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Jeffrey Clemens
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ABSTRACT

We examine the relationship between physician preferences and both the intensity and cost of care delivered to commercially insured heart attack patients. We match survey data on physician preferences, collected by Cutler, Skinner, Stern, and Wennberg (2019) (CSSW), to medical claims data from the Health Care Cost Institute, which spans over 50 million insurance beneficiaries. In contrast to CSSW, who find strong correlations between aggressive practice preferences and both expenditure and utilization for the Medicare population, we find relationships that are both economically and statistically smaller in magnitude within the commercially insured population. Variations in commercial insurers' prices appear to play an important mediating role.

Jeffrey Clemens
Department of Economics
University of California, San Diego
9500 Gilman Drive #0508
La Jolla, CA 92093
and NBER
jeffclemens@ucsd.edu

Pierre-Thomas Léger
Department of Health Policy
and Administration School of Public Health
University of Illinois, Chicago
ptleger@uic.edu

Yashna Nandan
University of California, San Diego
ynandan@ucsd.edu

Robert Town
Department of Economics
The University of Texas at Austin
2225 Speedway
BRB 1.116, C3100
Austin, TX 78712
and NBER
robert.town@austin.utexas.edu

I Introduction

There is longstanding interest in the cause and consequences of the substantial geographic variation in healthcare utilization and expenditure.[1] While a large number of papers have documented variation in utilization along many dimensions, relatively few papers provide evidence on the respective roles played by demand and supply side factors in generating these outcomes. For example, Finkelstein, Gentzkow, and Williams (2016) is one of the few papers that credibly decomposes the roles of demand and supply side factors. They find that about half of the variation in the Medicare market is driven by demand side factors and about half is a result of supply side factors.[2] There are fewer papers still that go beyond identifying the relative importance of the broad categories of supply and demand side factors by seeking to identify the underlying causal mechanisms. To what extent, for example, are supply-driven variations in care a result of differences in prices, the utilization management strategies of insurers, physician preferences or practice styles, organizational structures, or variations in medical care infrastructure?[3] Put differently, the question of what supply conditions lead physicians in a given region to behave differently than those in other regions is left largely unanswered.

A recent paper by Cutler, Skinner, Stern, and Wennberg (2019) (CSSW) provides an important exception. CSSW examine the role of physicians' elicited preferences over varying intensities of care. To collect information on physician preferences, they administer a large scale, strategic survey to primary care and cardiac physicians. This survey is designed to assess physicians' approach to treatment by eliciting their responses to several clinical vignettes. Using the survey responses, the authors then classify physicians into "Cowboys" who recommend intensive care beyond that indicated by clinical guidelines and "Comforters" who would consistently recommend palliative care for these same patients, as well as into "High Follow-up" and "Low Follow-up" physicians who indicated that they would follow up with a patient with a stable condition more or less frequently than is recommended, respectively.[4] The responses to the vignettes can be thought of

[1] The study of geographic variations in medical care dates to Glover (1938). See, Wennberg and Gittelsohn (1973) for another early influential study. Skinner (2011) provides an excellent literature review.

[2] Badinski, Finkelstein, Gentzkow, Hull, and Williams (2023) builds further on the research agenda initiated by Finkelstein, Gentzkow, and Williams (2016). In an effort to decompose supply-side forces into physician and non-physician factors, they conclude that "Physicians are roughly three times as important as non-physician supply side factors in driving regional variation."

[3] Chandra and Staiger (2007) provide evidence on the role of productivity spillovers in driving patterns of specialization that can explain variations in cardiac care.

[4] Cowboy and Comforter are defined to be nonexclusive categories, while High and Low Follow-up are exclusive.

as describing physician preference parameters. Crucially, we emphasize that preference parameters only translate into treatments and spending once combined with prices and other constraints, and hence do not describe by themselves how physicians treat or prescribe. CSSW's analysis finds that regional variations in the Cowboy and Comforter shares, coupled with the measures of follow-up intensity, predictively explain roughly 60 percent of the variation in Medicare beneficiaries' end-of-life spending and 12 percent of spending for heart attack patients. While these measures predictively explain a smaller share of heart attack spending than of end-of-life spending, the statistical strength of both findings is very strong.[5]

The analysis of CSSW focuses exclusively on the Traditional Medicare beneficiary population – those beneficiaries enrolled in Parts A and B (hereafter referred to as "Medicare"). Because Medicare's prices and other constraints on utilization do not vary meaningfully across geographic markets, it may not be surprising that preferences over treatment intensity explain variations in Medicare's utilization and spending. It remains an open question whether variations in the shares of Cowboy, Comforter, Low Follow-up or High Follow-up physicians have the capacity to explain variations in utilization and expenditure outside of the Medicare program. Put differently, do "preferences" over treatment intensity correlate with utilization and spending in the commercial insurance sector, where prices and other constraints *are* likely to vary across geographies? The answer to this question, which is our focus, has direct implications for understanding what theories might rationalize the relationships uncovered by CSSW. As we discuss further below, this will in turn have implications for assessing the potential policy and welfare implications of those relationships.

In this paper, we link the CSSW physician survey data with commercial insurance claims data in order to examine the relationship between regional variations in physicians' self-identified preferences over treatment and regional variations in spending and utilization outcomes for non-Medicare patients. That is, we analyze whether physicians' elicited preferences over treatment or follow-up intensity (as measured by the share of Cowboys, Comforters, Low Follow-up or High Follow-up

[5] We note that in CSSW the analysis of end-of-life spending is the paper's primary analysis. We focus on post-heart attack care because post-heart attack care for the commercially insured population is far more comparable to post-heart attack care for the Medicare population than is end-of-life care. This is due to the fact that the last stages of life are far more common for the elderly than for the near elderly, and that the causes of mortality differ non-trivially across these age groups. It is thus important to emphasize that the statistical strength of the relationships CSSW estimate between utilization and measures of physician preferences are very similar in their analyses of end-of-life and post-heart attack care.

physicians) explain variations in utilization and spending across geographies in commercial markets. Our analysis is motivated in part by an important and curious pattern in the literature on regional variations in health care: overall correlations between the geographic variation in spending in the Medicare population and the commercially insured population are weak (Chernew, Sabik, Chandra, Gibson, and Newhouse, 2010; Cooper, Craig, Gaynor, and Van Reenen, 2018; Franzini, Mikhail, and Skinner, 2010; Kibria, Mancher, McCoy, Graham, Garber, Newhouse, et al., 2013). That is, high Medicare spending areas are not, on average, high commercially insured spending areas (Cooper, Stiegman, Ndumele, Staiger, and Skinner, 2022). While there is little correlation in spending between the two sectors, economic theory points to a number of reasons why they are surely linked (Léger, Wu, and Town, 2023).[6] At the same time, recent work (Cooper, Stiegman, Ndumele, Staiger, and Skinner, 2022) also finds substantial correlations between geographic variation in utilization patterns for the Medicare and commercially insured populations. This fact pattern heightens the plausible role of physician practice preferences (or beliefs) as central drivers of geographic patterns in care provision.

