

# Variation in Health Care Spending

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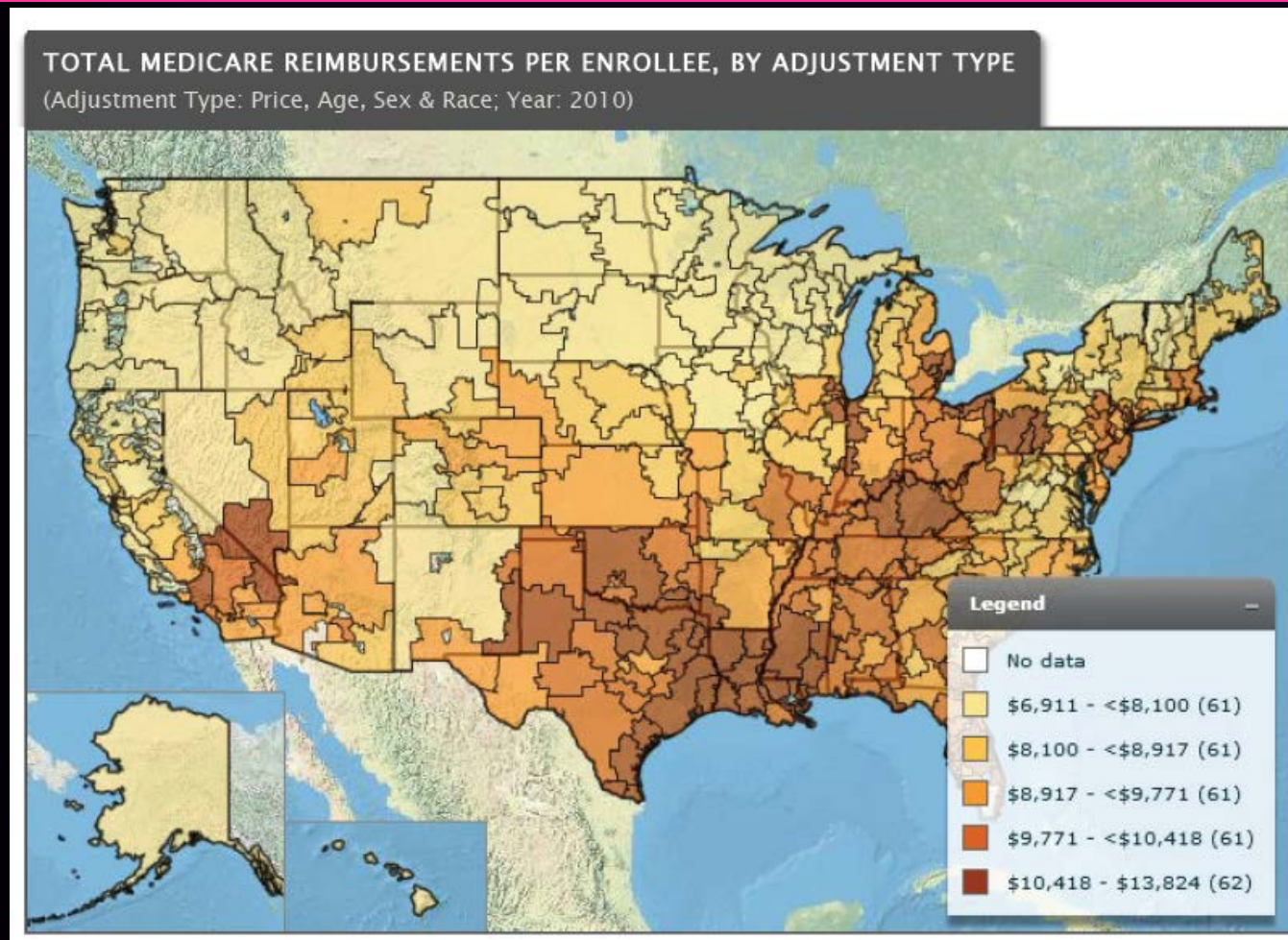
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# The Dartmouth Atlas

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- For decades a group at Dartmouth Medical School has studied geographic variation in Medicare spending as shown in the *Dartmouth Atlas*
  - ◆ [www.dartmouthatlas.org](http://www.dartmouthatlas.org)
- They defined market areas called Hospital Referral Regions or HRR's and nested within them Hospital Service Areas (HSA's)

