TRENDS

Health Spending By State Of Residence, 1991–2004

These data provide a baseline for studying impacts of states' health reform efforts.

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ABSTRACT: Differing trends in health spending by state underlie national spending trends. To shed light on the complexities of health spending patterns among state residents, we present updated per capita health spending estimates by state of residence for 1991–1998 and new estimates for 1999–2004, and we offer summaries of trends exhibited during these time periods. These statistics provide the opportunity for further analysis, such as examination of variations in state-level spending in Medicare, Medicaid, and total personal health care spending, which can yield new perspectives on recent state health spending trends and provide context for policy discussions. [*Health Affairs* 26, no. 6 (2007): w651–w663 (published online 18 September 2007; 10.1377/hlthaff.26.6.w651)]

IT HAS BEEN WELL ESTABLISHED that variation in health spending by geographic area lies beneath aggregate national health spending trends.[1] This paper presents calendar-year estimates of per capita health spending by state of residence for 1991–2004 (Exhibit 1).[2] State-level spending data that use a consistent set of definitions and methodologies for all payers and for all types of services allow for the examination of state-specific trends that are not available through other sources. These data can provide context for researching state spending variation and a baseline for studying impacts of state health reform efforts. Finally, these data can shed light on differences in state health care delivery and consumption and on the demographic and economic factors that contribute to health care spending patterns.

We found that the New England and Mideast regions claimed eight of the top ten states in per capita personal health care spending in 2004, while the states with the lowest per capita spending were typically located in the Southwest and Rocky Mountain regions. Through descriptive analysis, we compared high or low per capita spending in a state to demographic and economic forces such as provider supply, the age distribution of a state's population, personal income levels, and insurance rates.[3]

We also compared each state's per enrollee Medicare and Medicaid spending to its per capita total personal health care spending in 2004. This analysis demonstrates that relative to the U.S. average, Medicaid per enrollee

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EXHIBIT 1
Personal Health Care Spending Per Capita And As A Percentage Of U.S. Per Capita Spending, By Region And State Of Residence, Calendar Years 1991, 1998, And 2004, And Average Annual Growth, 1991–1998 And 1998–2004

	Total			As percent of U.S. per capita			Average annual growth	
Region and state of residence	1991	1998	2004	1991	1998	2004	1991–1998	1998–2004
US	$2,645	$3,663	$5,283	100%	100%	100%	4.8%	6.3%
New England	3,044	4,393	6,409	115	120	121	5.4	6.5
CT	3,273	4,592	6,344	124	125	120	5.0	5.5
ME	2,454	3,929	6,540	93	107	124	7.0	8.9
MA	3,249	4,646	6,683	123	127	126	5.2	6.2
NH	2,440	3,636	5,432	92	99	103	5.9	6.9
RI	2,867	4,160	6,193	108	114	117	5.5	6.9
VT	2,331	3,531	6,069	88	96	115	6.1	9.4
Mideast	3,033	4,236	6,151	115	116	116	4.9	6.4
DE	2,818	4,135	6,306	107	113	119	5.6	7.3
DC	4,742	6,221	8,295	179	170	157	4.0	4.9
MD	2,763	3,679	5,590	104	100	106	4.2	7.2
NJ	2,931	4,129	5,807	111	113	110	5.0	5.8
NY	3,158	4,521	6,535	119	123	124	5.3	6.3
PA	2,947	4,024	5,933	111	110	112	4.5	6.7
Great Lakes	2,631	3,679	5,394	99	100	102	4.9	6.6
IL	2,705	3,766	5,293	102	103	100	4.8	5.8
IN	2,487	3,549	5,295	94	97	100	5.2	6.9
MI	2,617	3,605	5,058	99	98	96	4.7	5.8
OH	2,681	3,728	5,725	101	102	108	4.8	7.4
WI	2,539	3,661	5,670	96	100	107	5.4	7.6
Plains	2,525	3,722	5,538	95	102	105	5.7	6.8
IA	2,534	3,729	5,380	96	102	102	5.7	6.3
KS	2,583	3,693	5,382	98	101	102	5.2	6.5
MN	2,566	3,811	5,795	97	104	110	5.8	7.2
MO	2,504	3,697	5,444	95	101	103	5.7	6.7
NE	2,377	3,563	5,599	90	97	106	6.0	7.8
ND	2,626	3,873	5,808	99	106	110	5.7	7.0
SD	2,418	3,638	5,327	91	99	101	6.0	6.6
Southeast	2,527	3,590	5,172	96	98	98	5.1	6.3
AL	2,538	3,609	5,135	96	99	97	5.2	6.1
AR	2,365	3,354	4,863	89	92	92	5.1	6.4
FL	2,918	3.904	5,483	110	107	104	4.2	5.8
GA	2,513	3.395	4,600	95	93	87	4.4	5.2
KY	2,387	3,625	5,473	90	99	104	6.2	7.1
LA	2,601	3,691	5,040	98	101	95	5.1	5.3
MS	2,174	3,355	5,059	82	92	96	6.4	7.1
NC	2,242	3,420	5,191	85	93	98	6.2	7.2
SC	2,260	3,460	5,114	85	94	97	6.3	6.7
TN	2,555	3,721	5,464	97	102	103	5.5	6.6
VA	2,374	3,244	4,822	90	89	91	4.6	6.8
WV	2,556	4,000	5,954	97	109	113	6.6	6.9
Southwest	2,350	3,235	4,542	89	88	86	4.7	5.8
AZ	2,383	2,847	4,103	90	78	78	2.6	6.3
NM	2,209	3,103	4,471	84	85	85	5.0	6.3
OK	2,344	3,362	4,917	89	92	93	5.3	6.5
TX	2,356	3,320	4,601	89	91	87	5.0	5.6
Rocky Mountain	2,242	3,085	4,557	85	84	86	4.7	6.7
CO	2,439	3,248	4,717	92	89	89	4.2	6.4
ID	2,088	2,982	4,444	79	81	84	5.2	6.9
MT	2,331	3,279	5,080	88	90	96	5.0	7.6
UT	1,926	2,685	3,972	73	73	75	4.9	6.7
WY	2,212	3,389	5,265	84	93	100	6.3	7.6

EXHIBIT 1
Personal Health Care Spending Per Capita And As A Percentage Of U.S. Per Capita Spending, By Region And State Of Residence, Calendar Years 1991, 1998, And 2004, And Average Annual Growth, 1991–1998 And 1998–2004 (cont.)

