Medicare Spending by State: The Border-Crossing Adjustment

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As the first step in a pioneering effort by the Health Care Financing Administration (HCFA) to measure interstate border crossing for services used by both Medicare and non-Medicare beneficiaries, the authors study the spending behavior of Medicare beneficiaries for 10 Medicare-covered services. Based on interstate flow-of-expenditure data developed for calendar year 1991, the authors analyze the spending patterns of State residents by studying the inflow and outflow rates and the net flow ratios of expenditures incurred by Medicare patients. The report also provides per capita expenditure estimates with residence-based adjustments and evaluates the impact of the border-crossing adjustment for individual services and States.

INTRODUCTION

Within HCFA's Office of the Actuary, the Office of National Health Statistics (ONHS) is charged with the responsibility for maintaining the National Health Accounts (NHA). These accounts form the structure for maintaining health care expenditure information for the United States.

In response to a request by the 1993 President's Task Force on Health Care Reform for estimates of health care spending by States, ONHS initiated a project to update estimates of State-specific health spending to current periods. The purpose behind this effort was twofold: to create an analytical tool that could be used to identify differences among States in patterns and levels of spending, and to create statistics that could be useful in addressing global budgeting issues for health care reform.

As a first step in this process, ONHS created State estimates of personal health care spending, where "State" represents the location of the provider of service (Levit et al., 1995). In other words, these estimates show the amount of revenues received by providers of a State, regardless of the residency of the patients using the services. This provider-State definition is driven by data available for estimating purposes that is usually collected from providers based on their location. The provider-based estimates are useful for measuring demand for health care in the State; however, they fail to address one important issue: How do health care costs per person vary from State to State? Because State spending estimates based on location of provider do not accurately represent spending by persons residing in that State, calculating per capita spending estimates using expenditures by State of provider along with resident population will produce inaccurate results.

To address this issue, ONHS is refining the State estimates so that they reflect health care expenditures made by the population of a State rather than revenues received by the State's providers. This task involves adjusting expenditures from provider location to beneficiary residence. The adjustment process requires the creation of complete interstate flow matrices that track service-specific expenditures incurred by Medicare beneficiaries of each

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State in every other State. Medicare interstate flow matrices are also intended to serve as the building blocks for estimating border-crossing patterns and expenditures per capita for non-Medicare beneficiaries residing in a State. Although spending for Medicare services by residence State is available, similar data for the non-Medicare population is not. Thus, Medicare flows will provide a basis for calculating non-Medicare flows, the work on which has already started.

The data adjusted for border crossing are expected to greatly enhance the usefulness of State estimates by providing States with tools to evaluate and assess the spending patterns of their residents for health care as a whole and by type of service. Despite the waning of the comprehensive national health care reform effort and the accompanying need to address global budgeting issues, per capita spending estimates by location of beneficiary residence provide a data base useful for interstate comparisons of health spending. These estimates are also useful for evaluating the effectiveness of individual State health reform initiatives by providing information on expenditures incurred by the residents for different services, spending growth over time, and the impact of policy changes on spending patterns. The adjustment for border crossing is especially important because studies indicate that patients traveling long distances use more resources and incur higher hospital charges than do local patients (Welch, Larson, and Welch, 1993). Thus, per capita expenditure will be grossly overstated for a State that is a major net exporter of services if the high-cost out-of-State cases are not excluded.[1] For example, per capita Medicare spending for the District of Columbia would be 43 percent higher, had no border-crossing adjustment been done.

Border crossing is a much-discussed subject area and is a part of the broader research on health service markets and identification of health service areas. Literature regarding the distance between patients and providers and the impact of distance on health care utilization can be traced back many years (Kleinman and Makuc, 1983; Shannon, Bashshur, and Metzner, 1969). Prior research on border crossing often used a health service area as the unit of analysis, defined either by geographic boundaries or by market shares of providers (Garnick et al., 1988; Morrisey, Sloan, and Valvona, 1988). Only a few of these studies focused on interstate border crossing (Buczko, 1992; Holahan and Zuckerman, 1993; U.S. General Accounting Office, 1992; Miller and Welch, 1992). Many of the previous studies analyzed travel patterns of patients using the utilization data of beneficiaries and primarily focused on inpatient hospital care (Hogan, 1988; Bronstein and Morrisey, 1990; Buczko, 1992; McGuirk and Porell, 1984), physician services (Holahan and Zuckerman, 1993), and ambulatory care (Kleinman and Makuc, 1983; Makuc, Kleinman, and Pierre, 1985).

This article presents the results of a pioneering effort by HCFA to measure interstate border crossing for each of 10 individual types of services used by Medicare beneficiaries by analyzing the expenditure data at the beneficiary level. The study's findings are based on the data base created as a result of this effort, which is the only nationwide data base covering a broad array of services. This analysis summarizes the out-of-State spending patterns of all Medicare beneficiaries, based on the interstate flow of expenditure data developed for calendar

[1] A net exporter of services provides more services to out-of-State residents than the corresponding services its residents receive out of State.

year 1991. The analysis provides State-specific data on Medicare expenditures for Medicare-covered services[2] by State of provider and by State of beneficiary residence. The differences between these estimates for each State reflect the adjustment for border crossing. The study also provides estimates of per capita Medicare expenditure by State and analyzes interstate differences in expenditure flows by computing rates of inflow and outflow of Medicare expenditure in each State.

DATA AND METHOD

For the Medicare population, the data on expenditures for health care services are obtained from the Medicare data files known as the National Claims History (NCH) files. These files contain records of transactions between the Medicare program and providers of health care services. Among the information items recorded are allowed charges, Medicare payment amounts, and number and type of services provided. The calendar year 1991 data base was used as the primary source for computing Medicare interstate flows for 1991. NCH files were used to process claims data for inpatient and outpatient hospital services, skilled nursing facility (SNF) services, home health agency (HHA) services, hospice care, independently billing laboratory services, freestanding end stage renal disease (ESRD) facilities, and physician and Part B supplier services.

Selection criteria were established and adjustments were made to the data to estimate the interstate spending pattern of Medicare beneficiaries. First, the State of the provider and the State of the beneficiary residence were determined, based respectively on the first two digits of the institutional claim number and the Social Security Administration (SSA) standard State codes identifying geographic area of residence. For physician and Part B supplier services, the provider State was determined using one or a combination of methods, e.g., the carrier number for carriers servicing all or part of a single State, pricing locality codes for multistate carriers, and provider ZIP Codes. Second, Medicare payment amounts for institutional claims from prospective payment system (PPS) hospitals were calculated by adding the result of per diem passthrough amounts times the number of Medicare covered days, plus covered charges for organ acquisition, to the provider payment amounts recorded in the institutional claims. Physician/supplier records contained the allowed charge amount, which was used as a proxy for program payments to providers or beneficiaries.

The next task was mapping data into NHA type-of-service categories. For this, a crosswalk was developed between the Medicare bill types and NHA type-of-service categories. The bill-type variable, which is the primary means used to allocate institutional data into NHA categories, was determined from the provider number facility-type code and the claim service-classification type code. For physician and Part B suppliers, the provider specialty code was used to categorize claims from physicians, other professionals, and durable medical equipment suppliers.[3]

FINDINGS

Tables 1-6 present summarized information on interstate flows of Medicare expenditure that resulted from HCFA's study. The tables follow the format usually presented in the National Health Expenditure (NHE) studies (Levit et al.,

[2] The study excludes services not covered by Medicare, e.g., prescription drugs.

[3] A detailed technical description of the data and methodology can be found in the report prepared by Fu Associates (1993).

1994), where services are grouped together into NHA categories according to the establishments providing services. These establishments are defined by the Standard Industrial Classification coding system (Executive Office of the President, 1987). In addition, data are presented for selected Medicare program service subcategories. For example, expenditures for inpatient and outpatient hospital services are included in expenditures for hospital care. Similarly, expenditures for care provided in hospital-based nursing homes are included in hospital care. Expenditures for a few Medicare service categories are not presented separately but are included in the broader NHE group (e.g., independently billing laboratory services are included under expenditures for physician services).

Converting From Provider State to Beneficiary State

Table 1 provides data on Medicare personal health care expenditure amounts for 1991 by economic region[4] and State of provider. Table 2 shows the results of converting the estimates based on provider location of Table 1 into estimates based on State of beneficiary residence. In preparing this conversion, border crossing was estimated for 10 different service categories. These categories represent Medicare types of services, including inpatient hospital care, outpatient hospital care, physician services, nursing home care, independent laboratory services, other professional services, services provided by freestanding kidney dialysis facilities, home health care, durable medical equipment supplies, and hospice services. A set of flow factors was calculated for each service type, based on the expenditure incurred by Medicare beneficiaries in their home State and in each of the other States in which they received services. These interstate flow matrices provide the basis for residence-based adjustments made in Table 2 to the provider-based data in Table 1.

In preparing the adjusted data, the flow ratios for each individual Medicare service category have been applied to the corresponding provider-based estimates and then collapsed into NHA categories mentioned earlier. In some cases, two or more flow matrices were used to adjust a single NHA category. For example, although it belongs to the hospital service, hospital-based nursing home estimates in Table 2 are derived by using the interstate flow factors for the nursing home category. Similarly, although not shown separately, the physician estimates include independent laboratory expenditures, which are derived by using a separate set of adjustment factors (or flow ratios). Home health care is split into hospital-based (included under outpatient hospital care in the tables) and non-hospital-based categories—in either case, however, the residence-based adjustment is made using flow ratios derived for total home health care.

An underlying assumption in this study is that Medicare enrollees in health maintenance organizations (HMOs) have similar travel patterns and health care expenditures to individuals covered by fee-for-service (FFS) plans. A major constraint in analyzing expenditure patterns for HMO enrollees is that no billing data exist for services received by Medicare HMO patients. The extent of border crossing by this group depends largely on the location of the provider network and other constraints on the choice of the providers. Thus, no definite conclusion can be reached on the border-crossing pattern by Medicare HMO enrollees. For lack of data

[4]Regions in this report represent economically interdependent groupings of States designated by the U.S. Department of Commerce, Bureau of Economic Analysis, based on journey-to-work patterns of employees.