# They Documented Variation in Medicare Spending Across HRR's\*



\*HRR's - Hospital Referral Regions, 306 market areas

# The Dartmouth Map and the ACA Debate

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- The Dartmouth work convinced members of Congress from low spending areas that there should be an Institute of Medicine (IOM) study of the issue; I chaired this study
  - ◆ We had a budget and could commission research

# Other Members of the Committee

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- Alan Garber, vice chair; Peter Bach; Joseph Baker; Amber Barnato; Robert Bell; Karen Davis; Mark Fendrick; Paul Ginsburg; Douglas Hastings; Brent James; Kimberly Johnson; Emmett Keeler; Thomas Lee; Mark McClellan; Sally Morton; Robert Reischauer; Alan Weil; Gail Wilensky

# The Dartmouth Atlas Data Have Some Omissions

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- They are only Medicare data and actually only a subset of Medicare data
  - ◆ Medicare Part C, now with 30% of beneficiaries, and Part D are omitted
    - Part C's penetration varies geographically, and it historically experienced selection

# The IOM Study

- We set out to get an all-in measure of spending to test how well the Medicare data in the Dartmouth Atlas generalized
  - ◆ Total revenue affects everyone's care
- The data sources were varied
- Medicare data came from a 100% sample of Medicare claims, including Part D\*
  - ◆ Part C Medicare spending was also available for a 100% sample

\*For the Medicare aficionado: The Congress instructed us to exclude Graduate Medical Education and Disproportionate Share Hospital payments from our analysis.

# Data Sources for Other Payers Are Problematic

- Commercial: Two large non-random data bases, MarketScan and OptumInsight
- Medicaid: Allocated based on state level HMO and non-HMO Medicaid enrollee \$
- Uninsured: Allocated based on MEPS, Census region, MSA-non-MSA, input price adjusted at the HRR level
- Weighted by payer share in each HRR\*



# There Is a Lot of Variation at Every Level of Geography

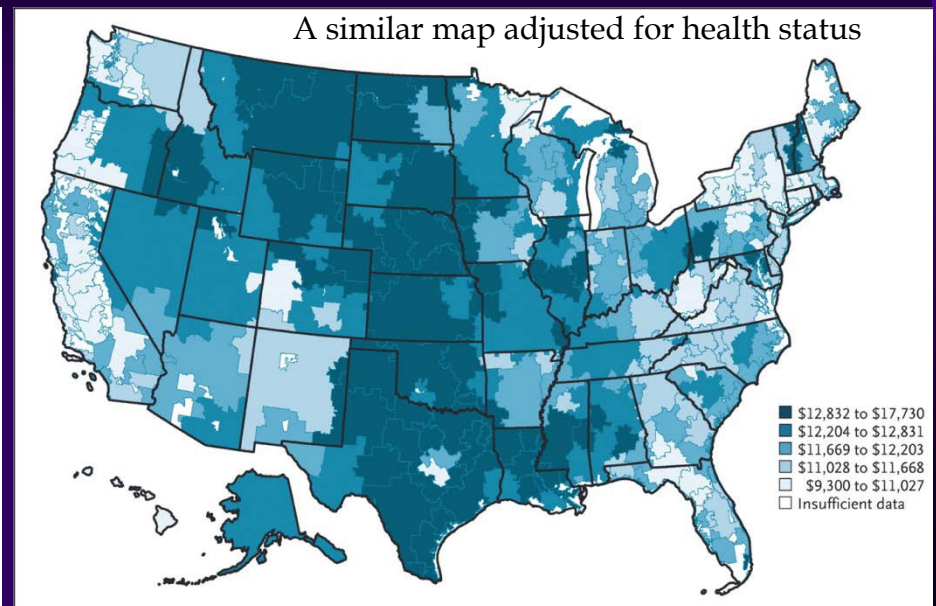
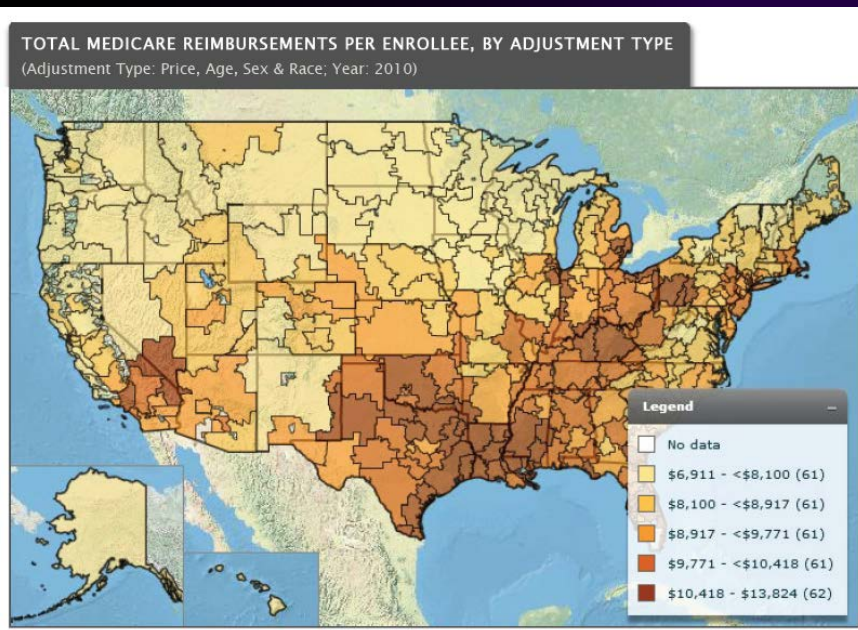
Ratio of 90<sup>th</sup> to 10<sup>th</sup> Percentile of Unadjusted Spending, by Geographic Unit