The health care claims data we analyze are from the Health Care Cost Institute (HCCI), a not-for-profit organization which provides researchers with access to administrative claims on a large, commercially insured population. More specifically, HCCI maintains claims data on over 55 million individuals per year. The claims data include information on diagnoses, procedures, location of service, and expenditures by insurers and patients. We merge these data with data from CSSW's novel surveys, which CSSW generously shared with us. To make points of comparison and contrast with CSSW's findings as sharp as possible, our analysis considers medical care spending and utilization in the year following the occurrence of a heart attack (acute myocardial infarction, or AMI). By following CSSW's criteria for defining episodes of care, we are able to analyze a directly comparable set of spending and utilization outcomes.

We find that there is little correlation between regional variations in either the Cowboy and Comforter physician shares or the High and Low Follow-up physician shares and health expenditures for commercial AMI patients. Further, the confidence intervals on this core result exclude the

[6] Plausibly relevant forces include capacity constrains (Clemens, Gottlieb, and Hicks, 2021), variations in market power (Cooper, Craig, Gaynor, and Van Reenen, 2018), variations in learning-induced productivity (Chandra and Staiger, 2007), contracting or bargaining institutions (Clemens and Gottlieb, 2017; Clemens, Gottlieb, and Molnár, 2017), and variations in demand from geographically mobile, quality-seeking, patient populations (Dingel, Gottlieb, Lozinski, and Mourot, 2023).

comparable point estimate for the Medicare population for both the Cowboy share and the High Follow-up share. Our analysis of the intensity of inpatient care utilization similarly finds estimates that are quite strongly distinguishable from CSSW's estimates for the Medicare population.[7] Interestingly, our analysis of outpatient physicians' service utilization finds estimates that carry the same sign as the estimates of CSSW for all four practice style measures. Indeed, our estimates for Cowboys, Comforters, and Low Follow-up physicians are, like CSSW's, all statistically distinguishable from 0. Notably, however, the utilization estimate for Cowboys is statistically distinguishable from CSSW's estimate for the Medicare population (as is the estimate for High Follow-up physicians) in addition to being statistically distinguishable from 0. Taken together, the estimates are thus suggestive that the quantities of care physicians deliver to the commercially insured population reflect some of the same tendencies observed by CSSW, but to a muted degree.

We also find that an increase in the share of High Follow-up physicians is correlated with a lower likelihood of a Percutaneous Coronary Intervention (PCI), which is similar to CSSW's findings in the context of Medicare patients. This suggests lower quality care, since PCI is clinically appropriate for the vast majority of these patients. Indeed, in our data a higher share of High Follow-up physicians also predicts a higher 30-day readmission rate, suggesting worse health outcomes.

Overall, our results contrast markedly from the findings of CSSW regarding relationships between the Cowboy and High Follow-up shares and variations in spending and utilization for the Medicare beneficiary population. Consistent with previous research, this implies that the role of the payer (and of the various levers payers may or may not be able to deploy to guide provider behavior) is important for understanding geographic variations in health care spending and utilization. Put differently, whether variations in the care physicians desire to implement translate into variations in the care delivered will tend to be mediated by payers. By confronting physicians with different incentives, payers can shape the care those physicians ultimately deliver. This can include variations in payment rates, which have been found to influence care provision in a number of environments and along a number of dimensions (Cabral, Carey, and Miller, 2021; Clemens and Gottlieb, 2014; Devlin, 2022; Gross, Sacarny, Shi, and Silver, 2022), as well as non-price utiliza-

[7] Here we note that in CSSW's analysis, "Spending measures are adjusted for differences across regions in prices," which in the Medicare context are generated by formula-driven cost indices rather than provider-insurer negotiations. The implication is that their analyses of expenditures map directly into quantities, whereas our measures of inpatient and outpatient expenditures can be meaningfully decomposed into utilization indices (e.g., the number of Relative Value Units or the sum of DRG weights) and price indices (e.g., dollars per Relative Value Unit and dollars per DRG weight).

tion management strategies (Dunn, Gottlieb, Shapiro, Sonnenstuhl, and Tebaldi, 2021; Macambira, Geruso, Lollo, Ndumele, and Wallace, 2022; Starc and Town, 2020). Medicare, for example, does little monitoring or assessing the appropriateness of care but is a relatively frugal payer, which may readily create a different spending and utilization dynamic than the incentives typically created by private insurers.

Returning to the results of our analysis, we find that physicians in regions with a high share of Low Follow-up physicians systematically receive higher payment rates, as do physicians in regions with a high share of Comforter physicians, while physicians in regions with a high share of Cowboys or High Follow-up physicians systematically receive lower payment rates. The correlations we document are consistent with the idea that contracted payment rates push against the potential excesses of Cowboy and High Follow-up physicians and against the potential inadequacies in care provision from Comforter and Low Follow-up physicians. That is, commercial insurers tend to pay lower rates in aggressively practicing regions, pushing physicians farther down their supply curves, and higher rates in less aggressively practicing regions, pushing physicians farther up their supply curves. We find weaker correlations between physician types and proxies for non-price utilization management strategies.

The remainder of our paper proceeds as follows. In section II we present our data and empirical methods. In section III we present our results and in section IV we conclude.

II Data and Methods

Data

Our analysis combines data from several sources. For data on health care utilization and expenditures, we use the Health Care Cost Institute (HCCI) Commercial Claims Database. The HCCI data cover individuals aged 0-64 with employer-sponsored insurance through Aetna, Humana, and Blue Health Intelligence. These data contain information on enrollment, prescription drug utilization, and both inpatient and outpatient healthcare utilization.

We construct intensity-adjusted measures of utilization, separately for carrier and inpatient claims. For carrier claims we measure utilization by weighting services according to their assigned number of Relative Value Units (RVUs), which allows us to decompose expenditures into RVUs

and a price index that captures the dollars paid per RVU. For inpatient claims we proceed similarly through the use of the weights assigned to each Diagnosis Related Group (DRG).[8] For each carrier service or inpatient stay, we thus have both a measure of resource intensity and a measure of the price per intensity-adjusted unit.

We also construct two additional outcome measures with the claims data. First, we identify AMI patients who received Percutaneous Coronary Intervention (PCI) on the first day of their hospital admission. PCI is used primarily to open a blocked coronary artery and restore arterial blood flow to heart tissue. Alternatives to a PCI are Coronary Artery Bypass Graph surgery (which is rare) or pharmacologic intravenous thrombolysis, which uses drugs to dissolve the coronary artery blockage. While the exact clinical circumstances and the capabilities of the facility where a patient presents affect its appropriateness, for most AMI patients, a PCI should be performed.[9] We also construct a clinical outcome measure using an indicator for whether a patient was readmitted within 30 days of being discharged from the hospital.[10]

To measure variations in physician practice styles, we obtain Hospital Referral Region (HRR) level measures constructed by CSSW using their novel survey. HRRs are constructed by the Dartmouth Atlas and represent regional health care markets for tertiary medical care.[11] CSSW use a survey to elicit physician responses to vignette-based questions about how they would treat hypothetical patients with specific conditions and medical histories. They then use physicians' responses to classify them as Cowboy, Comforter, High Follow-up, and Low Follow-up physicians. Next, they collapse these data at the HRR level to obtain HRR-level measures of physicians' "practice styles."[12] We merge these HRR-level measures to our claims data using the HRR code associated with the patient's address in the year they experienced an AMI.

[8]Note that we do not present utilization for hospital outpatient claims as there is not a natural crosswalk from outpatient HCPCS/procedure codes to an intensity-adjusted measure of utilization. Medicare pays for outpatient hospital care using the OPPS program, based on Ambulatory Payment Classifications (APC). However, unlike in the inpatient setting, one "stay" can have several APCs and add-on services are often bundled into the payment for the primary APC.