Table 1

Medicare Personal Health Care Expenditures by Type of Service[1], Region, and State of Provider: Calendar Year 1991

Region and State of Provider	Total	Hospital Care				Physician Services	Home Health Care[3]	Nursing Home Care[3]	Other Professional Services			Medical Durables
		Total	Inpatient Hospital Care	Outpatient Hospital Care[2]	Hospital-Based Nursing Home Care				Total	Other Professional Services[4]	Freestanding ESRD Facilities	
	Millions of Dollars											
All Areas	$120,497	$75,868	$65,123	$9,783	$962	$31,380	$4,255	$1,897	$4,081	$2,820	$1,261	$3,015
United States	119,959	75,647	64,930	9,757	960	31,165	4,224	1,896	4,052	2,813	1,239	2,975
New England	6,987	4,619	4,015	592	12	1,534	356	114	239	197	41	125
Connecticut	1,735	1,071	931	136	3	443	87	41	63	54	8	31
Maine	487	326	280	43	3	104	29	1	15	13	2	11
Massachusetts	3,660	2,474	2,157	314	3	746	183	60	127	106	21	71
New Hampshire	381	266	228	37	2	78	19	2	9	6	2	6
Rhode Island	531	347	305	42	NA	126	24	9	22	15	7	4
Vermont	192	135	114	20	1	36	15	1	4	4	NA	2
Mideast	24,428	15,834	13,873	1,864	97	6,295	548	318	795	598	197	638
Delaware	287	184	161	21	2	70	11	4	12	7	5	7
District of Columbia	535	402	354	47	1	101	11	3	16	5	11	2
Maryland	2,179	1,420	1,202	210	8	565	51	20	72	40	32	52
New Jersey	3,827	2,321	1,989	328	4	1,158	65	34	102	86	16	148
New York	9,621	6,348	5,690	630	29	2,468	196	121	308	243	66	179
Pennsylvania	7,979	5,159	4,478	628	53	1,933	215	137	286	217	68	249
Great Lakes	19,265	12,640	10,780	1,716	145	4,619	532	339	589	459	130	546
Illinois	5,241	3,439	2,944	415	81	1,233	158	67	161	113	48	182
Indiana	2,420	1,654	1,387	242	24	543	58	75	49	33	16	40
Michigan	4,355	2,723	2,324	391	8	1,119	143	57	163	133	30	150
Ohio	5,272	3,484	2,956	502	26	1,265	133	90	167	137	30	132
Wisconsin	1,977	1,340	1,168	166	6	459	40	49	48	41	6	42
Plains	8,063	5,491	4,558	762	171	1,925	141	112	221	170	52	172
Iowa	1,179	834	666	132	36	263	18	3	36	31	5	25
Kansas	1,061	697	587	85	24	264	24	10	40	26	14	26
Minnesota	1,857	1,240	1,080	141	20	454	25	53	40	33	6	45
Missouri	2,730	1,859	1,522	265	72	643	63	34	78	52	26	52
Nebraska	631	437	345	78	14	154	7	6	14	13	1	13
North Dakota	315	222	186	33	3	77	2	3	8	8	NA	4
South Dakota	290	203	173	27	3	70	1	3	6	6	NA	7

See footnotes at end of table.

Table 1—Continued

Medicare Personal Health Care Expenditures by Type of Service[1], Region, and State of Provider: Calendar Year 1991

Region and State of Provider	Total	Hospital Care				Physician Services	Home Health Care[3]	Nursing Home Care[3]	Other Professional Services			Medical Durables
		Total	Inpatient Hospital Care	Outpatient Hospital Care[2]	Hospital-Based Nursing Home Care				Total	Other Professional Services[4]	Freestanding ESRD Facilities	
	Millions of Dollars											
Southeast	$30,362	$18,289	$15,771	$2,348	$170	$8,037	$1,687	$379	$1,138	$698	$440	$831
Alabama	2,050	1,274	1,125	142	7	466	148	28	81	45	35	54
Arkansas	1,226	831	708	107	15	277	36	5	42	31	11	35
Florida	9,559	4,921	4,309	586	26	3,254	489	186	378	280	98	332
Georgia	2,751	1,745	1,522	217	6	622	176	30	102	53	50	75
Kentucky	1,708	1,100	958	130	12	423	62	16	65	49	16	42
Louisiana	2,200	1,464	1,183	233	48	475	126	6	93	54	39	37
Mississippi	1,104	695	589	99	7	230	111	4	39	15	24	25
North Carolina	2,816	1,833	1,581	240	12	681	112	31	114	60	54	44
South Carolina	1,145	732	636	92	4	256	50	13	56	22	34	37
Tennessee	2,675	1,609	1,395	198	16	568	304	32	71	38	33	91
Virginia	2,206	1,472	1,231	232	10	548	49	22	70	32	38	44
West Virginia	922	612	534	71	8	237	24	7	26	20	6	16
Southwest	10,322	6,529	5,536	869	123	2,633	415	112	388	231	157	245
Arizona	1,906	1,154	954	183	17	570	45	35	68	45	24	33
New Mexico	472	302	255	44	3	119	13	8	17	11	6	12
Oklahoma	1,329	912	765	127	20	291	56	7	37	29	7	26
Texas	6,615	4,160	3,561	516	83	1,653	301	62	266	146	120	174
Rocky Mountains	2,356	1,562	1,269	261	32	518	75	62	61	46	16	77
Colorado	1,185	772	640	113	18	269	31	34	36	24	12	43
Idaho	280	185	147	35	4	65	7	8	7	7	[5]	7
Montana	314	216	173	40	3	69	8	6	6	6	[5]	9
Utah	463	308	243	60	5	92	25	14	10	7	3	13
Wyoming	114	80	66	13	1	21	3	2	2	2	1	5
Far West	18,177	10,684	9,127	1,346	211	5,603	469	460	621	415	206	340
Alaska	81	61	50	10	1	16	1	[5]	2	1	1	1
California	13,994	8,113	6,948	982	184	4,408	369	360	494	317	176	249
Hawaii	377	233	197	30	5	125	4	2	8	5	3	4
Nevada	542	296	269	26	2	186	17	9	17	12	5	16
Oregon	1,211	753	621	123	8	337	26	36	35	31	5	24
Washington	1,973	1,228	1,041	176	11	531	52	52	64	49	16	45
Outlying Areas[6]	538	221	193	25	2	216	31	[5]	30	7	23	40

[1] National Health Account and Medicare type-of-service categories.
[2] Includes hospital-based home health agency services.
[3] Services provided by freestanding facilities
[4] Includes expenditures for hospice care.
[5] Less than $500,000.
[6] Outlying areas include Puerto Rico, Virgin Islands, Guam, and other U.S. territories.

NOTE: ESRD is end stage renal disease. NA is no expenditures for this service in this State.

SOURCE: Health Care Financing Administration, Office of the Actuary: Estimates prepared by the Office of National Health Statistics.

Table 2

Medicare Personal Health Care Expenditures by Type of Service[1], Region, and State of Residence: Calendar Year 1991

Region and State of Residence	Total	Hospital Care				Physician Services	Other Professional Services					Medical Durables
		Total	Inpatient Hospital Care	Outpatient Hospital Care[2]	Hospital-Based Nursing Home Care		Home Health Care[3]	Nursing Home Care[3]	Total	Other Professional Services[4]	Freestanding ESRD Facilities	
	Millions of Dollars											
All Areas	$120,497	$75,868	$65,123	$9,783	$962	$31,380	$4,255	$1,897	$4,081	$2,820	$1,261	$3,015
United States	119,888	75,602	64,889	9,753	960	31,146	4,223	1,896	4,051	2,813	1,238	2,970
New England	6,944	4,563	3,966	585	12	1,534	356	113	239	198	42	138
Connecticut	1,735	1,075	935	136	4	438	87	41	63	54	9	32
Maine	511	339	291	45	3	113	29	1	16	13	3	13
Massachusetts	3,549	2,387	2,082	302	3	727	182	58	125	104	21	70
New Hampshire	398	272	233	38	2	86	19	3	10	8	2	8
Rhode Island	542	349	307	42	(5)	129	23	9	22	15	6	10
Vermont	208	142	120	22	1	42	15	1	4	4	(5)	4
Mideast	24,448	15,879	13,914	1,867	98	6,323	556	323	801	601	200	565
Delaware	304	195	171	22	2	74	10	4	12	7	5	9
District of Columbia	374	253	216	35	2	85	9	4	15	5	10	7
Maryland	2,266	1,503	1,281	214	8	572	54	19	72	40	32	46
New Jersey	4,009	2,540	2,194	341	5	1,166	67	36	111	93	18	90
New York	9,786	6,385	5,718	637	30	2,533	202	126	313	245	68	228
Pennsylvania	7,708	5,002	4,333	618	52	1,894	215	134	277	210	67	186
Great Lakes	19,736	12,961	11,079	1,735	147	4,811	538	339	599	464	135	488
Illinois	5,490	3,657	3,144	432	81	1,314	160	70	165	115	50	123
Indiana	2,420	1,631	1,371	236	24	561	59	72	50	34	16	48
Michigan	4,494	2,820	2,412	399	9	1,162	144	59	165	134	31	144
Ohio	5,304	3,488	2,961	500	27	1,296	134	90	170	139	31	126
Wisconsin	2,029	1,366	1,191	168	7	479	41	49	49	42	7	46
Plains	7,833	5,321	4,402	751	168	1,865	142	113	220	169	51	172
Iowa	1,277	892	722	135	35	299	18	4	37	32	5	27
Kansas	1,144	754	637	93	25	293	22	11	42	28	14	23
Minnesota	1,662	1,133	974	139	20	388	25	52	38	33	5	25
Missouri	2,567	1,727	1,404	253	70	596	66	34	75	51	24	69
Nebraska	617	420	333	74	13	153	7	6	14	13	1	17
North Dakota	275	190	158	29	3	68	2	3	7	7	(5)	5
South Dakota	290	204	174	27	3	69	1	3	7	6	1	6

See footnotes at end of table.