	HSA	HRR	METROPOLITAN
Medicare	1.47	1.42	1.38
OptumInsight	1.71	1.42	1.50
MarketScan	1.43	1.36	1.36

# Adjusting for Health Status Is Problematic

- The usual method is to use diagnoses on claims forms
- But Dartmouth has shown that higher spending regions code more intensively\*
  - ◆ Movers from lower spending to higher spending regions “acquire” diagnoses
  - ◆ Unfortunately this does not tell us whether the bias from using diagnoses is important

# Adjusting for Health Status Matters; Compare the Maps



Source for right hand map: Zhang, et al., *NEJM*, July 29, 2010. Absolute dollars differ from left hand map because cost sharing amounts are included. Also only beneficiaries with Part D drug plans are included.

# The Variation in Medicare Across HRR's Is in Post-Acute Services

TABLE 3-8 Proportion of Variance Across HRR's Attributable to Each Medicare Service Category		
	Adjusted Total Medicare Spending	
	Remaining Variance	Reduction in Variance (%)
Variation in Total Medicare Spending	6974	--
If No Variation in Post-Acute Care Only	1864	73
If No Variation in Acute Care Only (inpatient hospital and physician services)	5085	27
If No Variation in either Post-Acute or Acute	780	89
If No Variation in Prescription Drugs	6374	9
If No Variation in Diagnostic Tests and Office Visits	5986	14
If No Variation in Outpatient Procedures	6020	14
If No Variation in Emergency Department Visit/Ambulance	6972	0
If No Variation in Other	6882	1

Post-acute spending is primarily home health and skilled nursing, but also includes long-term care hospitals, rehabilitation hospitals and units, and hospices.

