
Border Crossing for Physician Services: Implications for Controlling Expenditures

John Holahan, Ph.D., and Stephen Zuckerman, Ph.D.

In this article, the authors explore geographic border crossing for the use of Medicare physician services. Using data from the 1988 Part B Medicare Annual Data (BMAD) file, they find that there is substantial geographic variation across both States and urban and rural areas in border crossing to seek services. As might be expected, there is more border crossing among smaller geographic areas than among States. Predominantly rural areas tend to be major importers of services, but urban areas, on average, export services. Border crossing tends to be greater for high-technology services such as advanced imaging, cardiovascular surgery, and oncology procedures. These results suggest that expenditure-control policies applying to States or metropolitan areas should incorporate adjusters for patients' current geographic patterns of care.

INTRODUCTION

In this article, we analyze the extent to which Medicare beneficiaries travel across geographic borders to receive physician services and identify the types of services for which this occurs most frequently. Border crossing has important

implications for future refinements of the Medicare volume performance standards (MVPS) established by Congress in 1989 (Omnibus Budget Reconciliation Act of 1989 [OBRA 1989], Public Law 101-239). Under the present policy, updates for fees could be limited if the growth in expenditures for physician services exceeds the MVPS target for a given year. Other than allowing for different rates for surgical and non-surgical services, the same target rate of growth is applied to all areas of the country.

A potential limitation of this policy is that the behavior of any individual physician has such a small impact on the overall growth in expenditures that there may be no real incentive to modify behavior. One alternative to current policy is to apply separate standards to physicians in smaller geographic areas. Smaller MVPS geographic areas would magnify the impact of any physician's behavior on the group and, as such, would strengthen the incentives for physicians to control the volume of services provided. In addition, the smaller the area, the more physicians can identify other physicians who provide a high volume of services and can apply peer pressure to modify practice patterns. Adopting a subnational approach to MVPS based on geographic areas could allow for differential fee updates for each area, depending on the relationship between the area's standard and the actual rate of growth in spending.

Support for this research was provided by the Health Care Financing Administration (HCFA) to The Urban Institute through Cooperative Agreement Number 17-C-99473/3-01. This cooperative agreement supported a number of research projects related to the Medicare Volume Performance Standard Policy. The authors are with The Urban Institute. Any opinions expressed are those of the authors and do not reflect the opinions of HCFA, The Urban Institute, or its sponsors.

Although small areas with relatively few providers would result in strong incentives to modify behavior, such areas would not likely be self-contained markets for physician services. As a result, it may be hard to justify a small-area MVPS policy, the goal of which is volume growth control, when beneficiaries are free to use services outside of their area of residence. Even if physicians in an area respond to the incentives and limit the growth in service volume, a substantial amount of border crossing by beneficiaries may offset any cost savings. Thus, it would be difficult to hold the area's physicians accountable. To assess the desirability of alternative subnational MVPS areas, it is useful to understand the extent of border crossing that could occur with various types of area delineations. For example, although the use of metropolitan statistical areas (MSAs) may seem to provide reasonably strong incentives, MSAs may be subject to such a high degree of border crossing that the use of States may be more viable.

A second and equally important issue related to the development of subnational MVPS targets is whether there should be uniform target rates of growth in fees when there is extensive cross-sectional variation in the provision of Medicare services. Variation in service provision is not in itself a problem, but widespread variation in utilization may be, if it reflects overutilization, access barriers, or both. But performance standards are directed at physicians and can only indirectly reflect variations in utilization. This makes it difficult to introduce equity considerations into an MVPS policy.

Variation in service provision may reflect either real differences in beneficiary use rates or else patterns of border cross-

ing in order to receive services that are not widely available. In other words, high-volume areas of service provision may be the result of high utilization rates by beneficiaries living in the area or by beneficiaries from other areas entering the market. Conversely, low-volume areas may reflect low use among the residing beneficiary population or a reason for residents to travel elsewhere to receive care.

Volume performance standards that apply the same limits on the rate of growth in expenditures in all areas would tend to keep existing variations in service provision in place. However, variations in rates of service provision would not in themselves be a problem if beneficiary use rates did not vary by more than amounts considered acceptable by policymakers, e.g., if there were sufficient amounts of border crossing by beneficiaries from low- to high-volume areas. On the other hand, if high service provision in certain areas is the result of high beneficiary use rates and not border crossing, policymakers may want to establish targets with lower rates of growth; higher target rates may be desired in areas with low service provision if these areas also have low beneficiary use rates. This issue also requires a clear understanding of the present patterns of border crossing and the degree to which they result in reducing variations across areas in beneficiary utilization rates.

Prior research on border crossing has tended to focus on inpatient hospital care (Hogan, 1988; Bronstein and Morrissey, 1990; Buczko, to be published; McGuirk and Porell, 1984). In most instances, these studies used detailed data from a single State or county. The only studies of the extent of border crossing for ambulatory services that we could identify were

Kleinman and Makuc (1983) and Makuc, Kleinman, and Pierre (1985).

Using data from the 1978 Health Interview Survey, these studies of ambulatory services examined counties and several types of areas that are aggregations of counties to measure border crossing across the entire country. They used the percentage of visits received outside of the patient's area of residence as their primary indicator. Not surprisingly, they found border crossing more common when the county, as opposed to an aggregation of counties, is used as the geographic basis of the analysis; i.e., smaller areas are more frequently associated with border crossing than large areas. In addition, these studies showed that border crossing occurred more among rural residents and was more likely to be associated with seeking the care of specialists than of primary care physicians. Of particular note with respect to the issue of MVPS, patterns of border crossing for the group 65 years of age or over were similar to those of other age groups.

This article differs from earlier work in a number of important ways. First, the study focuses exclusively on border crossing for physician services among Medicare beneficiaries. Second, the geographic areas that are used cover the entire Nation and are derived from the current set of Medicare physician payment localities. (These geographic areas differ from those recently proposed by the Physician Payment Review Commission [1991] and from those recommended by Welch and Zuckerman [1991]). We are able to analyze the exporting and importing of medical services for different kinds of geographic areas, including rural areas as well as small and large cities; we also examine border crossing by State within

regions of the country. Third, we examine border crossing for different types of Medicare physician services, e.g.: Is border crossing greater for high-technology services than for, say, office visits? Fourth, we explore the extent to which border crossing reduces the variation in beneficiary utilization rates. To accomplish this, we show differences between levels of service provision in geographic areas and levels of beneficiary utilization in the same areas. We conclude with discussion of a policy option that would allow policymakers to establish subnational MVPS targets that apply to the areas in which physicians practice but that also incorporate information on levels of beneficiary utilization.

