures to increase utilization that both sectors may face.

This hypothesis was further affirmed by measuring the degree of variation between MSAs in the true MSA means by using regression-adjusted estimates that correct for covariates, including differences in sample size, disease, and demographics. The main analysis thus suggests that variation in the public sector exceeds variation in the private sector by about 2.8 times for outpatient visits and 3.9 times for hospital days. There is some evidence of greater variation for the number of hospitalizations, but there is no statistical difference. However, prescription drug utilization exhibits statistically less variation in the Medicare population; this is important because both samples obtain their prescription drug insurance privately. Moreover, the presence of Medicare patients without any prescription drug insurance likely reduces the number of “high medication users” even more than what is observed among the privately insured. This may explain why prescription drug use variation is even lower in Medicare than in the private sector.

FIGURE 1  
GRAPHICAL DISTRIBUTION OF VARIATION IN MEAN HOSPITAL  
DAYS AND OUTPATIENT VISITS ACROSS U.S. CITIES



SOURCE: Authors' calculations. The data on private patients come from a proprietary health insurance claims database developed and held at the University of Southern California Schaeffer Center. The data on public patients come from the Medicare Current Beneficiary Survey.

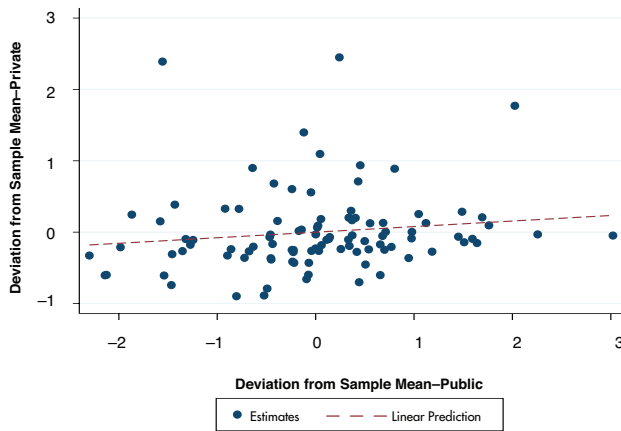
NOTE: The graph plots the distribution of the deviation of mean hospital days and outpatient visits per patient per year across Metropolitan Statistical Areas.

## Key Findings regarding Spending

Table 3 presents basic features of the spending data. Spending related to hospitalizations, hospital days, and outpatient visits tends to be lower for private patients. Total medical spending for individuals in the private plans is \$8,401 per year, compared to \$10,245 for the Medicare patients, which is about 20 percent higher. As with prescription drug utilization, spending among private patients for prescription drugs is the exception to the pattern.

Figure 3 provides a broad sense of the variation in total inpatient and outpatient spending for both sectors. As predicted, the findings are decidedly

FIGURE 2  
COMPARISON OF MEAN HOSPITAL DAYS, PUBLIC AND PRIVATE SECTORS



SOURCE: Authors' calculations. The data on private patients come from a proprietary health insurance claims database developed and held at the University of Southern California Schaeffer Center. The data on public patients come from the Medicare Current Beneficiary Survey.

NOTE: Each dot in the figure represents the mean public and private hospital days in a particular Metropolitan Statistical Area, with the public figure on the x-axis and the private figure on the y-axis. The dashed line is the regression line fit through the data.

TABLE 3  
COMPARING REGIONAL VARIATION IN HEALTH CARE UTILIZATION FOR PATIENTS OF SIMILAR HEALTH

	Public-Sector Variance across Regions	Private-Sector Variance across Regions	Ratio of Public to Private Variance across Regions
Hospitalizations	0.006	0.005	1.27
Hospital days	0.31	0.08	3.91*
Outpatient visits	2.68	0.94	2.84*
Prescriptions	21.13	27.09	0.78*

SOURCE: Authors' calculations. The data on private patients come from a proprietary health insurance claims database developed and held at the University of Southern California Schaeffer Center. The data on public patients come from the Medicare Current Beneficiary Survey.