Table 2—Continued

Medicare Personal Health Care Expenditures by Type of Service[1], Region, and State of Residence: Calendar Year 1991

Region and State of Residence	Total	Hospital Care				Physician Services	Home Health Care[3]	Nursing Home Care[3]	Other Professional Services			Medical Durables
		Total	Inpatient Hospital Care	Outpatient Hospital Care[2]	Hospital-Based Nursing Home Care				Total	Other Professional Services[4]	Freestanding ESRD Facilities	
	Millions of Dollars											
Southeast	$30,256	$18,257	$15,737	$2,350	$170	$7,938	$1,675	$378	$1,127	$692	$435	$881
Alabama	2,092	1,286	1,134	145	7	484	148	29	80	45	34	65
Arkansas	1,273	845	726	105	15	300	37	6	42	31	11	42
Florida	9,373	4,876	4,260	589	27	3,164	476	179	367	272	95	311
Georgia	2,724	1,715	1,495	213	6	621	175	30	102	52	50	80
Kentucky	1,732	1,120	975	133	12	414	62	18	66	49	17	52
Louisiana	2,193	1,436	1,159	230	46	478	125	6	92	53	39	55
Mississippi	1,213	766	654	104	8	256	113	4	40	16	24	34
North Carolina	2,730	1,798	1,550	236	12	618	111	32	114	60	53	58
South Carolina	1,251	800	698	98	4	290	52	14	58	23	35	36
Tennessee	2,441	1,455	1,251	188	15	522	296	30	69	37	31	70
Virginia	2,268	1,516	1,271	236	10	551	53	22	71	33	38	54
West Virginia	967	644	563	73	8	240	26	8	27	20	7	23
Southwest	10,265	6,456	5,470	863	123	2,598	413	112	385	230	156	302
Arizona	1,819	1,098	907	174	17	540	44	34	66	43	23	37
New Mexico	516	328	278	47	3	133	14	8	17	11	6	15
Oklahoma	1,444	975	821	134	20	323	57	7	38	30	8	43
Texas	6,486	4,054	3,464	508	83	1,602	298	62	264	145	118	206
Rocky Mountains	2,408	1,586	1,292	261	32	543	76	62	63	47	16	79
Colorado	1,147	744	616	110	18	263	31	33	36	24	12	41
Idaho	340	224	182	38	4	83	8	8	8	8	[5]	9
Montana	329	225	181	40	3	74	8	6	6	6	[5]	10
Utah	440	288	226	57	5	91	25	14	10	7	3	13
Wyoming	152	105	88	16	2	32	4	2	3	2	1	6
Far West	17,998	10,578	9,028	1,340	210	5,533	468	456	617	412	205	345
Alaska	95	69	57	11	1	20	1	1	3	1	1	2
California	13,861	8,034	6,875	978	182	4,355	368	356	492	316	176	256
Hawaii	371	229	194	30	5	122	5	2	8	4	4	5
Nevada	515	283	255	26	2	176	17	9	16	11	4	13
Oregon	1,197	741	611	121	9	335	26	36	35	31	5	23
Washington	1,960	1,222	1,036	174	11	525	52	52	64	49	15	46
Outlying Areas[6]	609	266	234	29	2	234	32	1	30	8	23	46

[1] National Health Account and Medicare type-of-service categories.
[2] Includes hospital-based home health agency services.
[3] Services provided by freestanding facilities
[4] Includes expenditures for hospice care.
[5] Less than $500,000.
[6] Outlying areas include Puerto Rico, Virgin Islands, Guam, and other U.S. territories.

NOTE: ESRD is end stage renal disease.

SOURCE: Health Care Financing Administration, Office of the Actuary: Estimates prepared by the Office of National Health Statistics.

and evidence supporting an alternative hypothesis, HMO enrollees were assumed to have out-of-State spending patterns similar to enrollees under FFS plans. This assumption, however, does not significantly impact the analysis, because HMOs are a small part of total Medicare (in 1991, about 6 percent of enrollment and 5 percent of expenditures). Moreover, for States with the largest HMO enrollment, e.g., California (accounting for approximately 40 percent of total Medicare HMO enrollment in the Nation in 1991), the issue is probably insignificant, as border crossing for health care services by Medicare beneficiaries in general in that State is very small.[5]

Net Flow Ratios

To show the relationship between provider-based and residence-based estimates, Table 3 contains a set of ratios calculated by dividing Medicare expenditures by State of beneficiary residence by the corresponding expenditure by the provider State. The ratios, called net flow ratios (NFRs), measure the extent to which a State is a net importer or net exporter of services both overall and by types of service. States that are net exporters of services have NFRs less than 1. These States provide more services to out-of-State residents than the corresponding services their residents receive out of State. In contrast, the States with net flow ratios greater than 1 are net importers of services. The residents of these States consume more services than are produced in the State. Regional data presented in Table 3 indicate that the New England, Plains, Southeast, Southwest, and Far West Regions are net exporters of services in the aggregate, and the remaining regions are net importers. The table indicates that except in the Plains Region, which exports a net amount of 3 percent of services (NFR equals 0.9716), all other exporting regions export a net amount of less than 1 percent. The Rocky Mountains and Great Lakes Regions import a net amount of about 2 percent of their services (NFR values are 1.0219 and 1.0245, respectively). For the Mideast Region, the services produced are nearly identical with services consumed by residents of that region, resulting in an NFR value close to unity (1.0008). In general, NFRs for regions are usually close to 1 overall and for most services.[6]

Whether a State is a net importer or net exporter of services depends on a variety of factors representing both supply and demand. Studies investigating the border-crossing issues for inpatient hospitals and for physician services identify a few of these factors. The supply indicators that have been found to have significant impacts on border crossing for inpatient care are availability of physicians, inpatient beds, specialists, and specialized services (Buczko, 1992). Demand is determined by a variety of factors, such as sociodemographic characteristics, population size, health status, and the complexity of illness. Although distance is found to be largely associated with severity of illness in several studies (Adams et al., 1991; Welch, Larson, and Welch, 1993), it can be a deterrent to hospital choice, particularly for older Medicare beneficiaries (Adams et al., 1991). States with large proportions of very elderly Medicare beneficiaries (85 years of age or over), such as Nebraska, may tend to have lower NFRs (0.9784), because there is evidence to suggest that the very old do not travel extensively, particularly for hospitalization (Hogan, 1988; Adams et al., 1991; Fu Associates, 1993).

[5]Most California residents live on the coast and not near the borders, reducing the potential statewide amount of border crossing for health care for HMO and non-HMO beneficiaries alike.

[6]Larger geographic areas, such as the regions used in this report, normally would show a smaller proportion of border crossing than smaller areas such as States.

Table 3

Net Flow Ratios[1] of Medicare Personal Health Care Expenditures by Type of Service[2], Region, and State of Residence: Calendar Year 1991

Region and State of Residence	Total	Hospital Care				Physician Services	Home Health Care[4]	Nursing Home Care[4]	Other Professional Services			Medical Durables
		Total	Inpatient Hospital Care	Outpatient Hospital Care[3]	Hospital-Based Nursing Home Care				Total	Other Professional Services[5]	Freestanding ESRD Facilities	
All Areas	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
United States	0.9994	0.9994	0.9994	0.9996	0.9998	0.9994	0.9998	0.9997	0.9998	0.9997	0.9999	0.9981
New England	0.9938	0.9880	0.9880	0.9877	1.0260	1.0000	0.9990	0.9857	1.0031	1.0018	1.0097	1.1053
Connecticut	0.9999	1.0038	1.0043	0.9991	1.0310	0.9884	0.9955	0.9847	1.0073	0.9971	1.0721	1.0514
Maine	1.0496	1.0371	1.0381	1.0341	0.9849	1.0832	1.0123	1.3229	1.0335	1.0189	1.1170	1.1952
Massachusetts	0.9695	0.9651	0.9652	0.9636	1.0683	0.9741	0.9993	0.9653	0.9838	0.9765	1.0210	0.9776
New Hampshire	1.0455	1.0198	1.0209	1.0167	0.9470	1.0976	0.9949	1.1632	1.1951	1.2719	0.9974	1.4059
Rhode Island	1.0208	1.0067	1.0061	1.0094	—	1.0231	0.9868	1.0091	0.9962	1.0625	0.8701	2.4045
Vermont	1.0817	1.0543	1.0485	1.0854	1.1061	1.1429	1.0146	1.2748	1.0513	1.0387	—	2.4134
Mideast	1.0008	1.0028	1.0029	1.0020	1.0116	1.0045	1.0161	1.0157	1.0070	1.0050	1.0133	0.8863
Delaware	1.0604	1.0618	1.0626	1.0616	0.9910	1.0707	0.9235	1.0235	1.0383	1.0732	0.9934	1.1768
District of Columbia	0.6996	0.6301	0.6108	0.7570	1.3838	0.8449	0.8310	1.3194	0.9796	0.9982	0.9710	3.0541
Maryland	1.0399	1.0584	1.0663	1.0172	0.9650	1.0115	1.0672	0.9718	1.0058	1.0086	1.0021	0.8880
New Jersey	1.0475	1.0941	1.1030	1.0384	1.2778	1.0065	1.0349	1.0642	1.0929	1.0799	1.1634	0.6066
New York	1.0172	1.0059	1.0050	1.0118	1.0381	1.0259	1.0302	1.0426	1.0138	1.0089	1.0318	1.2706
Pennsylvania	0.9661	0.9697	0.9676	0.9841	0.9755	0.9797	1.0000	0.9785	0.9697	0.9683	0.9741	0.7469
Great Lakes	1.0245	1.0254	1.0278	1.0115	1.0146	1.0417	1.0097	1.0012	1.0170	1.0125	1.0331	0.8934
Illinois	1.0475	1.0634	1.0678	1.0423	1.0100	1.0660	1.0102	1.0395	1.0240	1.0178	1.0388	0.6770
Indiana	1.0000	0.9858	0.9879	0.9763	0.9639	1.0331	1.0075	0.9486	1.0171	1.0247	1.0008	1.2013
Michigan	1.0318	1.0355	1.0378	1.0204	1.1227	1.0380	1.0089	1.0348	1.0100	1.0063	1.0263	0.9628
Ohio	1.0060	1.0011	1.0018	0.9958	1.0226	1.0242	1.0064	1.0006	1.0150	1.0097	1.0393	0.9522
Wisconsin	1.0263	1.0194	1.0198	1.0128	1.1078	1.0436	1.0247	0.9919	1.0246	1.0171	1.0729	1.1024
Plains	0.9716	0.9691	0.9658	0.9860	0.9821	0.9689	1.0113	1.0055	0.9932	0.9966	0.9820	0.9978
Iowa	1.0836	1.0699	1.0849	1.0194	0.9762	1.1385	1.0057	1.2888	1.0235	1.0293	0.9858	1.0817
Kansas	1.0781	1.0832	1.0866	1.0835	1.0006	1.1081	0.9101	1.0431	1.0404	1.0522	1.0179	0.8678
Minnesota	0.8953	0.9137	0.9022	0.9909	0.9941	0.8536	1.0180	0.9817	0.9707	0.9929	0.8516	0.5698
Missouri	0.9404	0.9291	0.9223	0.9556	0.9763	0.9268	1.0437	0.9889	0.9582	0.9647	0.9450	1.3230
Nebraska	0.9784	0.9627	0.9651	0.9533	0.9576	0.9917	1.0510	1.0114	1.0327	1.0072	1.3225	1.2293
North Dakota	0.8727	0.8566	0.8502	0.8811	0.9975	0.8856	1.0009	1.1030	0.9176	0.8947	—	1.1942
South Dakota	1.0011	1.0050	1.0032	1.0105	1.0682	0.9825	1.0987	1.0786	1.1047	0.9889	—	0.9332