The fundamental conclusion of this article is that there is a great deal of geographic border crossing by Medicare beneficiaries in the United States. (Throughout this article, we adopt the convention of referring to areas as being importers and/or exporters of services, not to the alternative of being exporters or importers of beneficiaries.) This is particularly true for urban and rural areas. Rural areas tend to be major importers of services; large cities that are adjacent to other large cities also tend to be importers. Very large cities, as well as large freestanding cities and small cities, are substantial exporters of services. There is also significant exporting and importing of services across States, though less than at the substate level. Rural States tend to be importers; large urbanized States tend to be exporters. There is also significant variation within regions, with rural States within a region tending to be importers and urbanized States, exporters. Finally, there tends to be substantially more importing and exporting of technologically sophisti-

cated services than for more routine evaluation and management services.

METHODS

In this article, we use data from the 1988 BMAD file. This data set provides information on utilization of all physician services for a 5-percent sample of Medicare beneficiaries and on the Medicare provider locality in which the service was provided. The file, however, does not contain any information on the area of residence of the beneficiary. To measure utilization rates based on the locality in which the beneficiary resides, we have merged information on the county of residence from the Health Insurance Skeleton Write-Off (HISKEW) file to the BMAD file. Using the county of residence together with an algorithm that associates a county with the Medicare provider locality, we are able to identify (or, in some cases, approximate) the locality in which the beneficiary resides. This augmented file then contains information on the provider locality in which the beneficiary resides as well as the provider locality in which each service that the beneficiary used was provided.

Given these data, there are two general ways of measuring border crossing. The first can be called "net flows." This is defined as the ratio of services or allowed charges used by beneficiaries residing in a given geographic area to services or allowed charges produced in that area. When this ratio is less than one, the area can be viewed as a net exporter of services; ratios greater than one imply net importing. For example, assume an area produces \$1.0 billion of Medicare physician services and that beneficiaries in that area use \$0.9 billion; the area would

have a net flow ratio of 0.90. The ratio of 0.90 would mean that the beneficiaries in the area use 10 percent fewer services than the area produces, and therefore the area is exporting 10 percent of its services to beneficiaries from other areas.

An alternative way of analyzing border crossing is to examine "gross flows." This approach provides information on both the services exported as well as services imported by an area. For example, a given area may have a net flow ratio of 1.00, implying neither net exporting or importing, yet have a relatively large amount of both exporting and importing (because the two balance each other out, resulting in little or no discernable net flow). Another area may have the same net flow ratio but have small amounts of exporting and importing. By examining gross flows as well as net flows, we can observe these patterns. In the results that are presented in the following sections, both approaches are used.

Before these statistics can be computed, however, the specific areas defining the borders must be selected. The two most obvious types of geographic areas that can be derived from the Medicare localities are States and substate areas that are related to MSA and non-MSA definitions. Substate areas cannot precisely track MSA and non-MSA definitions in all States because locality boundaries often do not conform to the same criteria. Using the localities in this way will provide guidance as to whether the MSA and non-MSA distinction could provide a suitable basis for subnational MVPS targets. Clearly, making use of MSA and non-MSA areas for MVPS would require a considerable reconfiguration of the payment localities.

To examine border crossing across State boundaries, some accommodation is made to existing carrier designations. For example, we retained the carrier division between northern and southern California and between upstate and downstate New York. In downstate New York, however, we have included Queens with the New York City metropolitan area. Our preliminary analysis of the data showed an extraordinary amount of border crossing by Queens beneficiaries. This is an artifact of New York City carrier and geographic boundaries and did not seem to be of sufficient merit to keep it separate from the rest of New York City. Our approach also uses the Washington, DC, carrier designation, which includes adjacent counties in Maryland and Virginia. The Kansas City carrier is split into its Kansas and Missouri localities, which are then considered parts of those States. In summary, our State or carrier designation is equivalent to the State, except for the treatment of California, New York, the District of Columbia, Maryland, and Virginia.

Substate areas related to the MSA and non-MSA concept can be derived from the present localities in 29 of the 51 States (including the District of Columbia). For the remaining 22 States, there is no way to disaggregate below the State level. Either the entire State is the provider locality, or the provider localities were not meaningful geographic market areas. However, even in the 29 States that can be divided, a precise application of MSA definitions was not always possible. In some cases we were able to group localities into areas that were the same as an MSA (e.g., New York City), but in others we were forced to work with areas that were clusters of MSAs (e.g., large cities in

Pennsylvania or small cities in Alabama). The end result is that the 240 Medicare localities are reduced to 121 substate or statewide geographic areas.

Seven area categories are defined. These are:

- Very large cities.
- Adjacent large cities.
- Freestanding large cities.
- Small cities.
- Small cities-rural areas.
- Rural areas.
- Statewide.

Table 1 indicates the cities or geographic areas within each classification system. Very large cities include the 10 largest MSAs in terms of population. Because our designation of cities is constrained by the definition of Medicare localities, in some instances we were forced to group cities with surrounding areas to approximate an MSA. In San Francisco, for example, we have included San Mateo and Marin counties. Washington, DC, includes adjacent counties in Maryland and Virginia. Pennsylvania large cities include Pittsburgh, Philadelphia, and Scranton.

Adjacent large cities are a group of cities that have more than 100,000 Medicare beneficiaries and are contiguous to 1 of the 10 largest MSAs. For example, Oakland-Berkeley is adjacent to San Francisco, and San Bernadino-Riverside is adjacent to Los Angeles. Freestanding large cities are similarly sized cities, in terms of Medicare enrollment, that are not contiguous to a very large MSA. These include Birmingham, Alabama; New Orleans, Louisiana; Baltimore, Maryland; Dallas, Texas; and others.

Table 1
Allocation of Medicare Payment Localities to Types of Substate Geographic Areas