Note: All variances are adjusted to account for regional differences in patient age, income, gender, and health status. \*Statistically different from 1.0.

more mixed. For outpatient spending, the distribution appears to be slightly tighter for the public sector. The figure for inpatient spending is harder to read visually, as the densities do not differ symmetrically. Nonetheless, the visual differences between the spending and utilization distributions suggest the possible importance of public-sector price restraints, which would decrease spending variation even with greater variation in utilization.

The analysis found the estimated regional variance using regression-adjusted means for the four spending measures to control for covariates. Outpatient spending

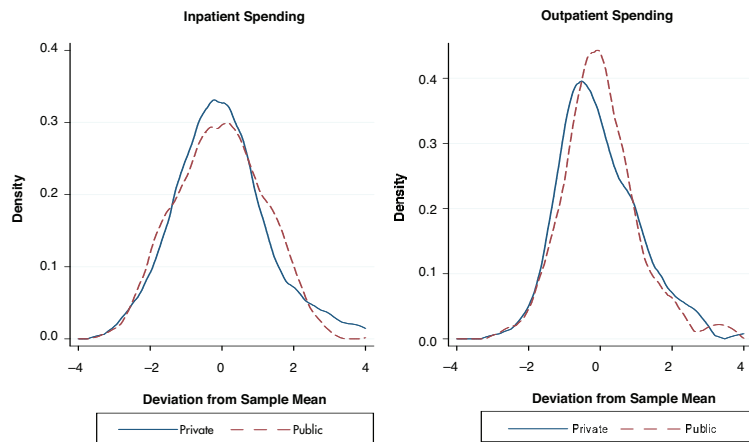
exhibits only about 35 percent as much variation in the public sector as in the private sector. Inpatient spending exhibits roughly equal variation in the two sectors. Finally, prescription drug spending varies less for Medicare patients. These results are very different from the utilization analysis. This finding lends support to the thesis that price restraints in the public sector may offset some of the spending increase that greater variation in utilization would produce.

### Discussion and Policy Implications

This study suggests significant differences in patterns of care between Medicare and private health insurers. Our findings are consistent with a body of literature documenting significant regional variation in utilization and spending in Medicare over four decades, but this variation is much less pronounced in the private sector. We find less variation in utilization among private patients for inpatient and outpatient care. There was, however, greater geographic variation in spending among private insurers; this lends support to the hypothesis that Medicare restrains prices to a greater extent. Prescription drugs were the exception to these patterns in that both utilization and spending are greater in the private sector than in the public sector.

The findings are consistent with the two theoretical premises we offered earlier. In brief, the study suggests that private payers are better able to manage utilization because of the myriad tools at their disposal for directing health care resources. In contrast, the Medicare program is better able to restrain prices because of its leverage with payers and because of direct price regulation. Paying attention to these differences in incentives between the public and private sectors introduces a new perspective for improving efficiency in the Medicare program: adoption of private-sector UM may be more effective policy than

FIGURE 3  
 GRAPHICAL DISTRIBUTION OF VARIATION IN MEAN HOSPITAL DAYS  
 AND OUTPATIENT VISITS ACROSS U.S. CITIES



SOURCE: Authors' calculations. The data on private patients come from a proprietary health insurance claims database developed and held at the University of Southern California Schaeffer Center. The data on public patients come from the Medicare Current Beneficiary Survey.

NOTE: The graph plots the distribution of the deviation of mean inpatient and outpatient spending per patient per year across Metropolitan Statistical Areas.

pursuing proposals that aim to model high-use regions after their low-use peers.

At a minimum, our findings cast doubt on the conventional view that high-use regions like Miami ought to remake themselves in the image of low-use regions like Minneapolis. Efficiency in health care may have less to do with geographic location and more to do with the health insurers that oversee the delivery of this care. Our findings also call into question the prevalent view that private health insurance is less efficient due to its higher administrative costs. Indeed, if administrative costs are higher because of more aggressive utilization review, this may be evidence of greater, not less, efficiency in the private sector. More generally, the efficiency benefits of utilization controls for Medicare would need to be weighed against the administrative costs of private-sector health insurance.