Region and state of residence	Total			As percent of U.S. per capita			Average annual growth	
	1991	1998	2004	1991	1998	2004	1991–1998	1998–2004
Far West	$2,601	$3,334	$4,740	98%	91%	90%	3.6%	6.0%
AK	2,593	3,826	6,450	98	104	122	5.7	9.1
CA	2,657	3,334	4,638	100	91	88	3.3	5.7
HI	2,597	3,562	4,941	98	97	94	4.6	5.6
NV	2,370	3,047	4,569	90	83	86	3.7	7.0
OR	2,282	3,321	4,880	86	91	92	5.5	6.6
WA	2,505	3,337	5,092	95	91	96	4.2	7.3

SOURCES: U.S. Bureau of the Census; and Centers for Medicare and Medicaid Services, Office of the Actuary, National Health Statistics Group.

spending was more consistently related to per capita total personal health care spending than was per enrollee Medicare spending in 2004.

In addition, we compared provider-based health spending with residence-based health spending by state, which illustrates the tendency of a state's residents to cross state borders to consume health care. This analysis helps one distinguish the health spending patterns of each state's population from the spending patterns of all those who use care in a state, regardless of residency.

Finally, when the entire time series is considered, the data suggest differing trends in two separate periods: 1991–1998 and 1998–2004. The range of states' spending relative to the national average expanded in the 1991–1998 period, which was heavily influenced by the proliferation of managed care. The 1998–2004 period was influenced by a retreat from more tightly controlled managed care, as well as by several federal and state policy changes.[4]

Study Data And Methods

The health spending estimates by state of residence presented in this paper are based on the National Health Expenditure Accounts (NHEA), the official government estimates of U.S. health spending.[5] The data reveal trends in state-specific personal health care spending by service, as well as state-level estimates of Medicare and Medicaid spending by service, using consistent definitions and methodologies that allow for comparisons across time and across states.

To construct per capita health spending estimates for each state, we used interstate border-crossing spending-flow patterns to adjust provider-based data.[6] This adjustment was necessary because health spending estimates by location of provider include spending on both residents and nonresidents, while population estimates are based on residency.[7] Adjustments were not made for Medicaid because Medicaid spending estimates were based on data provided by in-state providers for eligible residents only. States may pay small amounts for services that occur outside of a resident's state; however, these dollars are a small proportion of all Medicaid spending. Therefore, Medicaid spending by state was assumed to be identical on a residence and provider basis.

We used Medicare fee-for-service claims data to adjust Medicare spending from a provider to a residence basis. All non-Medicare and non-Medicaid expenditures—except for prescription drugs and other personal health care spending, which are assumed to already be based on state of residence—were also adjusted using Medicare claims data.[8] Inpatient hospital and physician services were further adjusted to reflect non-Medicare case-mix by reweighting Medicare spending flows using

private hospital discharge information and physician claims records.[9]

Because of data limitations, these estimates do not adjust for international inflows of health care spending.[10] Additionally, the U.S. census resident population does not include an adjustment for the population undercount by state, which results in slightly overstated per capita spending that does not materially affect our findings.

Study Findings

■ **Top states in per capita health spending in 2004.** In 2004, the ten states with the highest per capita personal health care spending were Massachusetts, Maine, New York, Alaska, Connecticut, Delaware, Rhode Island, Vermont, West Virginia, and Pennsylvania. These ten states consumed an average of $6,345 per person in 2004—nearly 20 percent higher than the U.S. average of $5,283.

Shared characteristics. It is useful to explore various characteristics of these states, such as income and wages (which influence cost and payment levels), providers available per person, and insurance coverage, in the context of per capita spending. For example, within the top ten states, Massachusetts, New York, Connecticut, and Delaware ranked among the highest in the nation in per capita personal income.[11] In addition, Massachusetts, New York, Connecticut, Rhode Island, Vermont, and Pennsylvania ranked among the highest in concentration of physicians to population.[12] Also, the uninsured share of the population was among the lowest in the nation for some of the top ten per capita health spending states.[13] This suggests that residents in these states may receive more services through more comprehensive employer-based health insurance benefit packages, or that the states are in a stronger financial position to provide expanded benefits through Medicaid or other state-initiated programs.

Differences among the top ten. Although shared characteristics may suggest some homogeneity among the top ten states, our state-by-state analysis also found differences in the mix of health care services and goods used and in sources of funding. Massachusetts, for example, had the highest per capita health care spending in 2004 ($6,683)—nearly 27 percent above the U.S. average.[14] It ranked near the top for per capita hospital, nursing home, and home health spending as well as for total per enrollee Medicare and Medicaid spending (Exhibit 2).[15] Hospital spending in Massachusetts may be driven by higher-than-average use of services, such as diagnostic treatments and more intensive services commonly used in teaching hospitals.[16] Furthermore, Massachusetts offers an expansive Medicaid program that may contribute to its higher-than-average Medicaid and overall health spending.