Very Large Cities	Adjacent Large Cities	Freestanding Large Cities	Small Cities	Small Cities-Rural Areas	Rural	Statewide
San Francisco, California	Oakland-Berkeley, California	Birmingham, Alabama	Small cities in Alabama	Small cities-rural Iowa	Rural Alabama	Arkansas
Washington, District of Columbia Metropolitan Area	San Bernadino-Riverside, California	New Orleans, Louisiana	Mobile, Alabama	Small cities-rural Kansas	Rural Louisiana	Colorado
Miami, Florida	Fort Lauderdale, Florida	Sacramento, California	Small cities in Louisiana	Small cities-rural Nebraska	Northern rural California	Delaware
Chicago, Illinois	East St. Louis, Illinois	Santa Clara-Monterey, California	Stockton, California	Small cities-rural Kentucky	Rural Florida	Montana
Urban Massachusetts	Poughkeepsie-North New York City suburbs	North and North Central Florida	Merced, California	Small cities-rural Massachusetts	Rural Illinois	New Hampshire
Detroit, Michigan	Ventura, California	Indiana Metropolitan Area	Fresno, California	Small cities-rural Michigan	Rural Indiana	Vermont
New York City	Anaheim-Santa Ana, California	Kansas City Metropolitan Area	Monterey, California	Small cities-rural Minnesota	Rural New York	North Dakota
Large cities in Pennsylvania		Buffalo, New York	Bakersfield, California	Northeast Texas	Rural Pennsylvania	South Dakota
Houston, Texas		Rochester, New York	Small cities in Illinois	Southeast Texas	Rural Arizona	New Jersey
Los Angeles, California		San Antonio, Texas	Iowa City, Iowa	Western Texas	Rural Georgia	Rhode Island
		Dallas, Texas	Omaha, Nebraska	Small cities-rural Washington	Rural Oklahoma	South Carolina
		Seattle, Washington	Lexington-Louisville, Kentucky	Small cities-rural Wisconsin		Utah
		Milwaukee, Wisconsin	North central cities in New York	Small cities-rural Oregon		Alaska
		Phoenix, Arizona	Small cities in Pennsylvania	Small cities-rural Connecticut		Hawaii
		Atlanta, Georgia	Fort Worth, Texas	Small cities-rural Virginia		Nevada
		Portland, Oregon	Tucson, Arizona	Small cities-rural Missouri		New Mexico

See SOURCE at end of table.

Table 1—Continued
Allocation of Medicare Payment Localities to Types of Substate Geographic Areas

Very Large Cities	Adjacent Large Cities	Freestanding Large Cities	Small Cities	Small Cities-Rural Areas	Rural	Statewide
Los Angeles, California—Cont.		San Diego, California	Small cities in Georgia	Small cities-rural Ohio		Idaho
		Hartford, Connecticut	Oklahoma City, Oklahoma	Small cities-rural West Virginia		Tennessee
		New Haven, Connecticut	Tulsa, Oklahoma	Small cities-rural Maryland		Wyoming
		St. Paul-Minneapolis, Minnesota	Santa Barbara, California			North Carolina
		Tidewater Virginia	Stamford, Connecticut			Mississippi
		St. Louis, Missouri	Richmond, Virginia			Maine
		Akron-Youngstown, Ohio	Charleston, West Virginia			
		Cincinnati, Ohio				
		Columbus, Ohio				
		Dayton-Springfield, Ohio				
		Baltimore, Maryland				

SOURCE: Holahan, J., and Zuckerman, S., Urban Institute, Washington, DC, 1993.

Small cities include MSAs with fewer than 100,000 Medicare beneficiaries. These include Mobile, Alabama; Stockton and Bakersfield, California; Iowa City, Iowa; Tucson, Arizona; and Tulsa, Oklahoma. Small cities-rural areas include both small MSAs and rural areas for which it was impossible (because of the Medicare locality structure) to separate the small city from the rural area. Rural areas could be defined in 11 States and are entirely rural, in that they contain no counties that are part of an MSA. Most of the 22 States that could not be subdivided are among the least populous, but some are not, e.g., North Carolina, New Jersey, Tennessee, and Colorado.

Because the classification system is built on the basis of Medicare payment localities, the outcome is far from perfect. The results that we present in this article are to some degree a product of the geographic boundaries of the physician payment localities that we have included. The geographic boundaries in some Medicare localities are tightly drawn around the urban core; others include more outlying areas. This has some effect on the results, but the end result does permit us to obtain a fairly clear picture of the extent of border crossing to use Medicare services.

To examine border crossing by type of service, we use a new procedure classification system for Medicare services developed as part of this project by The Urban Institute (Berenson and Holahan, 1990). This type of service classification system divides Medicare services into 4 major categories and 20 subcategories. The first major group is evaluation and management services; it includes office visits, hospital visits, emergency room services, home and nursing home visits, consultations, and specialist evaluation

and management services. This last group includes a range of evaluation and management services provided by ophthalmologists, psychiatrists, pathologists, allergists, and other subspecialists.

The second major group is procedures; this includes major procedures, subdivided into cardiovascular, orthopedic, and other; ambulatory procedures, subdivided into eye and other; and minor procedures, including endoscopies and oncology procedures. Imaging is the third major group and is divided into standard imaging (routine X-rays and nuclear medicine), advanced imaging (computerized tomography scans and magnetic resonance imaging), sonographic imaging, and imaging procedures (largely cardiac catheterization). The final major group is tests, divided into laboratory and other tests. Other tests is dominated by a wide range of cardiovascular tests.

RESULTS

Border Crossing Among Substate Areas

In this section, we examine border crossing for the substate areas presented in Table 1. Table 2 summarizes the net flows across these areas. The first row indicates that the net flow ratio is 1.00 for the Nation; that is, the flows across geographic areas balance out, as one would expect. The table also shows that very large cities are net exporters; that is, they produce approximately 8 percent more services, or \$0.6 billion more in allowed charges, than are used by beneficiaries living in those areas. Adjacent large cities are net importers, with services used by beneficiaries approximately 6 percent more than services provided. Freestanding large cities, on the other hand, are the

largest net exporters in terms of allowed charges (\$0.9 billion). Such cities produce approximately 14 percent more services than are used by beneficiaries living in those areas. Small cities had \$0.5 billion more in allowed charges exported than imported; that is, producing approximately 20 percent more services than are used in small cities. The small cities-rural areas are large importers of services. They use about 26 percent more services, or \$0.8 billion in allowed charges, than are produced in those areas. Finally, rural areas are very large importers of services, using approximately \$0.9 billion in allowed charges, or 71 percent more services than are provided in rural areas. The residual statewide areas, consisting of the 22 States in Table 1, use about as much care as they produce.

Table 3 provides information on gross flows, the exporting and importing of services. It is of interest to compare this table with Table 2. Table 3 indicates that, on balance, all areas export and import about 15 percent of both services and charges. Very large cities have exports amounting to 13.3 percent of their allowed charges, while importing about 6.1 percent of all al-

lowed charges received. Adjacent large cities export about as many services as do very large cities. However, such cities are substantially greater importers, with allowed charges for imported services amounting to 18.1 percent of all allowed charges. Freestanding large cities and small cities are the largest exporters of services, with 20.6 and 34.0 percent of allowed charges, respectively. Small cities are also rather larger importers as well, with imports amounting to 17.3 percent of allowed charges. Nor surprisingly, small cities-rural areas and rural areas are the largest importers of services, with imports amounting to 27.1 and 47.4 percent of all allowed charges, respectively. But these areas also export services, with exports amounting to 8.0 and 10.2 percent of allowed charges produced, respectively.