[9]See, Amsterdam, Wenger, Brindis, Casey, Ganiats, Holmes, Jaffe, Jneid, Kelly, Kontos, et al. (2014); Levine, Bates, Blankenship, Bailey, Bittl, Cercek, Chambers, Ellis, Guyton, Hollenberg, et al. (2016); O'Gara, Kushner, Ascheim, Casey, Chung, De Lemos, Ettinger, Fang, Fesmire, Franklin, et al. (2013).

[10]The 30-day readmission rate is a commonly used measure of clinical performance. Currently, hospitals' Medicare reimbursements are a function of their 30-day readmission rate: https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/Value-Based-Programs/HRRP/Hospital-Readmission-Reduction-Program.

[11]As constructed by the Dartmouth Atlas, each HRR contains at least one hospital that performs major cardiovascular procedures and neurosurgery. For additional information on the construction of HRRs, see: https://data.dartmouthatlas.org/downloads/methods/geogappdx.pdf. HRRs should not be confused with antitrust markets for health care.

[12]See CSSW for a detailed description of the physician vignettes.

To classify cardiologists as Cowboys and Comforters, CSSW ask sample physicians about the various interventions and palliative care approaches they would recommend in several scenarios involving patients with heart failure. They define a Cowboy as a physician who would "frequently" or "always/almost always" recommend at least one-high-intensity intervention for the heart failure vignettes. Comforter physicians are those who would recommend hospice for end-of-life care. It is possible for a physician to be both a Cowboy and Comforter although, in practice, few in the CSSW sample meet both the Cowboy and Comforter criteria. CSSW classify High Follow-up physicians as those whose survey responses indicate that they would follow up with a patient with stable angina more frequently than recommended by the American College of Cardiology/American Heart Associate guidelines. Low Follow-up physicians are those that would follow up less frequently than recommended by the same guidelines.

Sample Selection

We construct our AMI sample following Cutler, Skinner, Stern, and Wennberg (2019). Specifically, we identify all AMI hospitalizations from 2012-2018 using the International Classification of Disease versions 9 and 10 codes (ICD9 and ICD10) for initial AMI in the HCCI data's file of inpatient hospital stays.[13] Utilization and expenditures are calculated in the 1 year following the patient's admission for the "index AMI hospitalization." We present summary statistics for our sample in Table 1. Average expenditures in the 1 year post admission are $79,152 and exhibit high variability.

Our baseline sample includes the full set of 270 HRRs for which the requisite data are available. CSSW's baseline analysis imposes an additional restriction that each HRR have at least 3 cardiologist respondents to their physician survey, which brings the number of HRRs in their analysis to 137. To ensure that any comparisons between our findings and the findings of CSSW are not driven by differences in the HRRs covered by our health care claims data, we have run our analyses using both the full sample of 270 HRRs as well as the CSSW sample of 137 HRRs. We obtain very similar point estimates with larger standard errors when analyzing the restricted sample. This underlies our adoption of the full sample for our baseline analysis, as it yields economically equivalent point estimates with greater precision.

[13] Note that the ICD9 to ICD10 transition occurred in October 2015. Thus, we identify AMIs using ICD9 codes for hospitalizations between 2012 and October 2015 and use ICD10 codes for all hospitalizations occurring after October 2015.

Unlike in traditional Medicare, commercial insurance plans differ in type (e.g., HMO vs. PPO) and generosity (e.g, prescription drug coverage). We see that the majority of patients in our sample have PPO insurance plans and are in self-funded plans, in which the employer bears the risk of insuring the employees. Our baseline regressions include controls for plan type. We additionally consider a sub-sample analysis in which we restrict the sample of patients to PPO participants, who account for roughly two-thirds of the post-AMI patients in the HCCI data, such that the estimates cannot be impacted by variation in the prevalence of the less common plan types across markets.

Estimation

Our goal is to estimate the relationship between the prevalence of CSSW's physician types and variations in spending and utilization among individuals in our commercially insured sample of patients who experienced AMIs. Our primary specification thus follows that of CSSW. Specifically, we estimate the parameters of Equation (1) using OLS.

$$y_{iht} = \alpha + \beta_1 Cowboy_h + \beta_2 Comforter_h + \delta_1 HighFUP_h + \delta_2 LowFUP_h + X_{iht}\gamma + \epsilon_{iht} \quad (1)$$

where y_{iht} is the utilization or expenditure outcome for patient i in HRR h in year t. Following CSSW, *Cowboy*, *Comforter*, *HighFUP*, and *LowFUP* denote HRR-level measures of the Cowboy share, Comforter share, High Follow-up share, and Low Follow-up share, respectively. X_{iht} is a vector of individual-level controls for sex interacted with age bins, location of the AMI, insurance product type (e.g., HMO, PPO, Point of Service (POS)), insurance funding status (self-funded vs. fully insured), indicators for whether the plan covers mental health and prescription drug benefits, zip-code level median household income, zip-code level percentage of Black, Hispanic, and Asian populations, and year fixed effects. To control for differences in the complexity and severity of patients across HRRs, we also include indicators for several comorbidities at the time of admission, as well as Hierarchical Condition Category (HCC) dummies for all diagnoses present in the 6 months prior to the index admission.

Our control variables deviate slightly from those in CSSW due to limited demographic characteristics available in the HCCI data. For example, the HCCI data do not include individual-level indicators for race/ethnicity or HCC scores. We instead use zip-code level measures of race and

ethnicity. To proxy for HCC risk scores, which are not available in HCCI data, we compile a list of all diagnoses present in the carrier claims data during the 6 months prior to the index admission. We use CMS crosswalks to link each diagnosis to one of 189 HCC categories. We then include these HCC dummies as controls in our regressions.

To disentangle the roles of pure utilization versus price in explaining geographic variation in commercial expenditures, we construct an intensity-weighted price index by dividing total expenditure per service by the intensity-adjusted units of that service (RVUs for carrier claims and DRG weights for inpatient claims). We present results for the average price index in Table 4, and separately for each of the five most common services delivered to the patients in our sample in Appendix Table A1. As an additional outcome in Table A1, we also include cardiac catheterization prices to test whether the prices for a more intensive service varies across regions in a manner that is correlated with physician practice styles.

Finally, we explore the potential role of claim denials in altering expenditure and utilization patterns. Commercial insurance companies may "deny", or choose not to reimburse, claims for services they deem medically unnecessary. That is, insurers may respond to overly aggressive treatment decisions by physicians by denying their claims. The HCCI data do not contain explicit indicators for denied claims. However, we create a rough proxy for a claim denial or reversal by identifying claims in which the total paid by the insurer is less than or equal to 0. Then, for each patient, we calculate the share of claims that are "denied".[14] We also calculate a proxy for delay in claim payment using the difference between the claim paid date and the date the service was provided. The assumption underlying this proxy is that longer delays between service provision and claim payment may reflect administrative hassles such as requests for additional documentation to verify the medical necessity of a claim. However, note that these measures may interact with physician behavior in ways that complicate interpretation. If physicians respond to the threat of denials, then a "threatening" payer may influence physician behavior without leaving persistent evidence of denied or delayed claims in the data (Macambira, Geruso, Lollo, Ndumele, and Wallace,

[14]Claims databases with explicit documentation of claim denial suggest that the proxy we are able to construct using the HCCI data will have the positive feature of capturing the vast majority of truly denied claims, but will also have a high false positive rate in the sense that roughly 50-60 percent of these "unpaid" claims are actual denials. Our estimates of the relationship between practice styles and our proxy can thus be most accurately described as capturing the relationship between practice styles and unpaid claims.