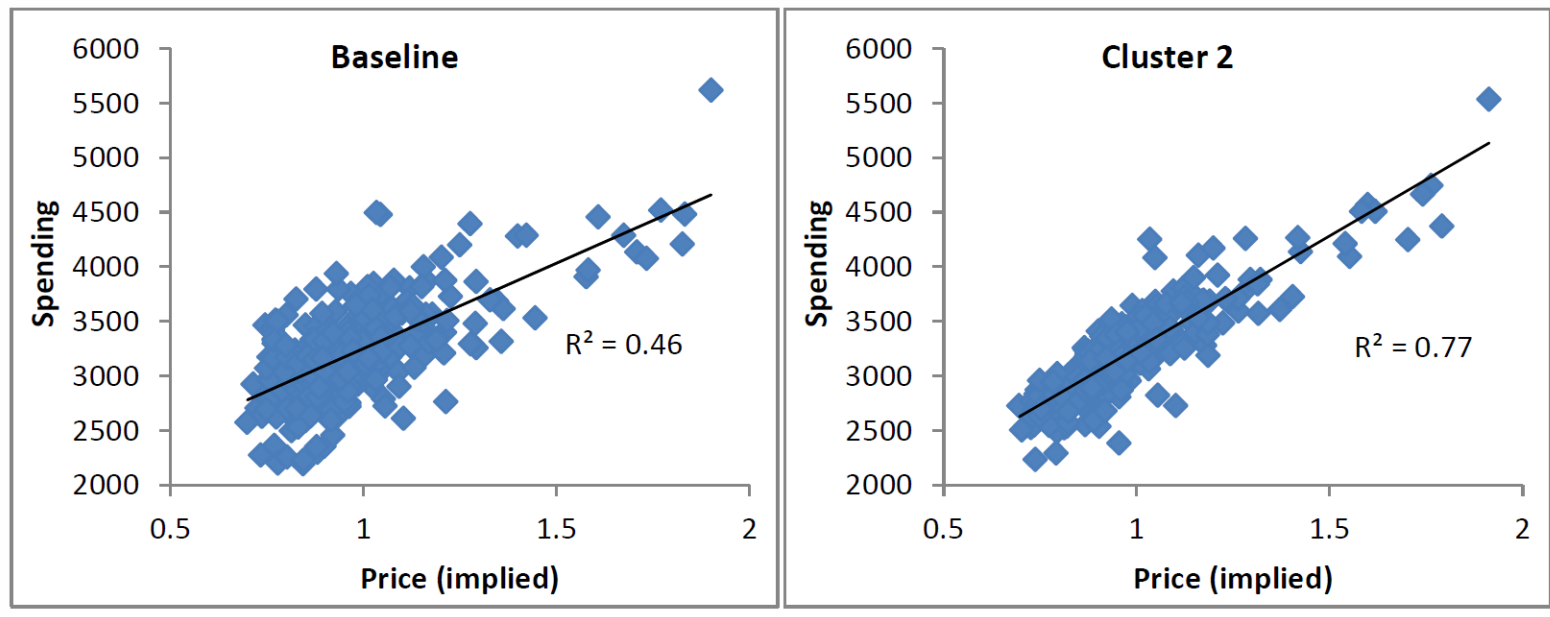
# The Causes of Variation Differ for Medicare and Commercial

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- Medicare prices are standardized, so the Medicare variation is in the quantity of services (i.e., the \$ are a quantity index)
- Commercial insurers, however, negotiate unit prices, and negotiating power varies geographically, both on the insurer and the provider sides