The next set of tables looks at border crossing by type of service. Table 4 presents information on net flows across geographic areas for each of the evaluation and management services. Border crossing for office visits and emergency room care tends to be relatively low. As might be expected, it is even lower for

Table 2
Allowed Charges and Net Flow Ratio (Border Crossing) Among Substate Geographic Areas for All Services

Area Classification	Services Used (in Billions of Dollars in Allowed Charges)	Services Produced (in Billions of Dollars in Allowed Charges)	Net Flow Ratio ¹
All Areas	\$25.1	\$25.1	1.00
Very Large Cities	6.3	6.9	0.92
Adjacent Large Cities	1.7	1.6	1.06
Freestanding Large Cities	4.9	5.8	0.86
Small Cities	2.0	2.5	0.80
Small Cities-Rural Areas	4.1	3.3	1.26
Rural	2.2	1.3	1.71
Statewide ²	3.8	3.8	1.00

¹The net flow ratio is defined as the ratio of services (allowed charges) used by beneficiaries residing in a geographic area to services (allowed charges) produced in that area. For example, the net flow ratio of 0.92 means that very large cities produce 8 percent more services than beneficiaries residing in very large cities use.

²Twenty-two States that were not disaggregated.

SOURCE: Health Care Financing Administration; Tabulations from the 1988 Part B Medicare Annual Data file.

Table 3

Services and Allowed Charges per Enrollee (Gross Flows) for All Services Among Substate Geographic Areas

Geographic Area	Services and Allowed Charges for Area Beneficiaries				Services and Allowed Charges by Area Providers			
	Services		Allowed Charges		Services		Allowed Charges	
	Number per Enrollee	Percent Imported	Amount per Enrollee	Percent Imported	Number per Enrollee	Percent Exported	Amount per Enrollee	Percent Exported
All Areas	20.53	14.9	\$830.06	15.4	20.53	14.9	\$830.06	15.4
Very Large Cities	24.70	8.6	1,093.12	6.1	25.98	13.1	1,183.76	13.3
Adjacent Large Cities	25.39	18.1	1,164.77	18.1	24.27	14.3	1,098.83	13.2
Freestanding Large Cities	20.46	8.4	841.45	7.2	22.96	18.4	982.56	20.6
Small Cities	18.86	18.3	761.56	17.3	22.50	31.5	954.30	34.0
Small Cities-Rural Areas	18.51	22.2	682.78	27.1	15.49	7.0	540.83	8.0
Rural	18.79	40.8	736.31	47.4	12.29	9.6	430.90	10.2
Statewide ¹	18.92	6.3	696.46	8.3	20.28	12.6	698.13	8.3

¹Twenty-two States that were not disaggregated.

SOURCE: Health Care Financing Administration: Tabulations from the 1988 Part B Medicare Annual Data file.

home and nursing home visits, even in rural areas. Not surprisingly, the specialist evaluation and management services and consultations, services that tend to be provided more by medical and surgical subspecialties, had the largest amounts of exporting by very large cities, freestanding large cities, and small cities, and the greatest amount of importing by small cities-rural areas and rural areas. These reflect the fact that individuals living in outlying areas must go to urban areas for the services of ophthalmologists, psychiatrists, and other specialists.

Table 5 examines border crossing for major procedures. Here, the net flows are considerably greater than for most evalu-

ation and management services. Among major procedures, net importing and exporting are particularly large for cardiovascular procedures. Very large cities provide about 18 percent more cardiovascular procedures than are used in those areas. The ratios of exports to imports are even larger for freestanding large cities and for small cities. On the other hand, beneficiaries in adjacent large cities have allowed charges of about 20 percent more for cardiovascular procedures than physicians in those areas provide. Individuals in rural areas have allowed charges (used) that are more than three times as great for cardiovascular procedures as allowed charges produced in those areas. The

Table 4

Ratios of Allowed Charges Used to Allowed Charges Produced (Net Flows) for Substate Geographic Areas for Evaluation and Management Services

Area Classification	Office Visits	Hospital Visits	Emergency Room Services	Home and Nursing Home	Specialist Evaluation and Management Services	Consultations
All Areas	1.00	1.00	1.00	1.00	1.00	1.00
Very Large Cities	0.96	0.94	0.97	0.97	0.91	0.93
Adjacent Large Cities	1.03	1.02	1.00	0.97	1.08	1.05
Freestanding Large Cities	0.92	0.89	0.92	1.00	0.87	0.86
Small Cities	0.84	0.78	0.84	0.89	0.77	0.79
Small Cities-Rural Areas	1.13	1.22	1.12	1.05	1.27	1.34
Rural	1.36	1.52	1.35	1.15	1.72	2.00
Statewide ¹	1.02	1.01	1.00	1.03	1.03	1.02

¹Twenty-two States that were not disaggregated.

SOURCE: Health Care Financing Administration: Tabulations from the 1988 Part B Medicare Annual Data file.

Table 5

Ratios of Allowed Charges Used to Allowed Charges Produced (Net Flows) for Substate Geographic Areas for Major Procedures

Area Classification	Major Procedures		Major Orthopedic
	Other	Cardiovascular	
All Areas	1.00	1.00	1.00
Very Large Cities	0.89	0.82	0.89
Adjacent Large Cities	1.12	1.20	1.09
Freestanding Large Cities	0.85	0.73	0.84
Small Cities	0.77	0.77	0.78
Small Cities-Rural Areas	1.26	1.58	1.23
Rural	1.74	3.27	1.81
Statewide ¹	1.03	1.00	1.01

¹Twenty-two States that were not disaggregated.

SOURCE: Health Care Financing Administration: Tabulations from the 1988 Part B Medicare Annual Data file.

same pattern applies, but to a lesser degree, for other major procedures as well as orthopedic procedures.

Similar patterns apply for ambulatory procedures (Table 6). Net importing of these procedures is particularly high for rural areas, especially for oncology procedures. Similarly, very large cities, freestanding large cities, and small cities are large net exporters of all ambulatory, oncology, and endoscopy procedures. There is less border crossing for all types of areas for minor procedures. As is shown later, the limited amount of border crossing for minor procedures contributes to wide variation in use rates.