For Maine and Connecticut, per capita personal health spending was influenced by different service spending patterns in 2004 than was the case for other top-ten states. Maine's per capita spending on physician services was second-highest in the nation, while per capita physician spending in Connecticut and Massachusetts ranked lower (data not shown). In addition, Maine had higher per capita spending on other personal health care services, which includes expanded Medicaid coverage for services provided under home and community-based waivers, than any other state in 2004 (data not shown). Maine also provides greater coverage of long-term care services and support of those with disabilities within its Medicaid program.[17] Connecticut's low percentage of the population that is uninsured and recent expansion of hospital services offered may contribute to comparably high per capita health spending relative to the rest of the United States.[18]

Per capita personal health care spending in New York and Alaska was greatly influenced by Medicaid spending. New York's per enrollee Medicaid spending in 2004 was $10,173, among the highest in the country. Medicaid accounted for 32 percent of total health spending in the state—nearly double the national average. High per enrollee Medicaid spending in New York is influenced by high incidence of illnesses that lead to hospital admissions and high use of both prescription drugs and long-term care services.[19] Alaska's

EXHIBIT 2
Medicare And Medicaid Personal Health Care Spending Per Enrollee, Share Of State's Total Personal Health Care Spending, And Average Annual Percentage Growth, By Region And State Of Residence, Calendar Year 2004

	Medicare personal health care spending			Medicaid personal health care spending		
Region and state of residence	Spending per enrollee, 2004	Share of state's total personal health care spending, 2004	Per enrollee average annual spending growth, 1998–2004	Spending per enrollee, 2004	Share of state's total personal health care spending, 2004	Per enrollee average annual spending growth, 1998–2004
US	$7,439	19.6%	5.7%	$ 6,119	17.4%	3.4%
New England	7,592	18.1	5.4	8,790	19.0	4.3
CT	8,185	19.4	6.4	8,643	17.0	1.0
ME	6,015	16.2	5.6	8,237	23.6	3.0
MA	8,168	18.4	5.0	9,150	19.3	5.8
NH	6,302	16.7	6.1	9,997	14.7	2.8
RI	6,925	17.9	4.7	9,479	22.5	5.0
VT	6,028	15.1	6.4	5,977	20.3	9.9
Mideast	8,092	19.5	5.2	9,366	22.8	3.5
DE	7,726	18.2	7.3	5,616	14.2	2.2
DC	9,154	14.0	3.7	8,317	23.3	2.4
MD	8,535	18.8	6.5	7,229	14.0	5.8
NJ	8,512	20.7	5.8	10,199	14.6	6.0
NY	8,221	18.1	4.9	10,173	31.8	1.7
PA	7,520	21.7	4.7	8,181	17.5	6.6
Great Lakes	7,333	19.5	6.4	6,121	15.0	3.1
IL	7,604	19.0	6.3	5,576	15.0	4.6
IN	6,973	18.8	6.2	6,569	14.5	2.1
MI	7,860	22.6	6.1	5,213	13.8	1.1
OH	7,343	19.5	6.5	7,439	16.9	4.5
WI	6,198	16.2	7.1	6,010	13.7	−0.5
Plains	6,522	17.7	6.6	7,444	16.1	4.8
IA	5,767	17.6	6.6	7,877	14.6	6.2
KS	6,903	18.6	6.6	6,780	11.8	1.8
MN	6,435	15.0	7.3	9,191	17.7	6.4
MO	7,029	20.1	5.8	6,370	18.7	4.4
NE	6,532	17.3	8.2	7,684	14.2	6.4
ND	5,823	16.3	7.2	9,456	13.5	3.6
SD	5,640	16.9	6.6	6,235	13.5	2.2
Southeast	7,429	21.6	6.0	5,524	16.4	5.8
AL	7,250	22.9	6.1	4,089	13.6	1.3
AR	6,529	22.5	5.9	4,305	18.9	0.1
FL	8.462	26.5	6.2	5,486	12.4	5.7
GA	7,044	17.0	5.7	6,551	21.1	11.2
KY	6,808	19.8	6.1	6,200	17.5	5.4
LA	8,569	24.0	4.4	5,562	20.7	2.8
MS	7,644	23.3	6.0	5,081	22.5	4.1
NC	6,841	19.1	6.8	6,735	18.3	5.6
SC	6,919	20.1	6.3	4,680	17.3	3.9
TN	7,041	19.5	5.6	4,820	20.2	9.1
VA	6,373	17.1	6.1	5,971	10.5	6.4
WV	6,861	22.3	6.1	6,342	17.6	6.0
Southwest	7,694	20.1	5.5	5,111	16.0	2.6
AZ	6,642	21.2	6.2	4,287	18.5	3.3
NM	5,652	17.1	5.5	4,944	23.9	5.0
OK	7,415	22.7	6.1	5,208	14.5	1.4
TX	8,292	19.6	5.2	5,410	15.0	2.7

EXHIBIT 2
Medicare And Medicaid Personal Health Care Spending Per Enrollee, Share Of State's Total Personal Health Care Spending, And Average Annual Percentage Growth, By Region And State Of Residence, Calendar Year 2004 (cont.)