# Variation in Commercial Spending Across HRRs Is Driven by Variation in Unit Price\*

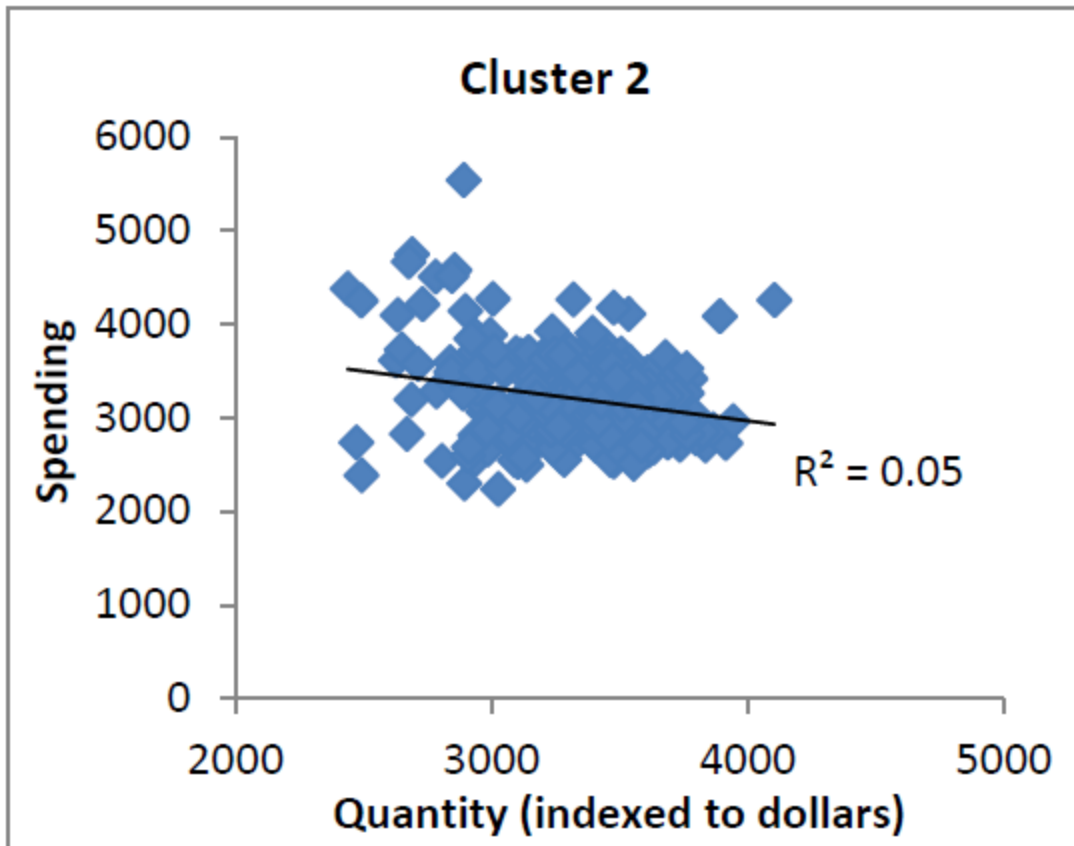
Figure 1. Relationship between spending and implied price, with and without controls for age, sex, and health status



The blue diamonds are HRR's. The "Baseline" (left) graph does not control for age, sex, and health status (DxCG's). The "Cluster 2" (right) graph does.

\*Implied price is spending/quantity index, where the quantity index uses national average price weights for each service.

# Little Relationship Between Quantity of Services and Commercial \$ Across HRR's



But there is variation in quantity within HRR's. Post-acute services are only a small share of commercial spending.

# Most of the Price Variation is in the Markup

Relative Proportion of Spending Variation Due to Quantity (utilization), Markup, and Input Price, Decomposed by Service Type

	Quantity (%)	Markup (%)	Input-Price (%)
Total Medical Spending	16	70	14
Inpatient Spending	18	62	20
Outpatient Spending	21	70	9



# Little Correlation Between Medicare and Commercial \$

	Medicare and MarketScan	Medicare and OptumInsight	MarketScan and OptumInsight
Raw Spending	0.11	0.08	0.66
Input Price Adjusted Spending	-0.09	-0.03	0.63

Spending is per Medicare beneficiary and per commercially insured do not correlate.

The two commercial data bases are reasonably correlated with each other.

# Modest Correlation Between Total \$ and Either Medicare or Commercial

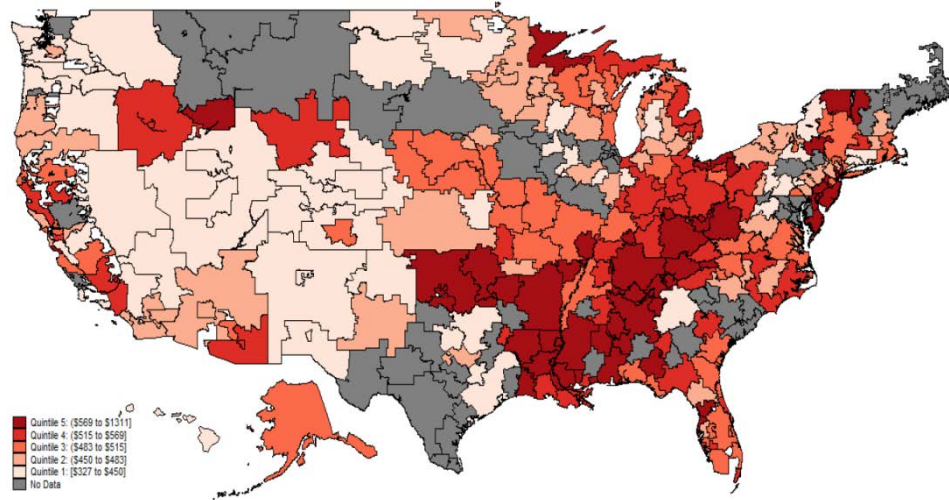
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	Total and Commercial	Total and Medicare
Input Price Adjusted Spending	0.21	0.30