Health economists are just beginning to investigate how differences in incentives across the public and private sectors affect the variation and efficiency of health care. Our study suggests the importance of research that delves more deeply into the differences in resource use between sectors, the causes of geographic variation, and the opportunities created to improve patient outcomes and lower costs through this new knowledge. By including private-sector data, our findings raise the possibility that the public sector can better achieve both of these goals by modeling itself after the private sector rather than by focusing on reducing utilization to the level of low-use regions.

## Notes

1. The main data source used to document regional variations is the Dartmouth Atlas of Health Care. See Trustees of Dartmouth College, "The Dartmouth Atlas of Health Care," Dartmouth Institute for Health Policy and Clinical Practice, available at [www.dartmouthatlas.org](http://www.dartmouthatlas.org) (accessed July 7, 2010).

2. Tomas J. Philipson, Seth A. Seabury, Lee M. Lockwood, Dana P. Goldman, and Darius N. Lakdawalla, "Geographic Variation in Health Care: The Role of Private Markets," *Brookings Papers on Economic Activity*, forthcoming.

3. Alchian and Demsetz found that there is a greater incentive for shirking and inefficiency in public enterprise, where managers' and employees' own standards of living are unaffected by poor performance.

See A. A. Alchian and H. Demsetz, "Production, Information Costs, and Economic Organization," *American Economic Review* 62, no. 5 (1972): 777–95. De Alessi observed that inefficient private firms disappear, while inefficient public firms can last for a long time. See L. De Alessi, "An Economic Analysis of Government Ownership and Regulation: Theory and the Evidence from the Electric Power Industry," *Public Choice* 19 (1974): 1–42; and L. De Alessi, "Managerial Tenure under Private and Government Ownership in the Electric Power Industry," *Journal of Political Economy* 82, no. 3 (1974): 645–53. Spann argued that private firms typically produce similar goods and services at much lower cost than their public counterparts. See R. M. Spann, "The Macroeconomics of Unbalanced Growth and the Expanding Public Sector: Some Simple Tests of a Model of Government Growth," *Journal of Public Economics* 8, no. 3 (1977): 397–404.

4. This analysis is general enough to nest several possible sources of regional differences and, in particular, allows for such differences to be efficient. For example, differences in liability or productivity may imply differences in efficient levels of care. About liability, see D. P. Kessler and M. B. McClellan, "Do Doctors Practice Defensive Medicine?" *Quarterly Journal of Economics* 111, no. 2 (1996): 353–90; D. P. Kessler and M. B. McClellan, "Malpractice Law and Health Care Reform: Optimal Liability Policy in an Era of Managed Care," *Journal of Public Economics* 84, no. 2 (2002): 175–97; D. P. Kessler and M. B. McClellan, "How Liability Law Affects Medical Productivity," *Journal of Health Economics* 21, no. 6 (2002): 931–55; and K. Baicker and A. Chandra, "Malpractice Liability and the Practice of Medicine in the Medicare Program," *Health Affairs* 26, no. 3 (2007): 841–52.

For differences in efficient levels of care, see A. Chandra and D. O. Staiger, "Productivity Spillovers in Health Care: Evidence from the Treatment of Heart Attacks," *Journal of Political Economy* 115, no. 1 (2007): 103–40.

5. See A. A. Alchian and H. Demsetz, "Production, Information Costs, and Economic Organization"; and L. De Alessi, "An Economic Analysis of Government Ownership and Regulation: Theory and the Evidence from the Electric Power Industry."

6. When estimating the cost of Medicare Part D, for example, the Congressional Budget Office inflated the reported MCBS prescription drug spending by 15 percent. See S. Christensen and J. Wagner, "The Costs of a Medicare Prescription Drug Benefit," *Health Affairs* (Millwood) 19, no. 2 (2000): 212–18.

7. See the notes to tables 1 and 2 for a few sample-size issues specific to certain variables.

8. The private sample contains both active workers and retirees receiving benefits from their current or past employers.