	Medicare personal health care spending			Medicaid personal health care spending		
Region and state of residence	Spending per enrollee, 2004	Share of state's total personal health care spending, 2004	Per enrollee average annual spending growth, 1998–2004	Spending per enrollee, 2004	Share of state's total personal health care spending, 2004	Per enrollee average annual spending growth, 1998–2004
Rocky Mountain	$6,210	15.6%	6.4%	$ 6,413	12.7%	2.3%
CO	6,590	15.4	6.0	6,426	11.4	1.6
ID	5,764	17.1	6.0	6,018	15.5	1.7
MT	5,650	17.4	6.5	7,665	13.8	5.6
UT	6,142	14.5	7.2	6,191	12.9	2.9
WY	6,019	15.8	6.7	6,348	13.9	2.0
Far West	7,271	18.4	5.1	4,031	16.5	1.8
AK	7,128	8.4	6.7	10,417	20.4	11.3
CA	7,693	19.2	4.5	3,664	17.4	1.2
HI	5,708	16.3	6.5	4,974	13.5	4.4
NV	7,248	19.5	6.3	5,340	9.2	0.2
OR	6,116	18.3	7.8	5,880	13.9	4.9
WA	6,200	15.6	6.3	5,339	15.6	4.0

SOURCE: Centers for Medicare and Medicaid Services, Office of the Actuary, National Health Statistics Group.
NOTES: For Medicare, enrollees are the number of people enrolled in Part A, Part B, or both. For Medicaid, enrollees are measured in fiscal person-years.

per enrollee Medicaid spending on total personal health care was the highest in the nation in 2004, at $10,417. Alaska spent the most in the nation per Medicaid enrollee on hospital, physician, and dental services (data not shown). Overall medical costs and prices may tend to be higher in Alaska because of its relative isolation, which decreases access to alternative and possibly more cost-efficient sources of care.[20]

Economic and demographic influences. Economic and demographic characteristics may influence the types of services received by residents of a state but are not always indicative of that state's per capita health spending patterns, particularly by source of funding. For example, Florida has the highest percentage of the population age sixty-five and older, and its Medicare per enrollee spending was among the highest in the nation ($8,462) in 2004. Maine also had a higher-than-average proportion of its population age sixty-five and older, but its Medicare per enrollee spending was among the lowest in the nation: $6,015, compared to $7,439 nationwide.[21] Regarding Medicaid, two states with higher-than-average proportions of their population receiving coverage in 2004 were New York and New Mexico, but New York's Medicaid per enrollee spending was third-highest in the nation, while New Mexico's ranked among the lowest nationwide ($4,944)—19 percent lower than the U.S. average of $6,119.

■ **States lowest in per capita health spending in 2004.** In 2004, the states with the lowest per capita personal health spending were Utah, Arizona, Idaho, New Mexico, and Nevada. They accounted for an average of $4,244 per person in 2004—nearly 20 percent lower than the U.S. average. Although not always the case, these states also tended to exhibit lower-than-average per enrollee Medicare and Medicaid spending. In addition, because of their less populous nature, there may be less access to and availability of physicians and hospitals.[22] Furthermore, demographic similarities of these states, such as lower median age and a smaller proportion of

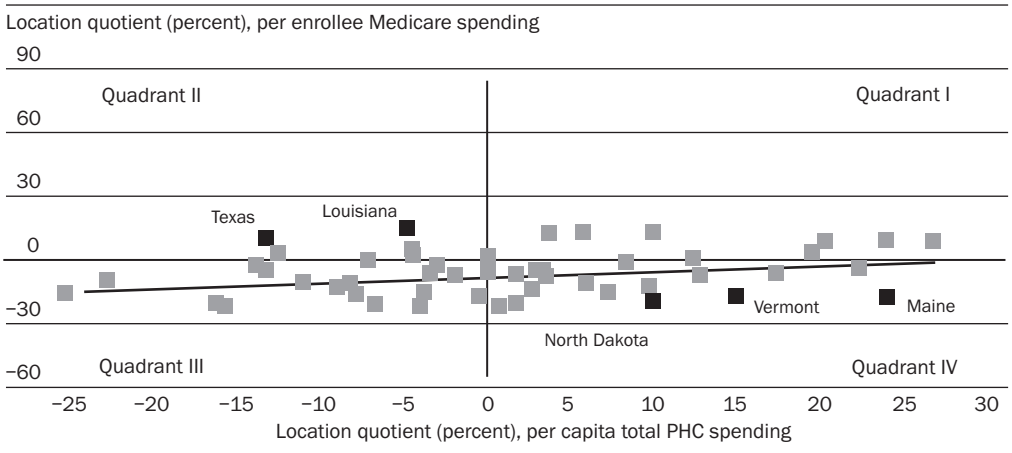
the population age sixty-five and older, may lead to less health care use.[23]

For example, Utah residents spent the least, per person, on personal health care in 2004 ($3,972—25 percent below the U.S. average). Utah's population had the lowest median age (twenty-eight) and, behind Alaska, the smallest percentage of residents over age sixty-five (data not shown). The percentage of Utah's population enrolled in Medicare and its percentage of overall spending attributable to Medicare both ranked second to last; also, its Medicare per enrollee spending of $6,142 was 17 percent below the U.S. average.

■ **Relationship of per enrollee Medicare and Medicaid spending to total per capita spending.** We also explored the relationship between total per capita personal health care spending and per enrollee Medicare and Medicaid spending relative to the national average in 2004. For Medicare, nearly half of all U.S. states (twenty-three) exhibited an inverse relationship (Exhibit 3). For example, per capita personal health care spending in Texas and Louisiana (quadrant II) were below the U.S. average, but Medicare per enrollee spending was above the national average. Conversely, states in quadrant IV of the exhibit, such as Maine, Vermont, and North Dakota, showed higher-than-average per capita personal health care spending yet lower-than- average Medicare per enrollee spending. This phenomenon is reflected in the relatively flat trend line in Exhibit 3. When comparing per enrollee Medicaid spending and total per capita personal health care spending relative to the national average, however, most states did fall in quadrants I or III (Exhibit 4). As a result, the trend line slopes upward. Only twelve states exhibited the inverse relationship and thus fell into quadrants II and IV.