See footnotes at end of table.

Table 3—Continued

Net Flow Ratios[1] of Medicare Personal Health Care Expenditures by Type of Service[2], Region, and State of Residence: Calendar Year 1991

Region and State of Residence	Total	Hospital Care				Physician Services	Home Health Care[4]	Nursing Home Care[4]	Other Professional Services			Medical Durables
		Total	Inpatient Hospital Care	Outpatient Hospital Care[3]	Hospital-Based Nursing Home Care				Total	Other Professional Services[5]	Freestanding ESRD Facilities	
Southeast	0.9965	0.9983	0.9978	1.0009	1.0052	0.9876	0.9925	0.9982	0.9903	0.9908	0.9894	1.0592
Alabama	1.0205	1.0095	1.0081	1.0165	1.0970	1.0393	1.0004	1.0515	0.9865	0.9967	0.9734	1.2096
Arkansas	1.0387	1.0179	1.0253	0.9728	0.9942	1.0821	1.0195	1.3497	1.0097	1.0020	1.0308	1.2029
Florida	0.9805	0.9909	0.9887	1.0057	1.0174	0.9725	0.9733	0.9601	0.9708	0.9735	0.9631	0.9387
Georgia	0.9900	0.9826	0.9824	0.9821	1.0536	0.9990	0.9942	1.0086	0.9994	0.9911	1.0083	1.0582
Kentucky	1.0138	1.0184	1.0174	1.0224	1.0498	0.9779	1.0101	1.1193	1.0071	1.0048	1.0140	1.2334
Louisiana	0.9966	0.9812	0.9800	0.9874	0.9779	1.0062	0.9985	1.0404	0.9904	0.9893	0.9919	1.4877
Mississippi	1.0989	1.1011	1.1104	1.0461	1.0994	1.1133	1.0199	1.2101	1.0256	1.0536	1.0084	1.3529
North Carolina	0.9694	0.9809	0.9800	0.9838	1.0399	0.9066	0.9844	1.0284	0.9929	0.9994	0.9855	1.3174
South Carolina	1.0928	1.0927	1.0974	1.0630	1.0293	1.1351	1.0404	1.0263	1.0358	1.0508	1.0264	0.9829
Tennessee	0.9125	0.9044	0.8974	0.9515	0.9253	0.9178	0.9721	0.9461	0.9685	0.9812	0.9539	0.7683
Virginia	1.0281	1.0298	1.0324	1.0173	1.0059	1.0042	1.0858	1.0092	1.0152	1.0409	0.9937	1.2340
West Virginia	1.0485	1.0507	1.0540	1.0333	0.9884	1.0132	1.0842	1.1235	1.0030	0.9714	1.1107	1.4829
Southwest	0.9945	0.9889	0.9880	0.9929	1.0001	0.9865	0.9952	1.0006	0.9935	0.9942	0.9925	1.2291
Arizona	0.9546	0.9516	0.9506	0.9538	0.9837	0.9465	0.9708	0.9804	0.9628	0.9613	0.9658	1.1330
New Mexico	1.0941	1.0843	1.0891	1.0573	1.0809	1.1168	1.0749	1.0175	1.0214	1.0236	1.0173	1.2939
Oklahoma	1.0865	1.0696	1.0727	1.0595	1.0150	1.1077	1.0192	1.0723	1.0487	1.0340	1.1073	1.6353
Texas	0.9805	0.9746	0.9726	0.9850	0.9970	0.9695	0.9908	1.0019	0.9920	0.9940	0.9895	1.1814
Rocky Mountains	1.0219	1.0148	1.0183	1.0006	0.9912	1.0489	1.0040	0.9891	1.0189	1.0182	1.0211	1.0295
Colorado	0.9678	0.9631	0.9614	0.9700	0.9789	0.9778	0.9979	0.9715	0.9962	0.9971	0.9945	0.9430
Idaho	1.2126	1.2094	1.2385	1.1055	1.0244	1.2635	1.0699	1.0449	1.0634	1.0503	1.8552	1.3163
Montana	1.0462	1.0387	1.0475	1.0026	1.0109	1.0665	1.0166	1.0261	1.0643	1.0504	1.3990	1.0975
Utah	0.9510	0.9338	0.9294	0.9486	0.9677	0.9822	0.9830	0.9603	0.9838	0.9901	0.9680	1.0392
Wyoming	1.3362	1.3096	1.3302	1.2266	1.1048	1.5186	1.0425	1.2229	1.2635	1.1865	1.4891	1.2509
Far West	0.9902	0.9901	0.9892	0.9957	0.9941	0.9877	0.9967	0.9922	0.9947	0.9945	0.9950	1.0140
Alaska	1.1665	1.1345	1.1481	1.0696	1.0924	1.2585	1.3498	1.6373	1.1133	1.1245	1.1021	1.4327
California	0.9905	0.9903	0.9895	0.9956	0.9889	0.9880	0.9950	0.9900	0.9953	0.9946	0.9965	1.0276
Hawaii	0.9841	0.9839	0.9814	0.9997	0.9855	0.9749	1.0303	1.0543	1.0055	0.9888	1.0274	1.1351
Nevada	0.9500	0.9576	0.9489	1.0346	1.1939	0.9450	1.0105	1.0099	0.9240	0.9209	0.9322	0.7996
Oregon	0.9888	0.9847	0.9836	0.9875	1.0243	0.9965	1.0174	0.9965	0.9974	0.9973	0.9977	0.9562
Washington	0.9937	0.9945	0.9947	0.9918	1.0253	0.9887	0.9877	0.9941	1.0016	1.0086	0.9801	1.0258
Outlying Areas[6]	1.1322	1.2045	1.2116	1.1614	1.0730	1.0850	1.0217	2.2983	1.0300	1.1068	1.0065	1.1380

[1] Expenditures by State of residence divided by expenditure by State of provider.
[2] National Health Account and Medicare type-of-service categories.
[3] Includes hospital-based home health agency services.
[4] Services provided by freestanding facilities
[5] Includes expenditures for hospice care.
[6] Outlying areas include Puerto Rico, Virgin Islands, Guam, and other U.S. territories.

NOTE: ESRD is end stage renal disease.

SOURCE: *Health Care Financing Administration, Office of the Actuary: Estimates prepared by the Office of National Health Statistics.*

On the other hand, studies also indicate that rural Medicare beneficiaries, particularly those with complex diagnoses, tend to travel more to urban hospitals with a large scope of services and with teaching status (Adams et al., 1991). Rural States, such as Wyoming and Idaho, are found to be major importers of services (with NFR values of 1.3362 and 1.2126, respectively), and large urbanized States with teaching hospitals, such as Massachusetts, tend to be major exporters (NFR equals 0.9695) for most services. The location of urban areas within a State also plays a major role in determining its service area. States with urban areas on borders (e.g., Tennessee) are likely to experience more border crossing for routine services. The States providing highly specialized services are major exporters of these services, because studies indicate that border crossing tends to be greater for high-technology services than for routine visits to physician offices (Holahan and Zuckerman, 1993). Some States, such as Florida and Arizona, have NFRs of less than 1 as a result of large seasonal inflows of out-of-State patients (Buczko, 1994).