2022). That is, physicians may respond preemptively by refraining from billing services that are more likely to experience denials or delays.

III Results

In this section, we present our findings. We begin by discussing our baseline estimates of the relationship between variations in elicited practice styles from CSSW's vignettes and variations in commercial spending and utilization. We benchmark these results for the commercially insured population against the findings of CSSW in their analysis of the Medicare population. Next, we present an analysis of potential mechanisms. We then conclude by discussing an extensive set of robustness analyses.

Spending and Utilization: Baseline Estimates and Interpretation of Magnitudes

We present our baseline estimates of the relationship between variations in physician practice styles and post-AMI utilization and expenditures in Table 2. To meaningfully compare our estimates for the commercially insured population with the estimates from CSSW's analysis of the Medicare population, we benchmark our expenditure and utilization estimates against CSSW's in Table 3. To prevent differences in the average level of commercial relative to Medicare prices from influencing our comparisons of expenditures, we benchmark our coefficients and the coefficients of CSSW as percent differences relative to sample means.

In contrast with CSSW's findings for the Medicare population, we find that physician practice styles are only weakly associated with HRR-level expenditures in the commercial population of AMI patients. In contrast, CSSW find strong relationships between practice styles and expenditures. In particular, CSSW estimate that shifting from a 0 to 100 percent Cowboy share predicts a strongly statistically significant 17% higher expenditures in the year following an AMI. The equivalent estimate for the Comforter share is of 6% lower expenditures, and the equivalent estimate for the High Follow-up shares is of a strongly statistically significant 36% higher expenditures. As shown in Table 3, the confidence intervals for our baseline estimates on the commercially insured population can readily rule out the CSSW estimate for the Medicare population for both the Cowboy and High Follow-up physician shares. For the Cowboy share, for example, we are able to rule out spending

variations in excess of 11%, while the upper bound of the confidence interval on our estimate for the High Follow-up share is 0.6%

We next look to the relationship between physician practice styles and intensity-weighted utilization. Our estimates for physicians' services carry the same sign as the estimates of CSSW for all four practice style measures. Indeed, our estimates for Cowboys, Comforters, and Low Follow-up physicians are, like CSSW's, all statistically distinguishable from 0. Notably, however, the utilization estimate for Cowboys is statistically distinguishable from CSSW's estimate for the Medicare population in addition to being statistically distinguishable from 0, which highlights two dimensions along which the estimate is informative. Our estimates for inpatient expenditure and utilization on the commercially insured population are also statistically distinguishable from CSSW's estimates for overall utilization for both the Cowboy share and the High Follow-up share.[15]

Taken together, the estimates are thus suggestive that the quantities of care physicians deliver to the commercially insured population reflect some of the same tendencies observed by CSSW, but to a muted degree. Consistent with prior work, we thus find that spending and utilization patterns for the Medicare population need not translate into similar patterns for the commercially insured population. More specifically, the evidence can reject the hypothesis that the relationship between utilization or expenditure and aggressive practice preferences (i.e., Cowboy or High Follow-up preferences) in the Medicare population is replicated in the commercial environment. Additionally, the evidence in Table 2's columns 1 and 2 combined suggest that commercial payers may be using payment incentives to curtail the aggressive provision of care to the Medicare population in areas with a high fraction of Cowboy physicians. Overall, the fact that the practice style associations are more fully dampened for expenditures than for utilization suggests a potentially important role for prices, to which we turn in the next section.

We conclude our discussion of Table 2 by turning to columns 4 and 5, in which we analyze two measures of "quality." Following CSSW, we construct an indicator for whether a patient received a PCI on the day of admission. Because we do not observe mortality in the HCCI data, we analyze 30-day inpatient readmissions as a health-outcome metric. Similar to CSSW, we find that Cowboy physician shares are not associated with higher quality of care. Also similar to CSSW, we find

[15] CSSW's table for does not separately consider expenditure or utilization of physician and inpatient services. We have done so in part because this breakdown is of direct potential interest and in part because price indices can more readily be formed for these distinct categories of services than for the combined aggregate of inpatient and outpatient services.

that High Follow-up physician shares are associated with lower quality of care, while Low Follow-up physician shares are associated with higher quality of care. Our finding that High Follow-up physician shares are associated with a lower rate of same-day PCI is complemented by the finding that patients in these regions experience a substantially higher 30-day readmission rate, which supports the interpretation that low rates of same-day PCI may indeed be indicative of poor care quality.

Potential Mechanisms

We now turn to exploring potential mechanisms that might underlie our finding that the relationship between practice styles and patterns of expenditure and utilization differ significantly when comparing the Medicare and commercially insured populations. Specifically, we consider two classes of tools commercial insurers may use to curtail costs or otherwise alter utilization patterns: prices and administrative barriers.

In Table 4, columns 1 and 2 present results for our outpatient and inpatient price indexes. The former is expressed in terms of dollars paid per RVU, while the latter is expressed in terms of dollars paid per DRG weight. We find that moving from 0 to 1 in the share of Cowboy physicians is associated with a roughly $5 decrease in the average number of dollars per RVU (roughly 10% relative to the mean), while moving from 0 to 1 in the share of Comforter physicians is associated with a roughly $7 increase in the average price (14% relative to the mean), respectively. Similarly, moving from 0 to 1 in the share of High Follow-up physicians is associated with an $8 decrease (16%) in average price, while moving from 0 to 1 in the share of Low Follow-up physicians is associated with a $21 increase (42%) relative to the mean. These initial results on prices are thus consistent with the view that insurers may use payment incentives to push back against the aggressive care provision of Cowboy and High Follow-up physicians and, similarly, to encourage additional care provision by the less aggressive Comforter and Low Follow-up physicians. Below, we show that these findings are robust to, among other things, the inclusion of measures of physician and insurer market structure as covariates.

In Appendix Table A1 we present price results separately for each of the 5 most common codes billed for the patients in our sample, separately considering the relationship between physician practice styles and prices for level 2 hospital follow-up care, level 3 hospital follow-up care, level

4 office visits, Electrocardiograms, and Chest Radiographs. We see a particularly strong and consistent pattern of lower prices in HRRs with a higher share of Cowboy physicians, with the strongest relationships for services with higher average costs. In column 6, we also show that these patterns hold for cardiac catheterization, a relatively intensive service with high average costs.