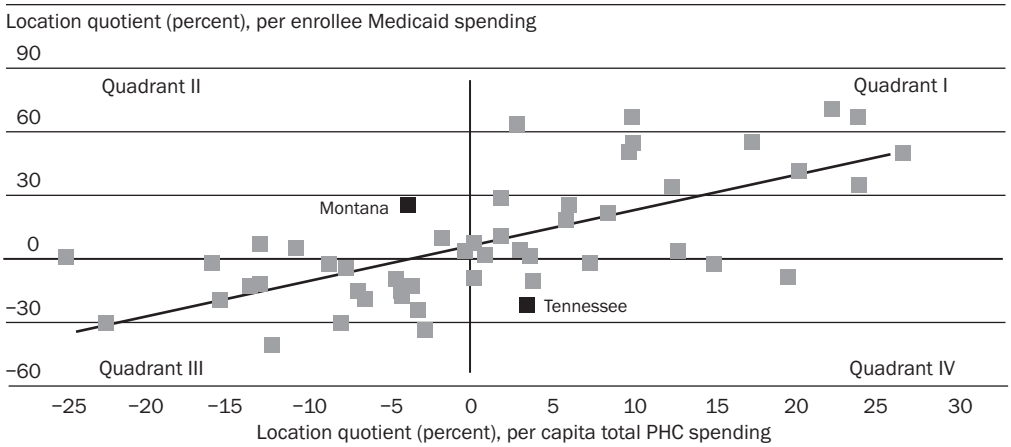
The relationships in these diagrams illustrate the respective influence of per enrollee Medicare and Medicaid spending on the variation in total per capita personal health care spending across states. Because Medicare is a national program that offers uniform benefits across geographic areas, per enrollee Medicare spending does not explain much of the variation in total per capita personal health care

EXHIBIT 3
Relationship Between Per Capita Total Personal Health Care Spending And Per Enrollee Medicare Spending To The National Average, By State Of Residence, Calendar Year 2004



SOURCE: Centers for Medicare and Medicaid Services, Office of the Actuary, National Health Statistics Group.
NOTES: The location quotient is defined as per capita spending by state residents as a percentage of U.S. per capita spending. The national average is depicted at 0,0. PHC is personal health care. Quadrant I (9 states): total PHC and Medicare above U.S. average. Quadrant II (5 states): total PHC below U.S. average, Medicare above U.S. average. Quadrant III (18 states): total PHC and Medicare below U.S. average. Quadrant IV (18 states): total PHC above U.S. average, Medicare below U.S. average.

EXHIBIT 4
Relationship Between Per Capita Total Personal Health Care Spending And Per Enrollee Medicaid Spending To The National Average, By State Of Residence, Calendar Year 2004



SOURCE: Centers for Medicare and Medicaid Services, Office of the Actuary, National Health Statistics Group.
NOTES: The location quotient is defined as per capita spending by state residents as a percentage of U.S. per capita spending. The national average is depicted at 0,0. PHC is personal health care. Quadrant I (21 states): total PHC and Medicaid above U.S. average. Quadrant II (6 states): total PHC below U.S. average, Medicaid above U.S. average. Quadrant III (17 states): total PHC and Medicaid below U.S. average. Quadrant IV (6 states): total PHC above U.S. average, Medicaid below U.S. average.

spending. Medicaid, on the other hand, consists of programs that vary widely from state to state. As a result, the strong relationship between per enrollee Medicaid spending and total per capita personal health care spending reflects the program's state-specific structure and variable spending patterns.

■ **State border-crossing patterns in 2004.** Residence-adjusted estimates also permit one to compare the health spending incurred by those residing in a state versus all health spending on medical services and products that occurs within a state's borders. This comparison allows for an understanding of a state's inflows (spending incurred by out-of-state residents in a state) and outflows (spending incurred by a state's residents for services outside of their own state). Net flows represent a combination of inflows and outflows and were calculated as aggregate spending by state of residence divided by aggregate spending by state of provider. Net-flow ratios greater than 100 percent indicate that spending incurred by the state's residents were more than the spending incurred by the state's health care providers; ratios less than 100 percent indicate that spending incurred by providers was higher than that incurred by residents (Exhibit 5).

Several reasons for residents to travel either into or out of a state to use health care include proximity to the state's border, ease of travel, attractiveness of major health care centers, and availability of specialists.[24] Because hospital and physician services generally account for the largest portion of total health spending in a state, they also account for the largest proportion of a state's inflows and outflows. However, it is also more likely that people will travel for these types of services when specialists or hospitals are not available in their immediate area or when easy access to care is available in neighboring states.[25] Our analysis allows us to determine those states where border crossing is more prevalent and in which direction residents tend to travel to receive health care services.

Net-flow ratios over 100 percent were highest for Wyoming, Idaho, West Virginia, New Mexico, and Vermont. For these states, ease of

EXHIBIT 5
Net-Flow Ratios Of Total Personal Health Care Spending, By Region And State Of Residence, Calendar Year 2004

Region and state of residence	Net-flow ratio	Region and state of residence	Net-flow ratio
United States	100.0%	Southeast	100.3%
New England	99.3	AL	101.4
CT	100.5	AR	104.6
ME	102.2	FL	100.1
MA	97.5	GA	99.0
NH	100.6	KY	100.7
RI	98.4	LA	99.3
VT	105.9	MS	104.9
Mideast	100.1	NC	99.3
DE	103.2	SC	103.6
DC	76.5	TN	95.1
MD	101.3	VA	100.7
NJ	104.2	WV	106.5
NY	100.2	Southwest	99.1
PA	98.6	AZ	97.2
Great Lakes	101.6	NM	106.3
IL	103.7	OK	104.4
IN	99.5	TX	98.2
MI	102.8	Rocky Mountain	100.2
OH	99.8	CO	97.2
WI	101.1	ID	109.7
Plains	98.6	MT	102.3
IA	105.4	UT	96.6
KS	103.4	WY	117.2
MN	95.8	Far West	99.4
MO	97.0	AK	101.6
NE	99.2	CA	99.4
ND	92.7	HI	99.2
SD	95.8	NV	97.9
		OR	100.0
		WA	99.0

SOURCE: Centers for Medicare and Medicaid Services, Office of the Actuary, National Health Statistics Group.