Looking at Inflow and Outflow Separately

Tables 4 and 5 explain the variation in NFRs by State more clearly by computing the inflow rate and the outflow rate of Medicare expenditures by States. The outflow rate is the percent of out-of-State Medicare expenditures incurred by residents of a State, and the inflow rate is the percent of Medicare expenditures incurred by out-of-State residents in the provider State. The inflow rate is calculated as Medicare expenditures incurred by out-of-State residents in the provider State as a proportion of total Medicare revenues received by that State's providers (Table 4). The outflow rate, on the other hand, is computed as Medicare expenditures incurred by State residents outside the State as a proportion of total Medicare expenditures incurred by that State's residents (Table 5). An outflow of expenditures indicates import of services, and an inflow of expenditures implies export of services. The States with higher outflow than inflow rates are net importers of services, with NFR values of greater than 1. The reverse is the case for States having higher inflow than outflow rates. The weighted average inflow and outflow rates of expenditures for all areas together are the same, indicating no net flow occurring overall.[7]

The inflow and outflow rates of expenditure for all services together are highest in the Plains Region (12.75 and 10.20 percent, respectively) and lowest in the Far West (3.91 and 2.96 percent, respectively). In both regions, however, the inflow rate exceeds the outflow rate. The regions having a net outflow of Medicare expenditures are the Mideast, Great Lakes, and Rocky Mountains. The States showing the highest and the lowest outflow rates of expenditures, respectively, are Wyoming (29.75 percent) and California (1.79 percent). The States with the highest inflow rates are the District of Columbia, North Dakota, and Minnesota. Generally, high-spending States (e.g., Pennsylvania, California, Florida, Texas, Minnesota, Massachusetts) are those with high inflow rates.[8] A few of the States retaining most of the funds spent by their residents (more than 95 percent) are Tennessee, Louisiana, Massachusetts, Pennsylvania, Texas, North Carolina, California, and Hawaii. The rural States

[7]Although services may be received by Medicare beneficiaries in foreign countries, Medicare does not pay for these services. Therefore, all Medicare expenditure flows are confined to the United States and its territories.

[8]Because of this, although outflow rates across States are, on average, found to be greater than the corresponding inflow rates, the all-area (weighted) average rates are equal. This can be explained by the fact that the States with higher inflow rates also have higher weights because they contribute to higher proportions of total expenditure.

Table 4

Percent of Medicare Personal Health Care Expenditures Incurred by Out-of-State Residents (Inflow Rate) in Region and State of Provider[1], by Type of Service[2]: Calendar Year 1991

Region and State of Provider	Total	Hospital Care				Physician Services	Home Health Care[4]	Nursing Home Care[4]	Other Professional Services			Medical Durables
		Total	Inpatient Hospital Care	Outpatient Hospital Care[3]	Hospital-Based Nursing Home Care				Total	Other Professional Services[5]	Freestanding ESRD Facilities	
All Areas	6.77	6.45	6.72	4.93	4.20	7.20	2.73	4.34	4.25	4.49	3.70	20.85
United States	6.79	6.47	6.73	4.94	4.21	7.24	2.74	4.34	4.27	4.50	3.74	21.11
New England	7.46	7.65	7.88	6.13	6.26	7.77	2.32	5.43	5.35	5.24	5.86	17.16
Connecticut	5.84	5.43	5.60	4.33	4.61	7.22	2.25	4.61	4.15	3.90	5.74	15.43
Maine	4.58	4.92	5.17	3.31	4.38	4.47	2.03	4.38	4.61	4.92	2.88	2.48
Massachusetts	6.85	6.91	7.07	5.80	5.65	7.17	1.72	5.65	4.75	5.22	2.36	19.38
New Hampshire	18.34	19.73	20.54	15.09	12.59	16.67	6.76	12.59	11.17	12.36	8.12	28.33
Rhode Island	8.05	8.35	8.62	6.39	—	7.76	3.39	5.33	9.48	6.16	16.08	16.05
Vermont	17.88	19.99	21.37	12.49	11.05	16.95	3.34	11.05	11.06	11.06	—	14.19
Mideast	7.10	6.23	6.44	4.76	4.37	7.75	2.83	4.02	4.57	4.71	4.15	30.86
Delaware	11.73	10.76	10.99	9.09	9.77	12.95	10.16	9.77	8.68	10.41	6.46	32.43
District of Columbia	41.96	42.77	44.25	32.49	7.59	44.92	29.63	7.59	19.95	32.86	14.03	32.05
Maryland	8.68	7.33	7.41	6.66	11.63	10.86	4.28	11.63	7.23	8.42	5.73	27.20
New Jersey	8.25	4.20	4.33	3.44	5.40	11.03	2.70	5.40	3.64	3.87	2.40	56.34
New York	4.14	4.07	4.20	3.07	1.73	4.67	1.66	1.73	2.77	3.05	1.74	5.71
Pennsylvania	7.19	6.48	6.81	4.32	4.36	6.67	1.80	4.36	5.16	5.40	4.41	34.58
Great Lakes	4.96	4.46	4.61	3.64	3.63	4.59	2.13	3.85	2.78	2.97	2.11	25.33
Illinois	4.64	3.07	3.14	2.63	2.87	4.09	1.57	2.87	2.25	2.61	1.38	43.54
Indiana	8.22	8.50	8.83	6.78	6.73	8.15	3.07	6.73	5.26	4.87	6.10	11.68
Michigan	2.70	2.29	2.34	2.04	2.04	2.49	1.86	2.04	1.98	2.22	0.94	13.38
Ohio	5.23	4.95	5.13	4.00	3.59	4.93	2.65	3.59	3.15	3.33	2.35	21.77
Wisconsin	6.06	6.18	6.47	4.28	3.31	5.95	2.17	3.31	3.42	3.62	2.09	13.35
Plains	12.75	12.14	13.07	8.05	5.52	14.66	6.19	4.77	8.02	7.80	8.75	27.71
Iowa	7.15	7.13	7.44	5.99	5.62	7.38	3.78	5.62	5.41	4.08	14.00	10.73
Kansas	7.53	6.34	6.27	6.75	6.45	7.11	17.80	6.45	5.62	6.30	4.33	37.72
Minnesota	18.00	16.17	17.56	7.21	3.70	22.70	2.45	3.70	9.96	8.37	18.51	53.59
Missouri	12.17	11.96	12.96	8.11	5.08	14.29	4.00	5.08	8.63	8.90	8.07	13.23
Nebraska	12.65	13.10	14.06	9.69	8.38	12.54	3.18	8.38	6.21	6.57	2.07	12.33
North Dakota	22.98	23.70	25.05	17.48	7.93	22.34	10.68	7.93	17.55	17.55	—	23.38
South Dakota	15.70	14.93	15.94	9.53	3.76	18.09	7.61	3.76	10.98	10.98	—	25.32

See footnotes at end of table.

Table 4—Continued

Percent of Medicare Personal Health Care Expenditures Incurred by Out-of-State Residents (Inflow Rate) in Region and State of Provider[1], by Type of Service[2]: Calendar Year 1991

Region and State of Provider	Total	Hospital Care				Physician Services	Home Health Care[4]	Nursing Home Care[4]	Other Professional Services			Medical Durables
		Total	Inpatient Hospital Care	Hospital-Based Outpatient Hospital Care[3]	Hospital-Based Nursing Home Care				Total	Other Professional Services[5]	Freestanding ESRD Facilities	
Southeast	7.88	7.52	7.82	5.65	5.79	9.05	3.02	6.54	4.95	5.34	4.33	18.88
Alabama	4.93	4.98	5.16	3.59	3.16	5.35	1.22	3.16	5.04	4.11	6.25	11.25
Arkansas	7.88	8.30	8.15	9.25	8.76	6.50	3.42	8.76	5.30	4.75	6.84	16.43
Florida	8.30	8.60	8.89	6.51	7.08	7.88	4.52	7.08	6.19	6.32	5.80	16.77
Georgia	7.14	6.95	7.19	5.32	4.88	8.37	1.80	4.88	4.36	5.25	3.43	18.66
Kentucky	8.15	7.06	7.30	5.58	4.05	12.11	3.24	4.05	4.20	4.24	4.07	11.78
Louisiana	4.53	4.72	5.09	3.19	3.08	4.53	1.04	3.08	2.27	2.47	2.00	14.60
Mississippi	4.71	4.29	4.50	3.13	3.33	6.85	1.29	3.33	3.30	4.03	2.85	14.15
North Carolina	7.90	5.86	6.05	4.72	4.33	14.28	2.89	4.33	3.05	3.01	3.09	21.56
South Carolina	4.42	3.67	3.74	3.17	4.29	3.87	1.52	4.29	2.66	3.25	2.28	29.87
Tennessee	12.86	12.99	13.73	7.81	12.53	14.32	3.54	12.53	6.36	6.62	6.06	37.66
Virginia	8.07	6.98	7.35	4.99	6.72	11.60	3.60	6.72	5.23	6.05	4.54	11.05
West Virginia	12.85	12.51	12.59	12.46	7.75	14.86	5.25	7.75	11.10	12.59	6.02	12.57
Southwest	5.96	5.96	6.17	4.99	3.48	6.70	2.24	4.34	3.51	3.94	2.87	8.85
Arizona	11.11	11.42	11.99	8.88	7.29	11.56	6.13	7.29	7.83	8.95	5.73	10.13
New Mexico	6.39	7.14	7.57	4.80	4.95	5.33	2.58	4.95	6.02	4.64	8.61	3.64
Oklahoma	3.33	3.16	3.26	2.55	2.95	3.81	1.43	2.95	3.12	3.07	3.34	8.42
Texas	4.97	4.98	5.14	4.23	2.75	5.63	1.80	2.75	2.28	2.52	2.00	9.04
Rocky Mountains	8.09	8.35	8.87	6.23	5.27	8.10	2.78	5.33	5.38	5.10	6.18	12.30
Colorado	8.06	8.15	8.60	6.07	5.31	7.70	2.85	5.31	4.79	4.43	5.54	17.28
Idaho	7.67	7.67	8.06	6.26	5.42	8.35	2.99	5.42	7.64	7.72	2.69	8.67
Montana	6.56	6.71	7.11	5.24	3.27	7.65	1.25	3.27	3.22	3.34	0.46	3.45
Utah	9.93	10.91	11.89	7.36	6.09	9.92	3.09	6.09	6.90	5.95	9.27	6.81
Wyoming	6.13	6.46	6.70	5.31	5.98	5.92	2.94	5.98	6.18	5.84	7.19	3.77
Far West	3.91	3.99	4.17	3.04	2.34	3.75	2.06	2.59	2.66	3.02	1.93	10.45
Alaska	7.35	7.80	8.39	5.32	2.14	6.28	4.68	2.14	6.24	8.23	4.27	3.87
California	2.72	2.74	2.85	2.04	2.10	2.63	1.65	2.10	1.80	2.04	1.36	8.31
Hawaii	4.81	4.89	5.30	2.51	2.92	4.92	2.27	2.92	4.07	6.30	1.12	2.59
Nevada	16.44	17.37	17.86	12.82	8.10	15.24	4.89	8.10	14.21	15.05	11.97	32.15
Oregon	7.82	8.06	8.47	6.21	4.45	7.22	3.44	4.45	6.06	6.01	6.38	21.16
Washington	6.14	6.17	6.40	4.99	3.64	6.55	3.34	3.64	4.05	4.05	4.04	9.57
Outlying Areas[6]	1.57	1.74	1.74	1.76	1.96	1.44	1.05	2.13	1.35	1.08	1.43	1.83

[1] Provider State expenditures for residents of non-provider States divided by total expenditures for provider State.
[2] National Health Account and Medicare type-of-service categories.
[3] Includes hospital-based home health agency services.
[4] Services provided by freestanding facilities
[5] Includes expenditures for hospice care.
[6] Outlying areas include Puerto Rico, Virgin Islands, Guam, and other U.S. territories.