Table 7 examines imaging services and tests. Here there is also a considerable

amount of net exporting and importing of services. The amount of border crossing tends to increase with the complexity of the service. There is less border crossing for standard imaging than for other services. For standard imaging services, very large cities provide about 7 percent more (allowed charges) than are used in those cities. At the other extreme, rural areas use approximately 61 percent more than they produce. For advanced imaging, very large cities, freestanding large cities, and small cities are large exporters. Small cities in particular provide about 25 percent more advanced imaging services (allowed charges) than are used by enrollees in those cities. At the other extreme, individuals living in rural areas use 81 percent

Table 6
Ratios of Allowed Charges Used to Allowed Charges Produced (Net Flows) for Substate Geographic Areas for Ambulatory Procedures

Area Classification	Ambulatory Procedures	Ambulatory Procedures, Eye	Minor Procedures	Oncology Services	Endoscopy Procedures
All Areas	1.00	1.00	1.00	1.00	1.00
Very Large Cities	0.92	0.90	0.95	0.88	0.93
Adjacent Large Cities	1.07	1.10	1.03	1.05	1.05
Freestanding Large Cities	0.87	0.84	0.91	0.83	0.88
Small Cities	0.81	0.77	0.83	0.73	0.76
Small Cities-Rural Areas	1.20	1.28	1.18	1.34	1.22
Rural	1.68	1.74	1.58	2.23	1.71
Statewide ¹	1.01	1.02	1.02	1.05	1.01

¹Twenty-two States that were not disaggregated.

SOURCE: Health Care Financing Administration: Tabulations from the 1988 Part B Medicare Annual Data file.

Table 7
Ratios of Allowed Charges Used to Allowed Charges Produced (Net Flows) for Substate Geographic Areas for Imaging Services and Tests

Area Classification	Standard Imaging	Advanced Imaging	Sonography	Imaging Procedures	Laboratory Tests	Other Tests
All Areas	1.00	1.00	1.00	1.00	1.00	1.00
Very Large Cities	0.93	0.93	0.93	0.83	0.98	0.94
Adjacent Large Cities	1.04	1.03	1.05	1.17	1.03	1.06
Freestanding Large Cities	0.89	0.86	0.88	0.76	0.90	0.89
Small Cities	0.79	0.75	0.79	0.71	0.99	0.82
Small Cities-Rural Areas	1.19	1.27	1.19	1.42	1.41	1.16
Rural	1.61	1.81	1.66	3.21	1.98	1.55
Statewide ¹	1.02	1.01	1.04	1.04	0.71	1.04

¹Twenty-two States that could not be disaggregated.

SOURCE: Health Care Financing Administration: Tabulations from the 1988 Part B Medicare Annual Data file.

more advanced imaging procedures than are produced in those areas. Even greater contrasts exist for imaging procedures. Very large cities produce more than 17 percent more imaging procedures than are used by beneficiaries living in those areas. Freestanding large cities and small cities are even greater net exporters. At the other extreme, individuals living in rural areas use over three times as many imaging procedures as rural areas produce.

Laboratory tests exhibit a slightly different pattern. Very large cities, freestanding large cities, and small cities remain exporters but by much smaller margins than for other services. Small cities-rural areas and rural areas remain relatively large net importers. The major explanation for this somewhat different pattern for laboratory tests reflects the role of high-volume, out-of-State laboratories in performing laboratory tests. The state-wide areas, for example, are substantial net exporters because of large laboratories in New Jersey, Delaware, and North Carolina. This pattern is evident later when examining border crossing by State.

Other tests reflect a pattern exhibited elsewhere, in that very large cities, freestanding large cities, and small cities are relatively large exporters of such tests. Adjacent large cities, small cities-rural areas, and particularly rural areas are large net importers of these services. These patterns reflect that a large proportion of these services are provided by specialists, particularly cardiologists, who tend to locate in urban areas.

Border Crossing Among States

Table 8 provides information on net flows across State borders. The definition

of States used in this article, as described earlier, is equivalent to actual States except for New York, California, Washington, DC, Maryland, and Virginia. In general, there is less border crossing across State borders than among our designated geographic areas. There tends to be more border crossing in rural States than in heavily urbanized States, reflecting the patterns shown in the more disaggregated areas. In addition, more rural States tend to be net importers and heavily urbanized States to be net exporters. States that have large populations tend to have less net importing or exporting. This seems to be because the importing and exporting that does occur is relative to a larger base than in a small State. Border crossing over State lines is also affected by the presence of border cities.

Some interesting patterns can be illustrated by examining two regions: the New England and Mountain States. In New England, Maine, New Hampshire, Rhode Island, and Vermont tend to be net importers. Massachusetts is a net exporter of all types of services. This may reflect the fact that the latter has large teaching hospitals and is therefore likely to provide services to beneficiaries in the other States in the region. New Hampshire, Vermont, and Maine may also have a significant amount of border crossing along their long, shared borders. The Mountain region follows a similar pattern. Idaho, Montana, New Mexico, and Wyoming all tend to be very large importers of services. Arizona, Nevada, and Utah are all net exporters. Colorado has a net flow ratio of 1.0, but is an exporter for many types of services (data not shown). The latter group of States have major cities and appear to export services to the other States in the region.

States that have large cities on their borders, not surprisingly, tend to have a larger amount of importing or exporting. For example, Illinois is a net importer and Missouri a net exporter. Much of this is the result of exporting by St. Louis, Missouri and importing by East St. Louis, Illinois. North Dakota has two small urban areas on the Minnesota border and a relatively small population base; it therefore tends to be a rather large net exporter. Iowa is a relatively large net importer; this

seems to be the result of importing of services from Omaha, Nebraska.

Table 9 provides data on gross flows for all services among States. Again, a number of findings are of interest. Many of these can be illustrated by examining the South Atlantic region. There, the District of Columbia metropolitan area is a relatively large overall exporter of services, but still imports 6.0 percent of all care. Virginia and Maryland (excluding by definition the counties adjacent to the District

Table 8
Ratios of Allowed Charges Used to Allowed Charges Produced (Net Flows) for States and Carriers for All Services

Location	All Services	Location	All Services
New England		East North Central	
Connecticut	0.99	Illinois	1.07
Massachusetts	0.97	Indiana	1.01
Maine	1.06	Michigan	1.03
New Hampshire	1.09	Ohio	1.01
Rhode Island	1.02	Wisconsin	1.02
Vermont	1.10		
		West North Central	
Middle Atlantic		Iowa	1.12
New Jersey	1.04	Kansas	1.03
New York, Downstate	1.00	Minnesota ²	0.82
New York, Upstate	1.04	Missouri	0.94
Pennsylvania	0.99	North Dakota	0.87
		Nebraska	1.00
South Atlantic		South Dakota	0.96
District of Columbia ¹	0.90		
Delaware	0.70	Mountain	
Florida	0.98	Arizona	0.97
Georgia	0.99	Colorado	1.00
Maryland ²	1.03	Idaho	1.22
North Carolina	0.90	Montana	1.08
South Carolina	1.11	New Mexico	1.10
Virginia ²	1.08	Nevada	0.93
West Virginia	1.02	Utah	0.98
		Wyoming	1.49
East South Central		Pacific	
Alabama	1.03	Alaska	1.18
Kentucky	1.00	California, Northern	1.04
Mississippi	1.10	California, Southern	0.95
Tennessee	0.91	Hawaii	1.00
		Oregon	1.02
West South Central		Washington	1.00
Arkansas	1.05		
Louisiana	0.98		
Oklahoma	1.06		
Texas	0.98		

¹The District of Columbia includes adjacent Maryland and Virginia counties; these counties are therefore excluded from Maryland and Virginia.