NOTES: Spending by state of residence is divided by spending by state of provider. Ratios greater than 100 percent mean that residents use more health care than the state produces; ratios less than 100 percent mean that the state produces more health care than its residents use.

travel influences residents' decisions to seek treatment outside their state. For example, Idaho residents tend to travel to Washington since Spokane is located near the border, and to Utah because major highways connect Idaho and Utah and feed into Salt Lake City. Similarly, West Virginia residents travel to Virginia, Ohio, Maryland, and Pennsylvania for health care services that might not be available in their own state. Vermont residents tend to use health care services in New Hampshire and Massachusetts because of the relatively short traveling distances and the attraction of major hospitals.

Net-flow ratios were lowest in the District of Columbia, North Dakota, Tennessee, South Dakota, and Minnesota. The largest percentage of border crossing occurred in the District of Columbia, which is unique because it is an urban conglomerate and provides a large amount of health care to residents of Maryland and Virginia. Spending for health care provided in North Dakota was higher than that incurred by its own residents; its nonresident patients consist primarily of northern rural Minnesota residents who cross into Fargo and northern rural South Dakota residents. While both Minnesota and South Dakota provide health care to residents of Iowa, Minnesota also serves neighboring Wisconsin residents, as well as residents of most other U.S. states because of its major specialty center, the Mayo

Clinic. Spending for health care provided in Tennessee is influenced by the four major cities located close to other state borders; patients travel from Mississippi to Memphis, from Virginia to Knoxville, from Georgia to Chattanooga, and from Kentucky to Knoxville and Nashville.

It may be expected that health spending by residents who live in northern states but who travel to or have a second residence in states such as Florida or Arizona during the winter months ("snowbirds") would stand out in these states' net-flow ratios. However, seasonal inflows into these two states were found to be only a small percentage of total spending and, therefore, do not have much impact on the states' net-flow ratios.[26]

■ **Differences in spending trends: 1991–1998 versus 1998–2004.** *Personal health care spending.* We analyzed per capita health spending trends across states and regions for two time periods: 1991–1998 and 1998–2004. The trends in the earlier period were affected, in part, by cost and utilization controls of managed care plans, particularly health maintenance organizations (HMOs), whereas the trends in the later period were affected by a retreat from these tight controls.[27] California, for example—which had one of the higher proportions of population enrolled in HMOs, at 47 percent in 1998—experienced per capita personal health care spending growth of just 3.3 percent on average per year during 1991–1998.[28] This was 1.5 percentage points below the national average and 1.4 percentage points below per capita health spending growth in Michigan, another large state but one with a lower proportion of the population enrolled in HMOs (25 percent in 1998; data not shown). Several other large states with lower HMO penetration, such as Texas, Florida, and Illinois, exhibited similar trends to that of Michigan: faster growth than California during the 1991–1998 period and similar growth during the 1998–2004 period. Particularly noticeable during this period was the slow growth in per capita hospital spending in California, which increased just 1.9 percent annually from 1991 to 1998; by comparison, per capita hospital spending grew 4.1 percent in Michigan. For the 1998–2004 period, however, per capita personal health care spending growth for California's residents accelerated to 5.7 percent per year, just 0.6 percentage points below the U.S. average and nearly identical to Michigan's experience (data not shown). Again, per capita hospital spending contributed greatly to this trend, as California's growth was 6.2 percent annually from 1998 to 2004, greater than that for Michigan (data not shown).

Spending for hospital services. Driven by trends in California, per capita spending on hospital services in the Far West grew much faster during the 1998–2004 period (6.5 percent annually) than during the 1991–1998 period (2.2 percent annually) (Exhibit 6). Per capita hospital spending growth accelerated between these two periods for all regions. This trend was influenced by greater use of hospital services (growth in the number of admissions in community hospitals was faster, 1.6 percent per year, during 1998–2004, compared to a decline of 0.4 percent per year between 1992 and 1998) and faster growth in hospital wages and professional liability costs than experienced during the 1990s.[29]

Drug spending. As occurred with hospital spending, per capita prescription drug spending grew faster in the 1998–2004 period than in the 1991–1998 period. This trend occurred in every state (except Colorado) and the District of Columbia, the result of a universal set of factors that included expanded private prescription drug coverage and use associated with lower copayments, an influx of new blockbuster drugs, efforts to substitute prescription drug treatments for other forms of care, and expanded public coverage under Medicaid and other state-initiated programs. Some regions and states were more affected than others because of a higher prevalence of prescription drug use. For the Far West region, average annual growth in per capita drug spending accelerated from 6.9 percent in the 1991–1998 period to 12.5 percent in the 1998–2004 period (Exhibit 6). The Rocky Mountain region, on the other hand, experienced just a 1.1-percent-

EXHIBIT 6
Average Annual Growth In Per Capita Personal Health Care Spending For Hospital Services And Prescription Drugs, By Region Of Residence, Calendar Years 1991–1998 And 1998–2004