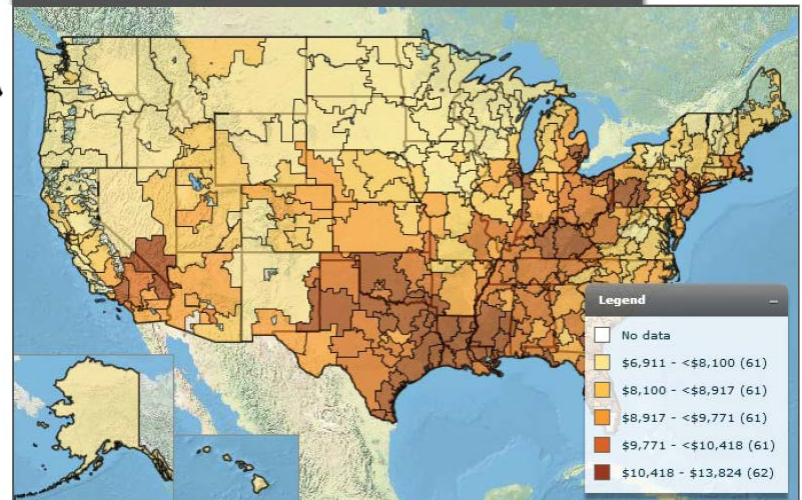
Total spending is per person; commercial and Medicare spending are per insured and per beneficiary, respectively.

# Comparing All-In and Medicare Spending by HRR

Figure 1. Total Spending (Input Price Adjusted) by HRR



TOTAL MEDICARE REIMBURSEMENTS PER ENROLLEE, BY ADJUSTMENT TYPE  
(Adjustment Type: Price, Age, Sex & Race; Year: 2010)



Note major changes in south Florida (not visible on the right), Houston, Las Vegas, northern Minnesota, Wisconsin; northern New Hampshire, Vermont, parts of northern California, Tucson, Arkansas, Wyoming

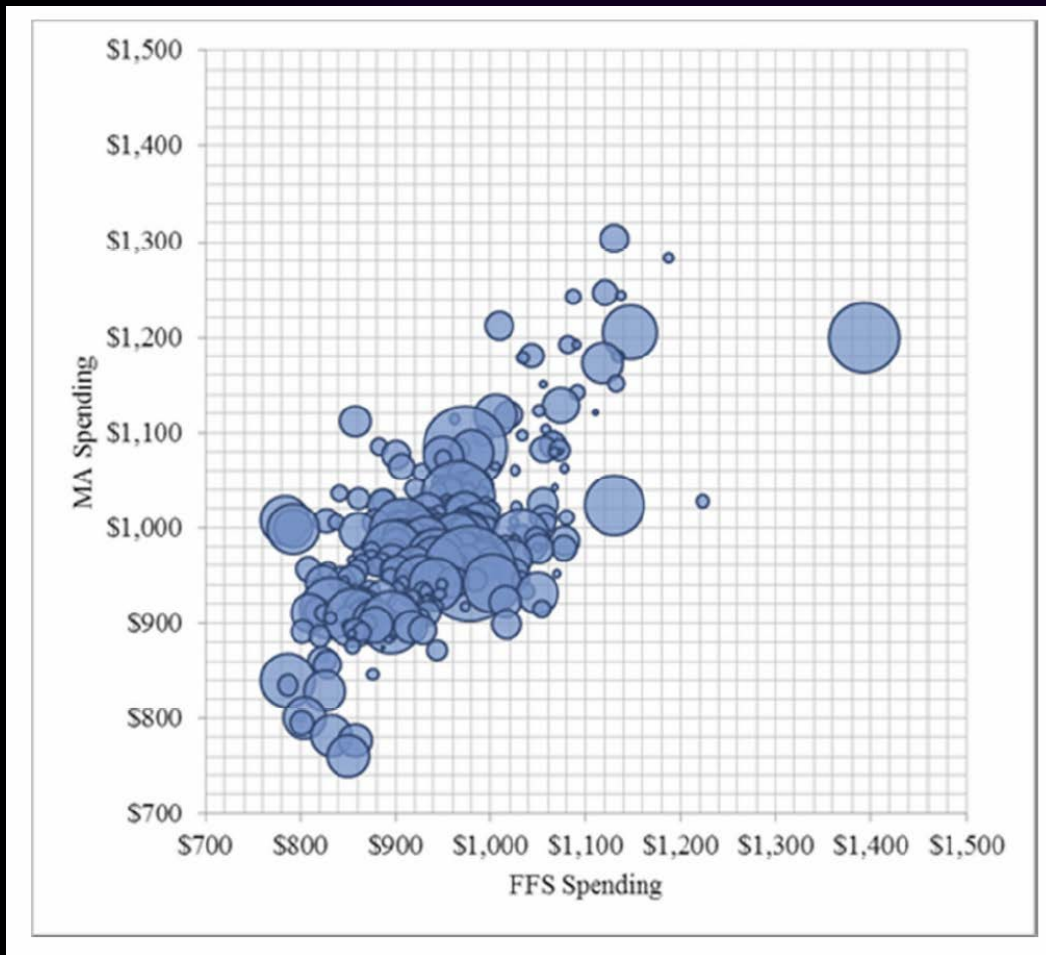
\*The gray areas of no data represent where the two commercial databases don't have enough sample to make reliable estimates. Totals include imputations for the uninsured and Medicaid.