In column 3 of Table 4 we consider whether variations in practice styles are associated with variations in inpatient cost sharing. This analysis explores the hypothesis that commercial insurers might push back against the high expenditures associated with aggressive practice styles by exposing patients to a greater share of cost. We find no evidence that this is the case for either the Cowboy or High Follow-up physician shares.[16] Patient cost sharing thus does not appear to be an important mechanism in our setting.[17]

Finally, in columns 4 and 5 of Table 4, we analyze our proxies for administrative barriers. In column 4, we do not find evidence that physician practice styles are associated with variations in "the regularity of unpaid claims," which is our best available proxy for claim denial rates.[18] In column 5, we find weak evidence that moving an HRR from 0 to 1 in the share of Comforter physicians is associated with 1.9 additional days to pay a claim, a roughly 5% increase relative to the mean of 36.4 days. We also find that moving an HRR from 0 to 1 in the share of High Follow-up physicians is associated with roughly 5 additional days to pay a claim, a roughly 14% increase relative to the mean. The latter result suggests that administrative barriers may play a moderate roll in insurers' efforts to curb the expenditures associated with High Follow-up physicians. For reasons explained below, however, we have stronger and more direct evidence (as presented in column 1) that prices are playing an important role.

While the implications of administrative barriers for expenditures can be difficult to quantify, we can straightforwardly infer the implications of variations in prices by drawing on supply elasticity estimates from the literature. Estimates from a number of recent papers spanning both hospitals and physicians' offices find supply elasticities to be substantial, perhaps on the order of 1 (Cabral, Carey, and Miller, 2021; Clemens and Gottlieb, 2014; Gross, Sacarny, Shi, and Silver, 2022). As

[16] The only statistically significant result in this column is the positive estimate for the Low Follow-up share, which would tend to operate against the hypothesis that patients might be encouraged to ask for more when practice styles might make physicians inclined to do less.

[17] We view this evidence as consistent with findings from Brot-Goldberg, Handel, and Kolstad (2017) and Chandra, Flack, and Obermeyer (2024) to the effect that demand side cost-sharing does not seem to generate targeted reductions in the consumption of low-value health care, at least in the context of prescription drugs.

[18] As discussed earlier, this metric will tend to encompass all true claim denials, but will also flag a substantial number of unpaid claims that were not formally denied.

noted above, our estimate for the Cowboy share implies that moving from 0 to 1 in the share of Cowboy physicians is associated with a $5 decrease in the average number of dollars per RVU, which is 10% relative to the mean. All else equal, and applying an elasticity of 1, prices set 10% lower imply a 10% lower quantity supplied. The resulting combination of the mechanical and behavioral effects of lower prices on expenditures amounts to roughly 20 percent. Note that this combined effect is of the same order of magnitude as the expenditure differential implied by the comparison of our baseline estimate with the estimate of CSSW, in that they associate moving from 0 to 1 in the share of Cowboy physicians with a 17% increase in expenditures whereas we associate the same shift with a 2% increase in expenditure. Notably, we find if anything a partially offsetting role for hospital prices in explaining differences between commercial and Medicare expenditure as associated with Cowboy physician preferences.[19] For the High Follow-up physician share, by contrast, for which we observe a substantially larger divergence between Medicare and commercial expenditure, we estimate that lower prices are playing a role in restraining both expenditure and utilization in both the inpatient and physicians' office settings.

Robustness of Main Results

In a set of Appendix tables, we explore the robustness of our baseline results across a number of dimensions. Full sets of robustness regressions for both our primary outcomes and our price indices span appendix tables A2 through A16. Table A17 then summarizes the strength of the contrast between our estimates for the commercially insured population and CSSW's estimates for the Medicare population across this full set of robustness checks.

Our robustness checks speak to the following issues. Tables A2 and A3 restrict the sample of patients to those participating in PPOs (which accounts for two-thirds of the post-AMI patients in the HCCI data) to ensure that our estimates are not impacted by variations in plan type prevalence across HRRs. Tables A4 and A5 restrict the sample of patients to those aged 55-64 to ensure that our results are not driven by differences in the treatment of relatively young post-AMI patients relative to relatively old post-AMI patients. Tables A6 and A7 apply CSSW's restriction of the sample to HRRs in which there were at least three cardiologist respondents to their survey, while Tables A8 and A9 weight each HRR according to the number of cardiologist respondents. Tables

[19] Here we are referring to the fact that we estimate a modest and statistically insignificant positive relationship between the Cowboy share and the dollars paid out per DRG weight.

A10 and A11 restrict the sample to patients who were enrolled continuously over the 12 month follow-up period,[20] while Table A12 rescales the expenditure and utilization outcomes to account for variations in the length of time a patient remained in the sample.[21] Tables A13 and A14 consider logged outcomes. Finally, for Table A15 and A16 we incorporate controls for additional covariates for measures of physician and insurance market competition, namely the number of cardiologists per-capita and the large-group insurance market HHI.

Comparisons of estimates across this set of robustness checks are facilitated by the benchmarking exercise presented in Table A17. We focus on the benchmarking results for our Cowboy and High Follow-Up physician point estimates, as these are the estimates of greatest emphasis in CSSW's analysis of the Medicare population.

For both expenditure and intensity-weighted utilization, we find that estimates from all robustness checks are statistically distinguishable from CSSW's estimates for the Medicare population with respect to High Follow-Up physicians. The data thus provide very strong evidence that High Follow-Up physicians are far less associated with high spending in the provision of care to commercially insured post-AMI patients than in the provision of care to the Medicare population. Our results on prices are suggestive that lower prices may be a mechanism behind this difference, though our estimates for the relationship between the High Follow-Up physician share and physician prices tend to fall modestly short of being statistically distinguishable from 0.

Our point estimates for the Cowboy physician share are similarly uniformly distinguishable from the CSSW estimates for the Medicare population in our analyses of physician expenditures. For total expenditures and for intensity-weighted utilization of physicians' services, our estimates are distinguishable from CSSW's estimates in our baseline specification and in all but two of the robustness checks. Notably, the estimates that are less strongly distinguishable from the CSSW estimates are from robustness checks that result in relatively large standard errors, and hence relatively wide confidence intervals. Qualitatively, the economic implications of the point estimates from these specifications point in the same direction. Finally, our estimates of the relationship

[20] Individuals in the HCCI data retain their unique patient ID only as long as they are linked with their current employer-sponsored plan. If an individual switches employers or insurers, we are no longer able to follow her and may incorrectly attribute $0 spending to those periods. By limiting the sample to patients we observe consistently throughout the 1 year outcome period, we reduce this risk. Doing so reduces our sample size considerably, but does not meaningfully change our results.

[21] The latter adjustment has no impact on our measure of prices, as a result of which there is no corresponding set of price regressions.

between the Cowboy physician share and physician prices are statistically distinguishable from 0 in our baseline and in all robustness checks but one.

IV Discussion and Conclusion

In our empirical analysis, we find little correlation between measures of physician practice styles (elicited from vignettes) and medical expenditures in a large, commercially insured population of heart attack patients. This result contrasts markedly with CSSW's estimates of the relationship between physician practice preferences and variations in spending among individuals in the Medicare population. While CSSW find that the presence of Cowboy and High Follow-up physicians drives a significant component of both Medicare spending and utilization, we find no relationship between the presence of either Cowboy or High Follow-up physicians and expenditures. Underlying these results are muted relationships between the Cowboy and High Follow-up physician shares and utilization, coupled with a negative relationship between the Cowboy and High Follow-up shares and the prices insurers pay physicians. Our analysis thus suggests that commercial insurers may approach their contracts with physicians in aggressively treating markets so as to push against inefficiently high levels of spending and care provision.