²This low ratio for Minnesota reflects a large amount of allowed charges billed by the Mayo Clinic using other than HCFA Common Procedure Coding System codes; they could not be classified into the type-of-service system. Total allowed charges for the exceptions or unclassified category for Minnesota was \$257.19. A very large share (77.3 percent of allowed charges) was provided to out-of-State residents.

SOURCE: Health Care Financing Administration: Tabulations from the 1988 Part B Medicare Annual Data File.

of Columbia) both import more services than they provide. This offsets the pattern observed for the District of Columbia. Delaware, being a small State with one major city but in close proximity to a major metropolitan area (Philadelphia), tends to both export and import a relatively large percentage of physician services. It is a major exporter of laboratory services, which explains the very high percentage of services exported. This also explains why it is a much higher exporter of services than of allowed charges. North Carolina is also a large net exporter; it too exports a large amount of laboratory services. South Carolina, in contrast, imports a substantially higher share of its services than it exports. This suggests border crossing and the use of services in North Carolina by South Carolinians. West Virginia is a relatively large importer and exporter of services. This reflects the presence of five metropolitan areas straddling the West Virginia border.

Data on border crossing among States by type of service (not shown in tables) confirm many of the results observed among the substate areas. First, there was relatively little border crossing for evaluation and management services, with the exceptions of specialist evaluation and management services and consultations. These services are typically provided by subspecialists and are not abundantly available in all States. Second, there is a substantial amount of border crossing among States for cardiovascular procedures (including cardiac catheterizations) and orthopedic procedures, but relatively little border crossing for other major procedures. Third, among ambulatory procedures, border crossing is only meaningful for ambulatory eye procedures and oncology. Fourth, there is

much more border crossing for advanced imaging than for standard imaging, but perhaps less than one might have expected. This may reflect the relatively widespread diffusion of advanced imaging technology by 1988.

Finally, there are substantial amounts of exporting and importing of laboratory services by State. However, this follows a very different pattern than that observed elsewhere. There are major national and regional laboratories in States such as New Jersey, Pennsylvania, Delaware, and North Carolina that produce laboratory services for Medicare beneficiaries all over the Nation. The result is that most States tend to be importers of laboratory services, with a handful of States being exporters.

Does Border Crossing Equalize Utilization Rates?

Table 10 summarizes the variation in the use and provision of services. The two lefthand columns provide the coefficients of variation for allowed charges per enrollee for the utilization and provision of services, by type of service, for States and carriers. The two righthand columns provide the same information for our designated substate geographic areas. A number of important findings are contained in Table 10. First, there is substantially greater variation in services provided than in services used. The coefficients of variation are higher for the former for all types of services. These results are even more striking for substate areas, principally because the latter allows us to look at rural areas as well as very large cities.

These results indicate that border crossing results in utilization of services being considerably less variable than the

Table 9

Ratio of Allowed Charges Used to Allowed Charges Produced (Net Flows) and Percent of Allowed Charges Imported or Exported (Gross Flows) for States and Carriers for All Services

Location	Allowed Charges			
	By Area Beneficiaries		By Area Providers	
	Amount per Enrollee	Percent Imported	Amount per Enrollee	Percent Exported
All States	\$830.06	7.5	\$830.06	7.5
New England				
Connecticut	836.12	6.5	841.62	7.1
Massachusetts	860.96	4.4	884.21	6.9
Maine	616.85	9.4	583.88	4.3
New Hampshire	612.34	23.1	561.79	16.2
Rhode Island	843.82	8.4	827.72	6.7
Vermont	585.74	24.3	531.19	16.6
Middle Atlantic				
New Jersey	887.63	12.0	850.24	8.1
New York, Downstate	1,122.01	6.1	1,124.35	6.3
New York, Upstate	695.92	8.2	668.58	4.4
Pennsylvania	790.61	5.4	797.00	6.1
South Atlantic				
District of Columbia	1,114.34	6.0	1,242.97	15.7
Delaware	751.19	17.1	1,067.72	41.7
Florida	1,239.26	6.6	1,259.13	8.1
Georgia	761.08	7.3	765.94	7.9
Maryland	622.05	13.1	603.80	10.5
North Carolina	615.19	5.6	684.92	15.2
South Carolina	617.11	13.7	554.16	3.9
Virginia	660.28	12.3	612.98	5.5
West Virginia	609.86	15.3	595.28	13.3
East South Central				
Alabama	758.79	8.4	738.42	5.8
Kentucky	665.38	9.0	664.37	8.8
Mississippi	637.68	14.7	579.62	6.1
Tennessee	668.78	5.4	734.01	13.8
West South Central				
Arkansas	737.74	11.8	704.88	7.7
Louisiana	867.90	3.3	881.65	4.8
Oklahoma	736.54	10.2	693.87	4.7
Texas	774.65	2.7	791.32	4.8
East North Central				
Illinois	784.23	10.4	732.84	4.1
Indiana	659.41	9.8	650.50	8.5
Michigan	960.99	5.6	932.43	2.7
Ohio	793.13	6.3	783.66	5.2
Wisconsin	642.81	8.1	629.19	6.1
West North Central				
Iowa	594.87	17.1	532.98	7.5
Kansas	735.56	7.1	715.85	4.6
Minnesota	528.43	11.8	643.48	27.6
Missouri	593.59	9.7	628.91	14.8
North Dakota	681.50	7.9	786.86	20.2
Nebraska	574.18	12.1	574.14	12.1
South Dakota	583.14	13.6	607.85	17.1

See footnotes at end of table.