NOTE: ESRD is end stage renal disease.

SOURCE: Health Care Financing Administration, Office of the Actuary: Estimates prepared by the Office of National Health Statistics.

Table 5

Percent of Medicare Personal Health Care Expenditures for State Residents Incurred Outside the State of Residence (Outflow Rate)[1], by Type of Service[2], Region, and State of Residence: Calendar Year 1991

Region and State of Provider	Total	Hospital Care				Physician Services	Home Health Care[3]	Nursing Home Care[3]	Other Professional Services			Freestanding Medical Durables
		Total	Inpatient Hospital Care	Hospital-Based Outpatient Hospital Care[2]	Hospital-Based Nursing Home Care				Total	Professional Services[3]	Other ESRD Facilities	
	Millions of Dollars											
All Areas	6.77	6.45	6.72	4.93	4.20	7.20	2.73	4.34	4.25	4.49	3.70	20.85
United States	6.74	6.41	6.67	4.90	4.19	7.19	2.72	4.31	4.25	4.47	3.73	20.96
New England	6.88	6.54	6.76	4.96	8.64	7.77	2.22	4.06	5.64	5.41	6.76	25.04
Connecticut	5.83	5.79	6.01	4.24	7.48	6.13	1.81	3.13	4.85	3.62	12.08	19.57
Maine	9.09	8.32	8.65	6.50	2.91	11.81	3.22	27.71	7.71	6.68	13.06	18.41
Massachusetts	3.92	3.54	3.72	2.24	11.68	4.70	1.65	2.26	3.18	2.94	4.37	17.53
New Hampshire	21.89	21.29	22.16	16.48	7.70	24.08	6.28	24.86	25.67	31.09	7.88	49.02
Rhode Island	9.93	8.96	9.18	7.26	100.00	9.84	2.09	6.18	9.31	11.68	3.54	65.09
Vermont	24.09	24.11	25.00	19.37	19.58	27.33	4.73	30.22	15.40	14.38	100.00	64.44
Mideast	7.18	6.49	6.71	4.95	5.47	8.16	4.37	5.50	5.24	5.18	5.40	21.99
Delaware	16.75	15.95	16.23	14.37	8.94	18.69	2.72	11.84	12.05	16.52	5.84	42.58
District of Columbia	17.04	9.18	8.73	10.82	33.22	34.82	15.32	29.96	18.28	32.74	11.46	77.75
Maryland	12.18	12.44	13.17	8.24	8.42	11.87	10.31	9.06	7.76	9.20	5.93	18.01
New Jersey	12.41	12.44	13.26	7.01	25.97	11.61	5.98	11.11	11.84	10.99	16.11	28.02
New York	5.75	4.63	4.68	4.19	5.34	7.08	4.55	5.75	4.09	3.91	4.77	25.79
Pennsylvania	3.94	3.55	3.68	2.77	1.96	4.74	1.80	2.26	2.20	2.30	1.86	12.41
Great Lakes	7.23	6.83	7.18	4.74	5.01	8.41	3.07	3.96	4.41	4.16	5.25	16.41
Illinois	8.97	8.85	9.30	6.57	3.83	10.03	2.57	6.57	4.54	4.31	5.06	16.61
Indiana	8.22	7.18	7.71	4.52	3.24	11.09	3.80	1.67	6.85	7.16	6.17	26.48
Michigan	5.70	5.65	5.90	4.00	12.75	6.06	2.73	5.34	2.95	2.83	3.48	10.03
Ohio	5.80	5.06	5.30	3.59	5.73	7.18	3.26	3.65	4.58	4.25	6.04	17.85
Wisconsin	8.47	7.97	8.29	5.49	12.72	9.88	4.54	2.52	5.74	5.25	8.74	21.41
Plains	10.20	9.34	9.99	6.74	3.80	11.92	7.23	5.28	7.38	7.48	7.08	27.55
Iowa	14.32	13.20	14.68	7.78	3.32	18.65	4.32	26.77	7.58	6.81	12.76	17.48
Kansas	14.23	13.53	13.74	13.94	6.51	16.17	9.68	10.31	9.28	10.95	6.02	28.24
Minnesota	8.40	8.25	8.62	6.36	3.13	9.44	4.18	1.90	7.24	7.71	4.32	18.54
Missouri	6.60	5.25	5.63	3.84	2.77	7.52	8.02	4.01	4.64	5.57	2.72	34.41
Nebraska	10.72	9.74	10.95	5.27	4.32	11.81	7.87	9.41	9.18	7.24	25.95	28.69
North Dakota	11.74	10.93	11.84	6.33	7.70	12.31	10.76	16.53	10.14	7.84	100.00	35.84
South Dakota	15.80	15.35	16.20	10.47	9.91	16.63	15.91	10.77	19.41	9.97	100.00	19.97

See footnotes at end of table.

Table 5—Continued

Percent of Medicare Personal Health Care Expenditures for State Residents Incurred Outside the State of Residence (Outflow Rate)[1], by Type of Service[2], Region, and State of Residence: Calendar Year 1991

Region and State of Residence	Total	Hospital Care				Physician Services	Home Health Care[4]	Nursing Home Care[4]	Other Professional Services			Medical Durables
		Total	Inpatient Hospital Care	Outpatient Hospital Care[3]	Hospital-Based Nursing Home Care				Total	Other Professional Services[5]	Freestanding ESRD Facilities	
Southeast	7.56	7.36	7.62	5.73	6.28	7.91	2.28	6.38	4.02	4.47	3.31	23.42
Alabama	6.85	5.87	5.92	5.16	11.72	8.93	1.26	7.91	3.75	3.80	3.69	26.64
Arkansas	11.31	9.91	10.41	6.72	8.23	13.59	5.27	32.40	6.21	4.94	9.63	30.53
Florida	6.48	7.75	7.84	7.04	8.67	5.28	1.90	3.22	3.37	3.78	2.20	11.34
Georgia	6.21	5.30	5.52	3.60	9.72	8.28	1.23	5.69	4.31	4.39	4.22	23.14
Kentucky	9.41	8.74	8.89	7.65	8.60	10.12	4.21	14.28	4.87	4.69	5.40	28.47
Louisiana	4.20	2.89	3.16	1.96	0.88	5.12	0.89	6.84	1.32	1.41	1.20	42.59
Mississippi	13.29	13.08	13.99	7.39	12.07	16.33	3.21	20.12	5.71	8.91	3.66	36.54
North Carolina	4.99	4.03	4.14	3.15	8.00	5.46	1.35	6.97	2.35	2.95	1.67	40.46
South Carolina	12.53	11.84	12.28	8.91	7.02	15.31	5.35	6.74	6.02	7.92	4.79	28.65
Tennessee	4.50	3.79	3.87	3.11	5.47	6.65	0.78	7.55	3.32	4.84	1.52	18.86
Virginia	10.59	9.67	10.26	6.61	7.27	11.97	11.22	7.57	6.65	9.74	3.93	27.91
West Virginia	16.88	16.73	17.06	15.28	6.67	15.97	12.61	17.89	11.37	10.02	15.38	41.04
Southwest	5.44	4.91	5.03	4.31	3.49	5.42	1.77	4.40	2.87	3.37	2.14	25.85
Arizona	6.88	6.92	7.41	4.46	5.76	6.56	3.31	5.44	4.27	5.28	2.38	20.68
New Mexico	14.44	14.36	15.13	9.95	12.06	15.22	9.36	6.58	7.99	6.84	10.17	25.53
Oklahoma	11.03	9.46	9.82	8.02	4.38	13.17	3.28	9.49	7.62	6.26	12.71	44.00
Texas	3.08	2.50	2.46	2.76	2.45	2.66	0.89	2.93	1.50	1.94	0.96	23.00
Rocky Mountains	10.05	9.69	10.51	6.29	4.43	12.38	3.17	4.29	7.13	6.80	8.11	14.81
Colorado	5.00	4.63	4.93	3.17	3.27	5.60	2.64	2.53	4.43	4.15	5.02	12.28
Idaho	23.85	23.66	25.77	15.21	7.68	27.46	9.32	9.48	13.14	12.14	47.55	30.62
Montana	10.69	10.18	11.33	5.49	4.31	13.41	2.86	5.72	9.07	7.98	28.85	12.03
Utah	5.29	4.59	5.20	2.34	2.95	8.28	1.41	2.20	5.36	5.01	6.27	10.33
Wyoming	29.75	28.58	29.86	22.80	14.90	38.05	6.89	23.12	25.75	20.64	37.68	23.07
Far West	2.96	3.03	3.12	2.63	1.76	2.55	1.74	1.82	2.13	2.48	1.43	11.69
Alaska	20.57	18.73	20.20	11.48	10.42	25.53	29.38	40.23	15.78	18.39	13.14	32.90
California	1.79	1.78	1.83	1.61	1.01	1.45	1.15	1.11	1.33	1.50	1.01	10.77
Hawaii	3.27	3.33	3.51	2.48	1.49	2.47	5.14	7.92	4.59	5.24	3.76	14.18
Nevada	12.04	13.71	13.43	15.74	23.02	10.31	5.88	8.99	7.15	7.75	5.57	15.14
Oregon	6.78	6.63	6.95	5.02	6.71	6.89	5.09	4.11	5.81	5.76	6.17	17.54
Washington	5.55	5.66	5.90	4.20	6.02	5.48	2.14	3.06	4.21	4.87	2.10	11.84
Outlying Areas[6]	13.06	18.43	18.90	15.41	8.64	9.16	3.15	57.41	4.22	10.63	2.07	13.74

[1] Expenditures by residents for services provided in non-resident States divided by total expenditures incurred by residents of a State.