Past evidence on the persistence of regional variations in Medicare spending and utilization lent strength to the hypothesis that these variations may be driven primarily by variations in physician practice preferences (Skinner, 2011). CSSW's evidence correlating variations in Medicare spending with measures of physician preferences is also consistent with a very strong role for those preferences. Prior evidence leaves open the question, however, of whether aggressive physician preferences lead inexorably to high levels of spending and utilization or whether a physician's inclination towards excess can be curbed through utilization management and payment incentives. Our findings complement evidence from additional recent research in supporting the latter perspective. Work by others has shown that although Medicare spending variations exhibit persistence, they are weakly correlated with spending on non-Medicare populations (Kibria, Mancher, McCoy, Graham, Garber, Newhouse, et al., 2013). Our analysis takes an additional step by providing novel evidence that the predictive content of CSSW's measures of practice preferences does not carry over from the Medicare to the commercially insured population. Consequently, models of regional

variations should consider empirical evidence of divergence in how physicians treat patients covered by different payers.

Our findings have both practical implications and implications for future research. With respect to practical implications, the literature on regional variations in health spending has taken an interest in the question of what policy instruments might curb costs in high spending regions. If aggressive practice preferences led inexorably to high spending and utilization, then efforts to avoid the development of aggressive practice styles, perhaps through reforms to physician training, might need to take center stage. By contrast, if the payment incentives and utilization management strategies of commercial insurers are sufficiently influential, then a more flexible adoption of such strategies within the Medicare program may be crucial if policymakers desire to curb spending in high-spending regions. Our analysis complements existing evidence in suggesting that, although physician training is surely relevant, the levers in insurers' payment models are influential as well.

With respect to directions for future research, we first note that our focus is on a specific albeit important condition, namely AMI, and it is possible that our results do not generalize to other conditions (e.g., heart failure). More work is needed to assess the generalizability of our results. There is also a need for rigorous theoretical analyses of geographic variations that seek to better understand the underlying mechanisms, the impact of different policy levers, and their welfare implications. We note that there are three classes of model features that can decouple the relationship between physician preferences and variations in spending or utilization. A first is capacity constraints which, on the margin, may require physicians to substitute across groups of patients. A second, for which our analysis finds evidence, is variation in prices. A third, on which our evidence is weaker, involves non-price utilization management strategies. To date, the analysis of Léger, Wu, and Town (2023) is the only analysis of which we are aware that models all three such forces simultaneously. Their model has the capacity, among other things, to match both CSSW's findings and our present findings on the relationship between Cowboy practice preferences and the delivery of care to both the Medicare and non-Medicare populations.

These modeling features can have direct implications for understanding the effects of policies that seek to dampen regional variations in Medicare spending. Changes in Medicare's price incentives, for example, may shift care towards the commercially insured and/or have spillover effects on physicians' payments from commercial insurers. These spillover effects may, in turn, influence

incentives for entry. In the presence of capacity constraints, one payer's utilization management strategies may similarly shift care provision across groups of patients. These implications differ markedly from the implications of a purely practice-style driven model, in which the spillovers from one payer's attempt at either price or non-price utilization management will tend to have reinforcing effects on other payers' spending. Further evidence on which forces are at work is essential if policymakers are to arrive at reliable inferences about the likely effects of reform efforts, and how those effects will tend to vary across market settings.

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Table 1: Summary Statistics

HRR-level Practice Styles	
Cowboy	0.24
	(0.23)
Comforter	0.40
	(0.26)
High Follow-up	0.08
	(0.12)
Low Follow-up	0.06
	(0.12)
Expenditures	
Total Expenditures	79152.84
	(101125.50)
Physician Expenditures	19715.47
	(26631.15)
Inpatient Expenditures	49921.84
	(76473.12)
Utilization	
Physician Utilization	306.46
	(327.03)
Inpatient Utilization	3.22
	(3.91)
Quality Outcomes	
Same-day PCI	0.48
	(0.54)
30-day Readmissions	0.02
	(0.10)
Age Groups	
Age 18-24	0.00
	(0.04)
Age 25-34	0.01
	(0.12)
Age 35-44	0.10
	(0.30)
Age 45-54	0.34
	(0.47)
Age 55-64	0.55
	(0.50)
Insurance Type	
EPO	0.02
	(0.12)
HMO	0.07
	(0.25)
POS	0.25
	(0.43)
PPO	0.66
	(0.47)
Self-Funded	0.67
	(0.47)
Insurance Benefits	
RX Covg.	0.57
	(0.49)
Mental Health Covg.	0.97
	(0.16)
Individual Observations	174,592
HRR Observations	270

Notes: Table presents summary statistics for the sample of patients hospitalized with an AMI between 2012-2018. Standard deviations are shown in parentheses. Variables under "HRR Practice Styles" are HRR-level measures obtained from Cutler, Skinner, Stern, and Wennberg (2019). Note that "Self-Funded" plans are those in which the employer bears the risk of insuring employees."1 Year Expenditures" is the sum of 1 year post-admission spending by the insurer, summed across physician, inpatient, and outpatient claims. Observations are unique at the patient level.

Table 2: Practice Styles and Commercial Expenditures

	Expenditures			Utilization		Quality	
	Total	Physician	Inpatient	Physician (RVUs)	Inpatient (DRG weights)	Same-day PCI	30-day Readmission Rate
Fraction Cowboy (unadjusted)	1327.699	-1164.710	2119.534	18.480**	0.040	-0.013	0.002
	(3773.780)	(979.221)	(3010.678)	(8.576)	(0.046)	(0.011)	(0.002)
Fraction Comforter (unadjusted)	2605.084	1815.280	1249.910	-13.274*	-0.117***	-0.024*	-0.001
	(3822.399)	(1596.652)	(2475.017)	(7.189)	(0.042)	(0.013)	(0.002)
Fraction Low Followup (unadjusted)	1746.473	6532.051	-4392.382	-33.472**	0.004	0.051**	0.002
	(9531.757)	(4561.685)	(5114.789)	(12.972)	(0.105)	(0.024)	(0.005)
Fraction High Followup (unadjusted)	-14140.032*	-1145.983	-9946.536**	31.308	0.146	-0.096**	0.020***
	(7442.627)	(2230.496)	(5025.687)	(19.130)	(0.131)	(0.039)	(0.006)
Observations	174592	174592	174592	174592	174592	174592	174592
R^2	0.066	0.064	0.042	0.103	0.058	0.287	0.019
Mean	79152.84	19715.47	49921.84	306.46	3.22	.48	.02
Year Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Table presents results from an extension of Table 4 from Cutler, Skinner, Stern, and Wennberg (2019) using a sample of commercially insured patients hospitalized with AMI between 2012-2018. All outcomes are measured over 1 year after admission for the index hospitalization. Total Expenditures includes spending from physician, inpatient, and outpatient claims. Expenditures from physician claims and inpatient claims are shown separately. Utilization for physician claims is measured in terms of relative value units (RVUs) and utilization for inpatient claims is measured in terms of diagnosis related group (DRG) weights. "Same-day PCI" measures whether a patient received a PCI on the same day as admission. All regressions control for sex interacted with age bins, location of the AMI, insurance product type (e.g., HMO, PPO, POS), indicators for whether the plan covers mental health and prescription drug benefits, funding status (self-funded or fully insured), zip-code median household income, zip-code level measures of percent black, Asian, and Hispanic populations, year fixed effects, comorbidities at admission, and HCC dummies from 6 months prior to admission.