Region of residence	Hospital services		Prescription drugs	
	1991–1998	1998–2004	1991–1998	1998–2004
United States	3.2%	6.0%	9.0%	12.3%
New England	3.4	7.0	10.1	13.7
Mideast	2.9	5.7	10.2	12.8
Great Lakes	3.7	6.2	9.1	11.5
Plains	4.4	6.7	8.7	12.7
Southeast	3.5	5.4	9.8	12.8
Southwest	3.1	5.8	7.3	11.3
Rocky Mountains	3.1	6.8	8.9	10.0
Far West	2.2	6.5	6.9	12.5

SOURCE: Centers for Medicare and Medicaid Services, Office of the Actuary, National Health Statistics Group.

age-point acceleration in per capita drug spending growth (from 8.9 percent to 10.0 percent). The Southeast region experienced the fastest acceleration in per enrollee Medicaid drug spending growth between the two periods, of which a substantial portion occurred in Tennessee. Tennessee's per enrollee Medicaid drug spending growth accelerated from 3 percent per year to 30 percent per year over the two periods (data not shown). This was caused in part by Tennessee's limited ability, as specified under law, to effectively contain prescription drug costs under its TennCare program.[30]

Spending trends and managed care. The difference between the highest- and lowest-spending regions (on a per capita basis) widened from 1991 to 1998 and then narrowed from 1998 to 2004; a similar trend occurred for states. In 1991, the gap between the region with the highest per capita personal health care spending (New England at $3,044) and the region with the lowest (Rocky Mountain at $2,242) was 36 percent. By 1998, when the effect of managed care appears to have reached its peak, this gap grew to 42 percent. Likewise, at the state level, the gap between the state with the highest per capita spending (Connecticut in 1991 at $4,646; Massachusetts in 1998 at $3,249) and the lowest (Utah in 1991: $1,926 and 1998: $2,685) widened from 70 percent in 1991 to 73 percent in 1998. For the 1991–1998 period, per capita health spending in twenty-two states and the District of Columbia relative to the U.S. average increased or decreased by more than five percentage points.

For the later period, the variation across regions and states diminished. The gap between the regions with the highest (New England at $6,409) and lowest (Southwest at $4,542) per capita spending decreased by one percentage point, from 42 percent in 1998 to 41 percent in 2004. Similarly, the gap between the states with the highest (Massachusetts at $6,683) and lowest (Utah at $3,972) per capita spending fell by five percentage points, from 73 percent in 1998 to 68 percent in 2004. The variation around the national average also lessened during this period as just fourteen states' per capita health care spending increased or decreased by more than five percentage points relative to the U.S. average.

Spending trends and public policy changes. Factors such as public policy changes also had an impact on the 1998–2004 spending trends. For example, the Balanced Budget Act (BBA) of 1997 greatly reduced Medicare payments for many services (most notably hospital, home

health, and nursing home services) across all states. Although two subsequent pieces of legislation—the Balanced Budget Refinement Act (BBRA) of 1999 and the Beneficiary Improvement and Protection Act (BIPA) of 2000—reversed some of these payment reductions, states with higher shares of Medicare home health and nursing home spending, such as Louisiana and Texas, experienced major impacts in these sectors. In addition, much of the Medicare legislation over this period was aimed at addressing perceived payment inequities in rural areas, which received legislated payment increases to help close the payment gap with urban areas. The timing of these estimates is too close to the enactment of the Medicare Prescription Drug, Improvement, and Modernization Act (MMA) of 2003 to reflect any impacts from that legislation.

THE ESTIMATES PRESENTED in this paper provide insight into the many factors that contribute to health spending patterns across states. Variation in state-specific spending and growth rates appears to arise from many different sources—payer mix, provider supply, or demographic and socioeconomic influences—reiterating that national trends reflect components of local experience. Although further research is necessary to fully elucidate the factors driving variations in state health spending, these data can provide valuable information as health reform proposals proliferate across the country.

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NOTES

1. A. Martin et al., "Health Care Spending during 1991–1998: A Fifty-State Review," *Health Affairs* 21, no. 4 (2002): 112–126; Center for the Evaluative Clinical Sciences, *The Dartmouth Atlas of Health Care 1998,* Overview, http://www.dartmouthatlas.org/atlases/98Atlas.pdf (accessed 15 May 2007); and Medicare Payment Advisory Commission, "Geographic Variation in Per-Beneficiary Medicare Expenditures," in *Report to the Congress: Variation and Innovation in Medicare,* pp. 3–18, 12 June 2003, http://www.medpac.gov/publications/congressional_reports/June03_Entire_Report.pdf (accessed 17 April 2007).
2. Personal health care expenditures by state are controlled to estimates presented in A. Catlin et al., "National Health Spending in 2005: The Slowdown Continues," *Health Affairs* 26, no. 1 (2007): 142–153.
3. Martin et al., "Health Care Spending."
4. Relevant federal policy changes include the Balanced Budget Act of 1997, the Balanced Budget Refinement Act of 1999, and the Benefits Improvement and Protection Act of 2000.
5. Catlin et al., "National Health Spending."
6. Centers for Medicare and Medicaid Services, "Health Expenditures by State of Provider, 1980–2004," February 2007, http://www.cms.hhs.gov/NationalHealthExpendData/05_NationalHealthAccountsStateHealthAccounts.asp (accessed 15 May 2007).
7. U.S. Bureau of the Census, "Annual Estimates of the Population for the United States and States," http://www.census.gov/popest/estimates.php (accessed 16 March 2007).
8. Medicare is the most comprehensive nationwide insurer, with publicly available claims files containing a large pool of service-specific records upon which to base interstate flows of spending between providers' and beneficiaries' resident locations.
9. National Inpatient Samples from Healthcare Cost and Utilization Project 3 data and MEDSTAT data from its MarketScan Commercial Database were used to reweight expenditure flows to reflect the procedure-specific bundle of services used by the non-Medicare, non-Medicaid population. Fu Associates, "Interstate Flows of Health Spending: Update for 2002" (Memoranda dated 30 January 2004 and 19 May 2006, Contract no. CMS-03-01070, prepared for the CMS, 2005).
10. A small percentage of U.S. citizens who are Medicare beneficiaries receive health care services (paid by Medicare) outside of the fifty states, and a small percentage of U.S. citizens living in the U.S. territories and in other countries return to the United States for health care.
11. U.S. Bureau of Economic Analysis, "State Per Capita Personal Income," http://www.bea.gov/bea/regional/spi (accessed 7 September 2007).
12. National Center for Health Statistics, "Table 104:

Active Physicians and Doctors of Medicine in Patient Care, by Geographic Division and State: United States, Selected Years 1975–2004," in *Health, United States, 2006, with Chartbook on Trends in the Health of Americans,* http://www.cdc.gov/nchs/data/hus/hus06.pdf#summary (accessed 14 May 2007).

13. NCHS, "Table 147: Persons without Health Insurance Coverage by State: United States, Average Annual 1995–1997 through 2002–2004," in *Health, United States, 2006.*
14. The District of Columbia was excluded from state rankings. Its per capita spending was higher than spending in any state in 2004, at $8,295.
15. The number of Medicaid enrollees is measured in fiscal person-years. Medicare enrollees are counted by the number of people enrolled in Part A, Part B, or both on July 1 for each year from 1991 through 2004.
16. Massachusetts Division of Health Care Finance and Policy, "Massachusetts Health Expenditures Accelerating," Analysis in Brief no. 10, November 2006, http://www.mass.gov/Eeohhs2/docs/dhcfp/r/pubs/analysisbrief/aib_10.pdf (accessed 15 May 2007).
17. P. Saucier, *MaineCare and Its Role in Maine's Healthcare System*, January 2005, http://www.kff.org/medicaid/upload/MaineCare-and-Its-Role-in-Maine-s-Healthcare-System-Report.pdf (accessed 23 August 2007).
18. State of Connecticut Office of Health Care Access, "Annual Report to the Governor and Legislature," April 2007, http://www.ct.gov/ohca/lib/ohca/publications/2006_annual_report_final.pdf (accessed 15 May 2007); and "Connecticut Office of Health Care Access Releases Comprehensive Results from Health Insurance Survey," Press Release, 31 January 2007, http://www.ct.gov/ohca/cwp/view.asp?a=1791&Q=331846&ohcaPNavCtr=|#46034 (accessed 23 August 2007).
19. U.S. Census Bureau, "Table 176: AIDS, Syphilis, and Tuberculosis Reported by State: 2004," in *Statistical Abstract of the United States: 2007,* http://www.census.gov/prod/2006pubs/07statab/health.pdf (accessed 19 April 2007); and R.B. Ward, "Why Does Health Care Cost So Much—and What Can New York Do about It?" February 2007, http://www.bcnys.org/connect/2007/feb-healthcare.pdf (accessed 23 August 2007).
20. M. Foster and S. Goldsmith, "Alaska's $5 Billion Health Care Bill—Who's Paying?" UA Research Summary no. 6 (2006), March 2006, http://www.iser.uaa.alaska.edu/Publications/researchsumm/RS6_06.pdf (accessed 15 May 2007).
21. U.S. Census Bureau, "Annual Estimates of the Population for the United States and States," http://www.census.gov/popest/states/asrh (accessed 27 September 2006).
22. NCHS, "Table 114: Community Hospital Beds and Average Annual Percent Change, by Geographic Division and State: United States, Selected Years 1960–2004," in *Health, United States, 2006.*
23. J. Wennberg, "Practice Variations and Health Care Reform: Connecting the Dots," *Health Affairs* 23 (2004): var-140–var-144 (published online 7 October 2004; 10.1377/hthaff.var.140); and M. Moon and C. Boccuti, "Location, Location, Location: Geographic Spending Issues and Medicare Policy," *Health Policy Briefs* no. 2, June 2002, http://www.urban.org/UploadedPDF/310500_No2.pdf (accessed 15 May 2007).
24. Fu Associates, "Interstate Flows of Health Spending: Updates for 1996" (Contract no. HCFA 500-95-0036, prepared for the CMS, 1999).
25. Ibid.
26. J. Basu, "Border-Crossing Adjustment and Personal Health Care Spending by State," *Health Care Financing Review* 18, no. 1 (1996): 215–236. Medicare data do not account for beneficiaries' second residence; therefore, seasonal migration cannot be removed from the net-flow analysis for Medicare spending. For non-Medicare spending, seasonal migration was found to account for a small percentage of the population. Because the overall effect was small, seasonal migration patterns were left unadjusted in overall net-flow ratios for Medicare and non-Medicare payers. Also, because a northern migrant's spending might take place in Florida but spending is reported for the person's primary state of residence, spending in this primary state may be overstated when the beneficiary was actually a resident of Florida for a given part of the year.
27. S. Smith et al., "The Next Ten Years of Health Spending: What Does the Future Hold?" *Health Affairs* 17, no. 5 (1998): 128–140.
28. NCHS, "Table 146: Persons Enrolled in Health Maintenance Organizations (HMOs) by Geographic Region and State: United States, Selected Years 1980–2005," in *Health, United States, 2006.*
29. American Hospital Association, *Hospital Statistics, 1998–2006 Editions* (Chicago: Health Forum, 1998–2006); and Catlin et al., "National Health Spending."
30. J.G. Morgan, *TennCare Prescription Drug Costs,* December 2002, http://www.comptroller.state.tn.us/orea/reports/tenncaredrug1202.pdf (accessed 23 August 2007).