Table 9—Continued

Ratio of Allowed Charges Used to Allowed Charges Produced (Net Flows) and Percent of Allowed Charges Imported or Exported (Gross Flows) for States and Carriers for All Services

Location	Allowed Charges			
	By Area Beneficiaries		By Area Providers	
	Amount per Enrollee	Percent Imported	Amount per Enrollee	Percent Exported
Mountain				
Arizona	\$910.05	8.5	\$941.42	11.5
Colorado	541.02	8.9	542.28	9.1
Idaho	576.98	23.9	474.13	7.4
Montana	570.21	13.4	530.26	6.8
New Mexico	707.07	13.8	644.86	5.4
Nevada	1,153.28	12.1	1,245.59	18.6
Utah	563.49	6.6	576.16	8.7
Wyoming	544.16	36.9	364.96	6.0
Pacific				
Alaska	495.47	25.7	418.80	12.1
California, Northern	905.78	8.0	873.62	4.6
California, Southern	1,363.37	2.9	1,429.86	7.4
Hawaii	849.72	4.5	854.01	5.0
Oregon	648.76	8.4	638.01	6.8
Washington	836.60	5.6	835.70	5.5

SOURCE: Health Care Financing Administration: Tabulations from the 1988 Part B Medicare Annual Data file.

Table 10

Coefficients of Variation for Allowed Charges per Enrollee, by Type of Service

	States or Carriers		Substate Areas	
	Utilization	Provision	Utilization	Provision
All Services	0.25	0.30	0.27	0.43
Evaluation and Management Services				
Office Visits	0.33	0.35	0.36	0.43
Hospital Visits	0.32	0.36	0.33	0.49
Emergency Room Services	0.37	0.41	0.37	0.47
Home and Nursing Home Services	0.52	0.53	0.48	0.50
Specialist Evaluation and Management Services	0.34	0.38	0.40	0.56
Consultations	0.49	0.54	0.54	0.68
Major Procedures				
Cardiovascular	0.30	0.37	0.29	0.63
Orthopedic	0.20	0.25	0.23	0.41
Other	0.23	0.26	0.22	0.42
Ambulatory Procedures				
Ambulatory, Eye	0.26	0.32	0.31	0.50
Ambulatory, Other	0.28	0.31	0.32	0.44
Minor Procedures	0.51	0.53	0.59	0.65
Oncology Services	0.39	0.45	0.42	0.64
Endoscopy Procedures	0.27	0.29	0.30	0.44
Imaging Services and Tests				
Standard Imaging	0.25	0.28	0.28	0.42
Advanced Imaging	0.38	0.43	0.36	0.54
Sonography	0.39	0.43	0.46	0.59
Imaging Procedures	0.33	0.43	0.30	0.64
Laboratory Tests	0.31	1.10	0.35	0.94
Other Tests	0.42	0.46	0.45	0.55

SOURCE: Health Care Financing Administration: Tabulations from the 1988 Part B Medicare Annual Data file.

provision of services. However, substantial variation remains in utilization rates across areas. There is a threefold variation in allowed charges per enrollee among States and carriers and a fourfold variation across our designated geographic areas. Thus, although border crossing provides a very useful function, it is not sufficient in itself to equalize utilization.

There are great differences among types of services in the relationship between areas' utilization and provision of services. In some cases, border crossing has reduced the amount of variation in utilization; in others, it has not. Variation in utilization is higher for services such as minor procedures, consultations, emergency room visits, oncology, advanced imaging, sonographic imaging, and other tests. It is somewhat lower for office visits, hospital visits, standard imaging, major procedures-other, ambulatory procedures-other, orthopedic surgery, and endoscopies. It is also relatively low, somewhat surprisingly, for cardiovascular surgery, imaging procedures, laboratory tests, and ambulatory eye procedures.

The data presented in Table 10 once again indicate that there is more border crossing across our substate areas than across States or carriers. Comparisons of the coefficients of variation in columns 1 and 3 indicate there are not substantial differences when one looks at services used. On the other hand, the differences in the coefficients of variation between services used and services provided are higher in the substate areas than in the States and carriers, particularly among procedures and imaging services. This suggests that there is more border crossing across the smaller geographic areas

to use services. Thus, the tradeoff that was suggested earlier in the article is evident in the data we present. Smaller geographic areas, while perhaps permitting greater control by physician organizations over provider behavior, would face much greater border crossing. In contrast, using States or carriers as the target areas would reduce the problem of border crossing, but result in weaker provider incentives.

The data provided in this table can also be used to categorize types of services both by the extent of border crossing and the degree of variation in utilization levels. This allows us to illustrate the role of border crossing in reducing variations and enhancing access to services across States and carriers. We divided types of services into high and low border crossing by developing net flow ratios by type of service for each State. We then determined the number of States with a net flow ratio of either less than 0.95 or greater than 1.05. Border crossing outside this range was considered to be high; border crossing within the range was considered to be low. For our purposes, if 20 or more States had high indexes, that type of service was regarded as having high border crossing and vice versa. Similarly, we used data on coefficients of variation in Table 10 to divide types of services into those with high and low variation. Types of services with coefficients of variation across States or carriers of 0.35 or greater were regarded as having high variation; coefficients of variation below this were regarded as low.

The results are shown in Figure 1. They indicate that for many services, border crossing is not important (Groups I and II); for most of these services (Group I), there are not substantial variations across ar-

eas. However, for others (Group II), variation remains high, even though little border crossing occurs. For some other types of services (Group III), Medicare beneficiaries quite often cross geographic borders, and this contributes to reductions in area variations. For others (Group IV), however, substantial variation in utilization rates remains despite extensive border crossing.

The first group (Group I) includes services with low border crossing and low geographic variation. These include office and hospital visits, standard imaging, major procedures-other, ambulatory procedures-other, endoscopies, and specialist evaluation and management services. The low geographic variation coupled with the low levels of border crossing suggests relatively few problems in access to these services. Given that these include basic medical and surgical procedures, this should not be too surprising. It is somewhat surprising that endoscopy procedures are as widely available as they appear to be; this suggests that the diffusion of these procedures was fairly wide by 1988. Specialist evaluation and management services are close to the threshold between high and low variation; if the data on designated areas had been used, these services would be regarded as having high variation.

Group II includes nursing home and home visits, minor procedures, and emergency room visits, all exhibiting low border crossing but high variation in utilization rates. This is probably the result of several different factors. High variation in nursing home and home visits may reflect the variation across the Nation in the availability of nursing home beds. The variation in emergency room visits may reflect differences across areas in the im-

Figure 1
Border Crossing and Geographic
Variation in Use of Services Based on
States or Carriers

Group I
Low Border Crossing
Low Geographic Variation

Office visits.
Hospital visits.
Specialist evaluation and management services.
Standard imaging.
Major procedures or other.
Ambulatory procedures or other.
Endoscopy procedures.

Group II
Low Border Crossing
High Geographic Variation

Nursing home and home visits.
Minor procedures.
Emergency room visits.

Group III
High Border Crossing
Low Geographic Variation

Cardiovascular procedures.
Imaging procedures.
Laboratory tests.
Ambulatory eye procedures.
Orthopedic procedures.

Group IV
High Border Crossing
High Geographic Variation

Oncology procedures.
Advanced imaging.
Sonographic imaging.
Other tests.
Consultations.