Table 3: Benchmarking Coefficients Estimates to CSSW

	Cutler Estimates	Commercial Estimates		
		Total	Physician	Inpatient
Panel A: Expenditures				
Cowboy Share	**17%**	1.67% (-7.67% - 11.01%)*	-5.91% (-15.69% - 3.87%)*	4.25% (-7.63% - 16.12%)*
Comforter Share	**-6%**	3.28% (-6.19% - 12.74%)	9.21% (-6.74% - 25.15%)	2.50% (-7.26% - 12.26%)
Low Follow-up Share	-7%	2.20% (-21.41% - 25.80%)	33.13% (-12.42% - 78.69%)	-8.80% (-28.97% - 11.37%)
High Follow-up Share	**36%**	-17.78% (-36.21% - 0.65%)*	-5.81% (-28.09% - 16.46%)*	-19.92% (-39.74% - -0.10%)*
Panel B: Utilization				
Cowboy Share	**17%**		6.03% (0.52% - 11.54%)*	1.25% (-1.53% - 4.04%)*
Comforter Share	**-6%**		-4.33% (-8.95% - 0.29%)	-3.63% (-6.18% - -1.07%)
Low Follow-up Share	-7%		-10.92% (-19.26% - -2.59%)	0.13% (-6.30% - 6.56%)*
High Follow-up Share	**36%**		10.22% (-2.07% - 22.51%)*	4.54% (-3.45% - 12.52%)*
Panel C: Price				
Cowboy Share	0%		-10.21% (-19.14% - -1.29%)*	3.81% (-9.91% - 17.52%)
Comforter Share	0%		13.29% (0.29% - 26.29%)*	8.13% (-2.72% - 18.98%)
Low Follow-up Share	0%		40.49% (0.20% - 80.78%)*	-6.07% (-28.54% - 16.40%)
High Follow-up Share	0%		-15.91% (-33.62% - 1.79%)	-18.75% (-38.35% - 0.86%)

Notes: Table benchmarks our coefficients on commercial expenditures, utilization, and prices, relative to those found in Table 4 of Cutler, Skinner, Stern, and Wennberg (2019). Note that in CSSW's analysis, "Spending measures are adjusted for differences across regions in prices," which in the Medicare context are generated by formula-driven cost indices rather than provider-insurer negotiations. The implication is that their analyses of expenditures map directly into quantities, whereas our measures of inpatient and outpatient expenditures can be meaningfully decomposed into utilization indices (e.g., the number of Relative Value Units or the sum of DRG weights) and price indices (e.g., dollars per Relative Value Unit and dollars per DRG weight. All coefficients are presented in terms of percent effects relative to the mean value of the outcome. Estimates are presented with their 95% confidence intervals in terms of percent effects relative to the mean value. * indicates when the confidence interval rules out the corresponding effect size from Cutler, Skinner, Stern, and Wennberg (2019), presented in the first row of each panel.

Table 4: Potential Mechanisms

	Physician Price ($/RVU)	Inpatient Price ($/DRG weight)	Share OOP Costs	Claim Denial Rate	Days to Pay Claim
	(1)	(2)	(3)	(4)	(5)
Fraction Cowboy (unadjusted)	-5.349**	645.151	0.000	-0.019	-0.001
	(2.373)	(1181.015)	(0.006)	(0.018)	(1.107)
Fraction Comforter (unadjusted)	6.959**	1377.813	0.001	0.005	1.974*
	(3.458)	(934.390)	(0.005)	(0.016)	(1.113)
Fraction Low Followup (unadjusted)	21.205**	-1028.900	0.019*	0.019	3.278
	(10.717)	(1935.229)	(0.010)	(0.039)	(2.427)
Fraction High Followup (unadjusted)	-8.334*	-3178.394*	-0.007	-0.004	5.494**
	(4.710)	(1688.074)	(0.010)	(0.037)	(2.685)
Observations	173565	171383	174366	174592	174592
R^2	0.036	0.011	0.057	0.232	0.009
Mean	52.37	16954.54	.09	.24	37.32
Year Fe	Yes	Yes	Yes	Yes	Yes

Notes: Sample consists of commercially insured patients hospitalized with AMI between 2012-2018. All outcomes are measured over 1 year after admission for the index hospitalization. "Physician Price" is the average of price per unit, calculated using provider claims. "Inpatient Price" is the average of price per unit, calculated using inpatient claims. "Share OOP Costs" is the share of total reimbursement that comes from patient out-of-pocket costs. "Claim Denial Rate" is the share of claims for which we observe a zero or negative amount paid by the insurer, summed across physician, inpatient, and outpatient claims. "Days to Pay Claim" is a measure of the number of days between the date a service was provided and the date the corresponding claim was paid, averaged across inpatient, outpatient, and physician claims. All regressions control for sex interacted with age bins, location of the AMI, insurance product type (e.g., HMO, PPO, POS), indicators for whether the plan covers mental health and prescription drug benefits, funding status (self-funded or fully insured), zip-code median household income, zip-code level measures of percent black, Asian, and Hispanic populations, year fixed effects, comorbidities at admission, and HCC dummies from 6 months prior to admission.

Appendix

Appendix Tables

Table A1: Price Index- Top 5 Services

	Office Visit (L3)	Office Visit (L4)	Electrocardiogram	Lipid Panel	Venipuncture	Cardiac Catheterization
	(1)	(2)	(3)	(4)	(5)	(6)
Fraction Cowboy (unadjusted)	-6.476**	-10.331**	-4.224***	-3.238**	-0.507	-76.803***
	(3.099)	(4.935)	(1.568)	(1.381)	(0.640)	(28.022)
Fraction Comforter (unadjusted)	7.158**	9.942**	2.105	3.039**	0.352	68.247
	(3.154)	(4.898)	(1.637)	(1.180)	(0.619)	(42.768)
Fraction Low Followup (unadjusted)	21.684**	33.008**	4.675	8.617**	1.425	166.815
	(8.994)	(13.479)	(4.239)	(4.076)	(1.579)	(135.510)
Fraction High Followup (unadjusted)	-7.633	-11.579	1.093	-3.064	3.202*	-52.585
	(5.184)	(8.814)	(3.268)	(2.223)	(1.641)	(51.045)
Observations	150128	178844	105648	100628	37342	55509
R^2	0.074	0.078	0.051	0.053	0.050	0.041
Mean	82.52	124.52	29.41	14.85	4.93	465.81
Year Fe	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Table presents results for a price index constructed from the top 5 most frequently billed HCPCS codes in the carrier files during the outcome period. the individual components of the price index in Table 4. These services are identified using provider claims for the 2012 sample, as well as a particularly "intensive" service - cardiac catheterization. Variables are measured using provider claims. All regressions control for sex interacted with age bins, location of the AMI, insurance product type (e.g., HMO, PPO, POS), indicators for whether the plan covers mental health and prescription drug benefits, funding status (self-funded or fully insured), zip-code median household income, zip-code level measures of percent black, Asian, and Hispanic populations, year fixed effects, comorbidities at admission, and HCC dummies from 6 months prior to admission.