# Variables Other Than Health Status Don't Explain Variation

**TABLE 2-8** Ratios of 90<sup>th</sup> to 10<sup>th</sup> Percentile HRR-Level Input-Price-Adjusted Spending across Payers When Adjusted for “Clusters” of Predictors

Cluster	Ratio: Medicare	Ratio: Commercial 1 (OptumInsight)	Ratio: Commercial 2 (MarketScan)
<b>Control:</b> <i>Adjusted for Year and Partial-Year Enrollment Only</i>	1.44	1.43	1.33
<b>Cluster 1:</b> <i>Adjusted for Control + Age + Sex + Age * Sex</i>	1.44	1.43	1.26
<b>Cluster 2:</b> <i>Adjusted for Cluster 1 + Health Status<sup>a</sup></i>	1.23	1.37	1.28
<b>Cluster 3:</b> <i>Adjusted for Cluster 1 + Race</i>	1.40	1.43	1.24
<b>Cluster 4:</b> <i>Adjusted for Cluster 1 + Income</i>	1.41	1.40	1.26
<b>Cluster 5:</b> <i>Adjusted for Cluster 1 + Race + Income + Health Status</i>	1.25	1.42	1.27
<b>Cluster 6:</b> <i>Adjusted for Cluster 1 + Employer/Insurance Predictors<sup>b</sup></i>	*	1.39	1.30
<b>Cluster 7:</b> <i>Adjusted for Cluster 1 + Market-Level Predictors<sup>c</sup></i>	1.44	**	1.26
<b>Cluster 8<sup>d,e</sup>:</b> <i>Adjusted for Cluster 5 + Employer/Insurance Predictors + Market-Level Predictors</i>	1.25	**	1.28
<b>Cluster 9<sup>e</sup>:</b> <i>Adjusted for Cluster 5 + Employer/Insurance Predictors + Reduced Set of Market-Level Predictors</i>	1.25	**	1.27
<b>Cluster 10<sup>e</sup>:</b> <i>Adjusted for Cluster 1 + Medicare-Specific Variables<sup>d</sup></i>	1.25	***	***

# How Much Difference Does Omission of Part C Make?



The horizontal axis is Parts A and B spending in an HRR; the vertical axis is Part C spending. The size of the circle reflects the population of the HRR. Spending is per month.

$R^2 = 0.44$ . Adjusted for input prices and health status.

# If You Want to Read More...

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- There are two short summary articles by myself and Alan Garber, *NEJM*, April 18, 2013, and *JAMA* September 25, 2013
- And if you want still more, you can download the IOM report at:  
<http://www.iom.edu/activities/healthservices/geographicvariation.aspx>
  - ◆ It is a free download if you register