SOURCE: Holahan, J., and Zuckerman, S.,
The Urban Institute, Washington, DC., 1993.

portance of emergency rooms in providing basic medical care services. The high variation in minor procedures may reflect the fact that these services are often discretionary and of less urgency. In areas where there is less access to specialists, particularly dermatologists, Medicare beneficiaries may simply go without these services.

The third set of services (Group III) are those with high levels of border crossing but low variation across geographic areas in use. These are cardiovascular procedures, imaging procedures, orthopedic procedures, laboratory services, and ambulatory eye procedures. The high level of border crossing for laboratory services reflects the major role of national laboratories; this kind of border crossing is clearly different because it reflects where the test was produced, not actual travel by beneficiaries. The high levels of border crossing for the other services in this group probably reflects the importance that beneficiaries place on these services and a high level of willingness to travel to obtain these services.

The final set of services (Group IV) has high levels of border crossing but high variation in utilization across States and carriers. These services are oncology procedures, advanced imaging, sonographic imaging, other tests, and consultations. With the exception of consultations, these are all relatively high-technology procedures. They include radiation treatment, computerized tomography scans, magnetic resonance imaging, various kinds of sonographic procedures, and a range of cardiovascular tests. Consultations are usually provided by subspecialists, for whom there is large geographic variation in availability. The high border crossing suggests that individuals are

willing to cross borders to use these services. However, the high variation that remains suggests that there may be widespread differentials in access to these services.

CONCLUSIONS AND POLICY IMPLICATIONS

In this article, we have presented information on geographic border crossing for the use of Medicare services. The results show that there is substantial geographic variation across both States and urban and rural areas in border crossing to seek services. As might be expected, there is more border crossing across smaller geographic areas than among States. Rural areas tend to be major importers of services. Adjacent large cities are also importers of services. Not surprisingly, large urban areas are exporters of most medical care services. Even small cities are significant net exporters of services, principally because they are surrounded by rural areas. Similar patterns occur across States. States that are largely rural tend to be importers of services. Heavily urbanized States tend to be exporters. Border crossing among States seems to vary with the size of the State and to be affected by geographic specifics, such as the presence of border cities. Finally, border crossing tends to be greater for high-technology services, such as advanced imaging, cardiovascular surgery, and oncology procedures.

In the beginning of this article, we suggested that subnational volume performance standards should not necessarily apply the same target rates of growth in all areas. That is, the large variation in use of services that remains for many Medicare services, after accounting for border

crossing, suggests there may be a need for some geographic adjustments to MVPS. Otherwise, there will be no greater incentives to limit service provision in very high utilization areas than elsewhere; at the same time, areas with low levels of utilization will experience fee reductions if all areas together exceed their targets. Wennberg (1982) raised similar issues of differentials in beneficiary utilization when considering the inappropriateness of hospital regulations that control the rate of growth in costs but ignore area variations in per capita hospital expenditures. He also argued that pricing insurance policies uniformly within an area that includes both high- and low-cost markets is inequitable. In both cases, Wennberg claims these practices perpetuate subsidies from low-cost to high-cost markets that insulate patients in the high-cost markets from the full economic consequences of their behavior.

The complication one faces in addressing this problem in the context of MVPS policy is that, although the concern is over levels of beneficiary utilization that are either "too high" or "too low," performance standards apply to physicians in specific areas independent of utilization in those areas. One possible approach is to use information on beneficiary utilization in given areas to adjust volume performance standards applied to providers in those areas. Table 10 demonstrates that the variation in service utilization by area beneficiaries was lower than the variation in service provision by area providers. In principle, one could establish thresholds of "acceptable" levels of beneficiary utilization and adjust provider volume performance standards accordingly.

Physicians in areas with levels of utilization below the lower threshold could have higher rate-of-growth standards regardless of the amount of services provided in the area. Similarly, physicians in areas with levels of utilization above the higher threshold could have lower rate-of-growth standards.

The other major issue addressed by this article is whether State or, alternatively, substate areas might be used as the basis of volume performance standards. The data presented in this article suggest that there is substantially greater border crossing at the substate level (within the State) than across State lines. Substate areas thus have a major disadvantage in that border crossing could result in instability in growth rates over time, resulting in unwarranted rewards and penalties under MVPS. In contrast, States could be used as the areas for MVPS without significant concern over the impact of border crossing on provider incentives. (The issue of laboratory services would have to be dealt with separately.) However, many States are quite large and heterogeneous, and the use of substate areas in a few States may be advantageous in order to increase the potency of provider incentives. Finally, several States have MSAs on their borders; these States also have substantial border crossing that could be problematic.

ACKNOWLEDGMENTS

Our project officer, Sherry Terrell, offered many suggestions that were incorporated in earlier drafts. W. Pete Welch and Mark E. Miller also provided a large number of useful comments.

REFERENCES

- Berenson, R., and Holahan, J.: Using a New Type of Service Classification System to Analyze the Growth in Medicare Physician Expenditures: 1985-1988. Working Paper 3983-01. Washington, DC. The Urban Institute, 1990.
- Bronstein, J.M., and Morrissey, M.A.: Determinants of Rural Travel Distance for Obstetrics Care. *Medical Care* 28(9):853-865, September 1990.
- Buczko, W.: Factors Affecting Interstate Utilization of Inpatient Care by Medicare Beneficiaries. To be published.
- Hogan, C.: Patterns of Travel for Rural Individuals Hospitalized in New York State: Relationships Between Distance, Destination, and Case Mix. *The Journal of Rural Health* 4(2):29-41, 1988.
- Kleinman, T.C., and Makuc, D.: Travel for Ambulatory Medical Care. *Medical Care* 21(5):543-557, 1983.
- Makuc, D., Kleinman, T.C., and Pierre, M.B.: Service Areas for Ambulatory Medical Care. *Health Services Research* 20(1):1-18, April 1985.
- McGuirk, M.A., and Porell, F.W.: Spatial Patterns of Hospital Utilization: The Impact of Distance and Time. *Inquiry* 21:84-95, Spring 1984.
- Physician Payment Review Commission: *Annual Report to Congress*. Washington, DC. March 1991.
- Welch, W.P., and Zuckerman, S.: Geographic Payment Areas for the Medicare Fee Schedule: Alternative Approaches. Working Paper 3839-03-02. Washington, DC. The Urban Institute, May 1991.
- Wennberg, J.E.: Should the Cost of Insurance Reflect the Cost of Use in Local Hospital Markets? *New England Journal of Medicine* 307(22):1374-1381, November 1982.

Reprint requests: John Holahan, Ph.D., The Urban Institute, 2100 M Street, NW., Washington, DC 20037.