[2] National Health Account and Medicare type-of-service categories.

[3] Includes hospital-based home health agency services.

[4] Services provided by freestanding facilities

[5] Includes expenditures for hospice care.

[6] *Outlying areas include Puerto Rico, Virgin Islands, Guam, and other U.S. territories.*

NOTE: ESRD is end stage renal disease.

SOURCE: Health Care Financing Administration, Office of the Actuary: Estimates prepared by the Office of National Health Statistics.

(e.g., Alaska, Wyoming, Idaho, Vermont, New Hampshire) experience a high proportion of out-of-State spending by their residents (greater than 20 percent) because services are not conveniently found within the States. The States that have large population bases often tend to have lower rates of inflow and outflow because these States have the population density to support large health service establishments. A large amount of exporting and importing of services is observed in States with large cities near their borders. For example, Missouri experiences a large inflow of expenditures because of the proximity of St. Louis, and Illinois patients go out of State from the border city of East St. Louis (Holahan and Zuckerman, 1993).

Ranked by services, the lowest amount of border crossing (indicated by both average outflow and inflow rates) is observed in the category of home health care (2.73 percent). Because home health services are mostly used by the home-bound elderly (Helbing, Sangl, and Silverman, 1993), and the agencies delivering the services are in most cases licensed by the State (Intergovernmental Health Policy Project, 1993), most home health service areas are limited by State boundaries. Longer travel time is also likely to be an impediment to access, particularly in rural areas, because this raises service delivery costs (Kenney, 1993).

The highest rate of border crossing is observed in the area of medical durable supplies (20.85 percent). The large interstate flows for medical durables appear to indicate that there is no fixed local market area for these services. The major components of medical durables paid by Medicare include prostheses, orthotics, wheelchairs, oxygen, and oxygen supplies. The concentration of wholesale distributors in certain regions and "telemarketing" may be contributing factors causing large interstate buying and selling of these products. Moreover, Medicare claims data from several medical supply companies reflect centralized billing offices located outside the State where services are actually rendered, contributing to ambiguity in correctly identifying the location of the provider.

The data for hospital care and physician services show that out-of-State spending for these two areas falls between the two extremes. The border crossing occurring in the use of inpatient hospital care is 6.72 percent and that for physician services is 7.20 percent in 1991. Tables 4 and 5 indicate that, in general, Medicare out-of-State expenditures are similar for inpatient hospital care and for physician services, indicating similarity of forces driving border crossing across these services. The outflow rate exceeds the inflow rate in the Mideast, Great Lakes, and Rocky Mountain Regions for both types of service expenditures. The reverse pattern is observed in other regions, except in New England, where the outflow rate corresponds to the inflow rate for physician services and is lower than the inflow rate for inpatient hospital services.

Improving Per Capita Expenditure Estimates

In addition to serving as the tool to track down expenditure flows across States, the major purpose of developing border-crossing measures for Medicare spending is to provide adjustment factors so that valid computation of per capita expenditures is possible. Without the adjustment for interstate border crossing, estimates of State spending per person could be produced only by using (1) expenditures by location of provider and (2) population by location of beneficiary residence. Studies examining this issue (U.S. General Accounting Office, 1992) suggest that "State transfers of health services" are not statistically sig-

nificant in explaining differences in State spending levels. However, the implication of the border-crossing adjustment for individual States cannot be overstated in light of its role in accurately identifying the spending levels for its residents. For example, the border-crossing adjustment lowered Medicare expenditures by 13 percent for North Dakota and raised them by 34 percent in Wyoming in 1991 (Table 3). Similarly, the District of Columbia provides extensive health care services to persons residing in Maryland and Virginia. Without the adjustment, spending per person in the District of Columbia would be grossly overestimated, and spending in Maryland and Virginia could be understated, if not offset by other border-crossing flows of health care spending.

Table 6 provides estimates of per capita expenditures by type of service after dividing expenditures for resident beneficiaries in each State by the population incurring these expenditures represented by the total number of Medicare enrollees for 1991. Because the NHA categories are grouped in such a way that both Part A and Part B enrollees are eligible to receive most services, a combined total including enrollees in either or both categories is used as the denominator in computing per enrollee expenditures for different services. A comparison of per enrollee expenditures provides the background for a more meaningful analysis of the variation in expenditures across States for each service because it controls for the difference in the population size.

The border-crossing adjustment raises per capita expenditures for States with NFRs greater than 1 and lowers the same for States with NFRs less than 1, relative to estimates produced using provider-based expenditures without the adjustment. The per capita expenditure data in Table 6 show that the highest spending per Medicare enrollee is for inpatient hospital services ($1,868), followed by physician services ($900), home health care ($122), and other professional care ($117). Overall, the Mideast Region spends the most per enrollee ($3,852), followed by the Far West ($3,809) and New England ($3,618). Many States with lower per capita spending are in the Rocky Mountain and South Regions. Some of the high-cost States are California, the District of Columbia, Maryland, Massachusetts, and Louisiana. Although State-to-State variations in per capita spending were observed, the spending was within 10 percent of the U.S. average[9] in 20 out of 51 States. Sixteen States were above the U.S. average, and the remaining 35 States were below. Thirty-two States spent within one standard deviation of the U.S. average per capita.

Studies investigating the causes of interstate variation in total spending indicate that factors such as State differences in personal income, the supply of health care resources (including the number of physicians and hospital and nursing home beds per capita), the concentration of hospital services in urban areas, and health status explained more than 80 percent of the difference in health spending among States (U.S. General Accounting Office, 1992). The State rankings in personal income per capita influence health spending. The States with high per capita income (e.g., the District of Columbia, Massachusetts, Maryland, New Jersey) generally spend more per capita. The opposite is true for States with low per capita income (e.g., Idaho, Utah). The States with relatively high urban populations generally have high costs of care and, consequently, relatively high per capita expenditures (the

[9]A previous finding, based on provider-State data, shows that in 1982 more than one-half of the States fell within 10 percent of the U.S. average (U.S. General Accounting Office, 1992) for per capita total personal health care expenditures.

Table 6

Medicare Per Enrollee[1] Personal Health Care Expenditures by Type of Service[2], Region, and State of Residence: Calendar Year 1991

Region and State of Residence	Total	Hospital Care				Physician Services	Home Health Care[4]	Nursing Home Care[4]	Other Professional Services			Medical Durables
		Total	Inpatient Hospital Care	Outpatient Hospital Care[3]	Hospital-Based Nursing Home Care				Total	Other Professional Services[5]	Freestanding ESRD Facilities	
All Areas	$3,456	$2,176	$1,868	$281	$28	$900	$122	$54	$117	$81	$36	$86
United States	3,510	2,214	1,900	286	28	912	124	56	119	82	36	87
New England	3,618	2,378	2,067	305	6	800	185	59	125	103	22	72
Connecticut	3,645	2,257	1,964	286	7	919	183	86	132	113	19	68
Maine	2,746	1,819	1,562	241	16	608	157	7	84	71	14	71
Massachusetts	4,035	2,714	2,367	344	4	826	207	66	142	118	24	79
New Hampshire	2,829	1,929	1,652	267	11	611	135	20	74	57	17	59
Rhode Island	3,375	2,171	1,908	263	(6)	805	144	54	136	96	40	65
Vermont	2,743	1,876	1,577	291	8	549	195	16	49	48	1	57
Mideast	3,852	2,502	2,192	294	15	996	88	51	126	95	32	89
Delaware	3,359	2,157	1,890	247	20	822	107	41	137	80	57	96
District of Columbia	4,804	3,249	2,775	452	21	1,092	122	57	196	63	134	88
Maryland	4,091	2,713	2,313	386	14	1,032	98	35	130	73	57	83
New Jersey	3,615	2,290	1,978	307	5	1,051	60	33	100	84	17	81
New York	3,867	2,523	2,260	252	12	1,001	80	50	124	97	27	90
Pennsylvania	3,882	2,519	2,182	311	26	954	108	67	139	106	34	94
Great Lakes	3,356	2,204	1,884	295	25	818	91	58	102	79	23	83
Illinois	3,533	2,354	2,023	278	52	846	103	45	106	74	32	79
Indiana	3,121	2,103	1,768	305	30	723	76	92	65	44	20	62
Michigan	3,574	2,242	1,918	317	7	924	115	47	131	107	25	115
Ohio	3,374	2,219	1,884	318	17	824	85	57	108	88	20	80
Wisconsin	2,806	1,889	1,647	232	9	662	56	67	68	58	10	64
Plains	2,934	1,993	1,649	281	63	699	53	42	82	63	19	64
Iowa	2,770	1,935	1,567	292	76	649	40	9	80	70	10	58
Kansas	3,109	2,050	1,732	252	67	795	60	30	114	75	38	61
Minnesota	2,784	1,898	1,632	233	33	650	42	87	64	55	9	43
Missouri	3,240	2,180	1,772	320	88	752	83	43	95	64	31	87
Nebraska	2,572	1,752	1,388	309	55	638	30	23	59	53	6	69
North Dakota	2,758	1,905	1,583	294	28	681	24	31	70	69	2	48
South Dakota	2,603	1,829	1,559	244	26	617	11	30	59	53	6	57

See footnotes at end of table.

Table 6—Continued

Medicare Per Enrollee[1] Personal Health Care Expenditures by Type of Service[2], Region, and State of Residence: Calendar Year 1991

Region and State of Residence	Total	Hospital Care				Physician Services	Home Health Care[4]	Nursing Home Care[4]	Other Professional Services			Medical Durables
		Total	Inpatient Hospital Care	Outpatient Hospital Care[3]	Hospital-Based Nursing Home Care				Total	Other Professional Services[5]	Freestanding ESRD Facilities	
Southeast	3,465	2,091	1,802	269	20	909	192	43	129	79	50	101
Alabama	3,526	2,168	1,912	244	12	816	249	49	134	76	58	110
Arkansas	3,204	2,127	1,826	263	38	756	94	16	106	78	29	105
Florida	3,900	2,029	1,773	245	11	1,317	198	74	153	113	39	130
Georgia	3,631	2,286	1,993	284	8	828	234	40	136	69	67	106
Kentucky	3,190	2,063	1,795	245	22	763	115	32	121	91	30	95
Louisiana	4,055	2,656	2,144	426	86	884	232	12	170	98	72	101
Mississippi	3,267	2,062	1,762	280	21	689	305	12	108	42	66	92
North Carolina	2,976	1,960	1,689	257	13	673	121	35	124	66	58	63
South Carolina	2,753	1,761	1,536	216	10	639	115	30	128	50	78	80
Tennessee	3,454	2,058	1,771	267	21	738	418	43	97	53	45	99
Virginia	3,062	2,047	1,716	318	13	743	72	30	96	45	51	73
West Virginia	3,094	2,060	1,801	234	25	767	82	25	85	64	21	74
Southwest	3,382	2,127	1,802	284	41	856	136	37	127	76	51	99
Arizona	3,516	2,123	1,753	337	33	1,044	85	66	127	83	44	72
New Mexico	2,782	1,767	1,498	251	18	717	77	45	94	61	32	83
Oklahoma	3,149	2,127	1,791	292	44	704	124	16	83	66	18	94
Texas	3,462	2,164	1,849	271	44	855	159	33	141	77	63	110
Rocky Mountains	2,852	1,878	1,531	309	38	643	90	73	74	55	19	94
Colorado	3,103	2,011	1,665	298	49	713	84	88	97	65	32	111
Idaho	2,508	1,653	1,343	284	27	611	59	59	59	57	2	67
Montana	2,736	1,871	1,510	333	28	616	67	47	52	49	3	83
Utah	2,659	1,739	1,363	345	31	547	151	82	58	42	16	81
Wyoming	2,844	1,970	1,647	292	31	607	68	36	54	38	16	109
Far West	3,809	2,239	1,911	284	44	1,171	99	97	131	87	43	73
Alaska	3,562	2,589	2,155	397	37	768	26	24	96	48	48	58
California	4,134	2,396	2,050	292	54	1,299	110	106	147	94	52	76
Hawaii	2,829	1,747	1,478	228	40	931	35	16	61	34	27	39
Nevada	3,414	1,880	1,693	175	13	1,166	114	63	104	75	29	87
Oregon	2,760	1,709	1,409	280	20	773	60	83	82	71	11	54
Washington	3,112	1,939	1,645	277	18	833	82	82	102	78	25	73
Outlying Areas[7]	848	370	326	41	3	326	45	1	42	11	32	63

[1]Number of aged and disabled residents enrolled in the Hospital and/or Supplementary Medical Insurance programs on July 1, 1991.
[2]National Health Account and Medicare type-of-service categories.
[3]Includes hospital-based home health agency services.
[4]Services provided by freestanding facilities
[5]Includes expenditures for hospice care.
[6]Less than $1.
[7]Outlying areas include Puerto Rico, Virgin Islands, Guam and other U.S. territories.

NOTE: ESRD is end stage renal disease.

SOURCE: Health Care Financing Administration, Office of the Actuary: Estimates prepared by the Office of National Health Statistics.

District of Columbia, Massachusetts, Florida, Connecticut, New York, New Jersey, etc.). The average payment per urban enrollee was found to be approximately 17 percent higher than that for rural beneficiaries (Health Care Financing Administration, 1995). The States with more health care resources tend to experience higher spending by their residents (such as California, with a high physician-to-population ratio). Other factors, such as age and sex composition of Medicare enrollees and their health and disability status (Helbing, Sangl, and Silverman, 1993), might serve as important determinants of per capita variation in Medicare spending. States with poor health status of the residents (e.g., Georgia, Louisiana, and Alabama) tend to spend more per capita than States with better health status (e.g., Utah, Idaho, Minnesota, Oregon, and Hawaii) (Prospective Payment Assessment Commission, 1995). In addition, factors such as provider practice patterns, managed-care market penetration, and provider resource costs are also important in explaining regional differences in per capita spending. The high resource costs in Louisiana (17 percent above the U.S. average) might partly explain the high per capita spending in that State (Prospective Payment Assessment Commission, 1995). The growth of managed care in recent years might also have slowed the growth of per capita spending in States with high HMO enrollment. However, evidence is still mixed as to the effect of managed care on growth of expenditures.

By analyzing the difference between per capita expenditures with and without adjusting for border crossing, several characteristics are observed: The effect of border crossing is found to be very large (9-34 percent) for certain States, such as Wyoming, Idaho, Alaska, and New Mexico. For States such as Minnesota, North Dakota, and the District of Columbia, per capita spending estimates decline by 10-30 percent as a result of this adjustment. Even for services such as home health care, for which there is very little border crossing, the effect on some States (e.g., New Mexico, West Virginia, the District of Columbia, Virginia, South Dakota) is quite substantial (8-18 percent increase).[10] For services such as durable medical equipment, a maximum difference of more than 200 percent is also observed (Table 3).[11] As a whole, the border-crossing adjustment reduces the variability of per capita expenditures across States: The coefficient of variation declines from 22 to 15 percent as a result of using the residence-based estimates to calculate the per capita expenditure.

The adjustment for border crossing has the greatest impact (measured by mean percent difference between adjusted and unadjusted per capita expenditures[12]) on per capita expenditures for laboratory services and durable medical supplies, but only a small impact on home health care, outpatient hospital care, and inpatient hospital services. Ranked by the average size of the impact, the lowest- to highest-ranking Medicare categories are:[13] home health care (0.58 percent), outpatient hospital care (0.75 percent), inpatient hospital care (0.98 percent), other professional care (1.77 percent), physician services (1.80 percent), hospice care (3.20 percent), nursing homes (3.24 percent), ESRD services (4.90 percent), medical durables (19.0 percent), and independent laboratory services (51.0 percent). The

[10]These high percentages result partially from the low volumes of home health care expenditures in those States.

[11]These percentages are calculated from Table 3 by subtracting 1 from the net flow ratios and then multiplying the result by 100. Because of the use of the same denominator for calculating both provider-based and residence-based per capita expenditures, these percentages measure the effect of the border-crossing adjustment on per capita as well as aggregate expenditures.

[12]This refers to the unweighted mean because the weighted mean is equal to zero.

[13]The outlying areas are excluded from these comparisons. The rankings refer to 10 Medicare categories before they are grouped into the NHA categories in Tables 1-6.

impact is also found to vary substantially across States. In terms of the variability of impact (measured by the coefficient of variation of percent differences between adjusted and unadjusted per capita expenditure), the lowest- to highest-ranking Medicare categories respectively are: nursing homes, medical durables, independent laboratory services, other professional care, ESRD services, hospice, physician services, home health care, outpatient hospital care, and inpatient hospital care. That is, the interstate fluctuations of impact are found to be highest for inpatient hospital services and lowest for nursing homes. The highest variability for hospital services is an indication of the wide fluctuation among States in how border crossing impacts per capita expenditures for this service, although the low average value of the impact for this service indicates that some of the positive and negative impacts cancel out. For services such as independent laboratory and medical durables, on the other hand, the interstate variation is small relative to the high average value of the impact. These findings indicate the sensitivity of the State estimates, especially for hospital services, to the border-crossing adjustment and highlight the significance of making this adjustment.

CONCLUSION

This analysis indicates the extent to which the border-crossing adjustment influences Medicare spending estimates by States. It should be noted that border crossing is one of several factors that explain differences in spending levels. Other factors, such as differences in personal income, the supply of health care resources, the concentration of hospital services in urban areas, and health status, are often found to be as significant in explaining differences in per capita spending levels (U.S. General Accounting Office, 1992). The reason why the impact of the border-crossing adjustment is not visible at the level of average comparison is that positive and negative impacts "net out" when aggregated across States.[14] However, from the perspective of national and State policymaking based on interstate comparisons, the impact of this adjustment on individual State spending estimates cannot be overemphasized.

HCFA's effort to refine and update State spending estimates continues. The next step includes the development of flow matrices for non-Medicare beneficiaries for hospital and physician services, by applying a service-mix adjustment developed from two private data bases to Medicare flows. Work will also continue on updating flow matrices to reflect expenditures for 1992 and 1993 for both Medicare and non-Medicare patients. This update will provide adjustment factors for 1992 and 1993 to the State estimates already published (Levit et al., 1995). The goal of this project is to enhance the methods of producing estimates of health care expenditures per capita and design a system in which State location of population and expenditure estimates are identical. This project will also enable HCFA to determine the stability of these flow matrices over time. The results of this work will be used to generate a time series of interstate flow ratios to adjust expenditures from the provider-State location to the beneficiary-residence State. HCFA will also explore the feasibility of studying border crossing for geographic areas smaller than the State.

ACKNOWLEDGEMENTS

The authors would like to especially thank the contribution of Fu Associates,

[14] Our analysis finds that the impact of border crossing is statistically significant when only the absolute size of the impact is considered.

who served as the contractor for this project and processed the data to create the interstate flow matrices for HCFA. Additionally, the authors are grateful to the following HCFA staff members who provided comments and suggestions on the draft of this article: Daniel Waldo, Nancy Miller, William Buczko, and Clifton Bailey.

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