Table A2: Robustness of Main Results - PPO Sample

	Expenditures			Utilization		Quality	
	Total	Physician	Inpatient	Physician (RVUs)	Inpatient (DRG weights)	Same-day PCI	30-day Readmission Rate
Fraction Cowboy (unadjusted)	1187.773	-1231.774	2098.358	17.976**	0.002	-0.013	0.001
	(3681.566)	(989.157)	(2811.246)	(7.811)	(0.052)	(0.010)	(0.002)
Fraction Comforter (unadjusted)	1536.506	1790.206	300.610	-17.059***	-0.118***	-0.016	-0.001
	(3852.564)	(1553.853)	(2507.511)	(6.417)	(0.041)	(0.010)	(0.002)
Fraction Low Followup (unadjusted)	4599.322	7993.394*	-2779.559	-23.244*	0.109	0.061***	0.003
	(10489.980)	(4645.960)	(5857.499)	(13.733)	(0.091)	(0.016)	(0.006)
Fraction High Followup (unadjusted)	-11790.215	-1482.710	-8286.024*	47.012***	0.136	-0.056**	0.026***
	(7383.755)	(2197.097)	(4889.819)	(15.237)	(0.103)	(0.024)	(0.008)
Observations	115424	115424	115424	115424	115424	115424	115424
R^2	0.064	0.062	0.042	0.095	0.063	0.303	0.019
Mean	77727.44	19424.91	49021.46	300.22	3.03	.47	.02
Year Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Insurance	PPO	PPO	PPO	PPO	PPO	PPO	PPO

Notes: Table presents results from an extension of Table 4 from Cutler, Skinner, Stern, and Wennberg (2019) using a sample of commercially insured patients hospitalized with AMI between 2012-2018. All outcomes are measured over 1 year after admission for the index hospitalization. The sample is restricted to patients under a PPO plan at the time of admission. Total Expenditures includes spending from physician, inpatient, and outpatient claims. Expenditures from physician claims and inpatient claims are shown separately. Utilization for physician claims is measured in terms of relative value units (RVUs) and utilization for inpatient claims is measured in terms of diagnosis related group (DRG) weights. "Same-day PCI" measures whether a patient received a PCI on the same day as admission. All regressions control for sex interacted with age bins, location of the AMI, indicators for whether the plan covers mental health and prescription drug benefits, funding status (self-funded or fully insured), zip-code median household income, zip-code level measures of percent black, Asian, and Hispanic populations, year fixed effects, comorbidities at admission, and HCC dummies from 6 months prior to admission.

Table A3: Robustness of Price Results - PPO Sample

	Physician Price ($/RVU)	Inpatient Price ($/DRG weight)
Fraction Cowboy (unadjusted)	-4.869**	624.596
	(2.409)	(1067.220)
Fraction Comforter (unadjusted)	6.783*	1203.523
	(3.459)	(965.113)
Fraction Low Followup (unadjusted)	21.166*	-966.226
	(10.971)	(2020.509)
Fraction High Followup (unadjusted)	-9.168**	-2855.292*
	(4.587)	(1671.972)
Observations	115245	113678
R^2	0.033	0.014
Mean	52.24	17344.94
Year Fe	Yes	Yes
Insurance	PPO	PPO

Notes: Sample consists of commercially insured patients hospitalized with AMI between 2012-2018. All outcomes are measured over 1 year after admission for the index hospitalization. The sample is restricted to patients under an PPO plan at the time of admission. "Physician Price" is the average of price per unit, calculated using provider claims. "Inpatient Price" is the average of price per unit, calculated using inpatient claims. All regressions control for sex interacted with age bins, location of the AMI, indicators for whether the plan covers mental health and prescription drug benefits, funding status (self-funded or fully insured), zip-code median household income, zip-code level measures of percent black, Asian, and Hispanic populations, year fixed effects, comorbidities at admission, and HCC dummies from 6 months prior to admission.

Table A4: Robustness of Main Results: Oldest Age Group

	Expenditures			Utilization		Quality	
	Total	Physician	Inpatient	Physician (RVUs)	Inpatient (DRG weights)	Same-day PCI	30-day Readmission Rate
Fraction Cowboy (unadjusted)	2318.624	-945.129	2837.406	23.002**	0.055	-0.011	0.003
	(4041.917)	(1122.053)	(3247.088)	(10.812)	(0.064)	(0.012)	(0.003)
Fraction Comforter (unadjusted)	3269.688	2059.833	1622.854	-11.980	-0.105*	-0.022*	-0.002
	(4343.472)	(1846.838)	(2777.286)	(8.516)	(0.054)	(0.013)	(0.002)
Fraction Low Followup (unadjusted)	4570.577	7913.953	-3090.556	-28.011*	0.072	0.046*	0.000
	(10972.952)	(5296.016)	(5744.425)	(15.033)	(0.120)	(0.027)	(0.005)
Fraction High Followup (unadjusted)	-14060.037*	-1091.113	-9577.366*	36.520*	0.185	-0.088**	0.023***
	(7910.653)	(2556.783)	(5222.028)	(19.801)	(0.161)	(0.037)	(0.008)
Observations	95472	95472	95472	95472	95472	95472	95472
R^2	0.064	0.065	0.040	0.099	0.056	0.290	0.021
Mean	84117.55	21071.7	53042.89	330.07	3.41	.47	.03
Year Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Table presents results from an extension of Table 4 from Cutler, Skinner, Stern, and Wennberg (2019) using a sample of commercially insured patients hospitalized with AMI between 2012-2018. The sample is restricted to patients between 55-64 years old during the time of admission. All outcomes are measured over 1 year after admission for the index hospitalization. Total Expenditures includes spending from physician, inpatient, and outpatient claims. Expenditures from physician claims and inpatient claims are shown separately. Utilization for physician claims is measured in terms of relative value units (RVUs) and utilization for inpatient claims is measured in terms of diagnosis related group (DRG) weights. "Same-day PCI" measures whether a patient received a PCI on the same day as admission. All regressions control for sex interacted with age bins, location of the AMI, insurance product type (e.g., HMO, PPO, POS), indicators for whether the plan covers mental health and prescription drug benefits, funding status (self-funded or fully insured), zip-code median household income, zip-code level measures of percent black, Asian, and Hispanic populations, year fixed effects, comorbidities at admission, and HCC dummies from 6 months prior to admission.

Table A5: Robustness of Price Results: Oldest Age Group

	Physician Price ($/RVU)	Inpatient Price ($/DRG weight)
	(1)	(2)
Fraction Cowboy (unadjusted)	-5.578**	559.470
	(2.452)	(1206.445)
Fraction Comforter (unadjusted)	6.913*	1576.811
	(3.643)	(974.932)
Fraction Low Followup (unadjusted)	22.767**	-463.263
	(11.404)	(2165.549)
Fraction High Followup (unadjusted)	-9.000*	-3119.148*
	(4.939)	(1716.853)
Observations	94944	93596
R^2	0.042	0.011
Mean	52.41	17165.51
Year Fe	Yes	Yes

Notes: Sample consists of commercially insured patients hospitalized with AMI between 2012-2018. The sample is restricted to patients between 55-64 years old during the time of admission. All outcomes are measured over 1 year after admission for the index hospitalization. "Physician Price" is the average of price per unit for calculated using provider claims. "Inpatient Price" is the average of price per unit, calculated using inpatient claims. All regressions control for sex interacted with age bins, location of the AMI, insurance product type (e.g., HMO, PPO, POS), indicators for whether the plan covers mental health and prescription drug benefits, funding status (self-funded or fully insured), zip-code median household income, zip-code level measures of percent black, Asian, and Hispanic populations, year fixed effects, comorbidities at admission, and HCC dummies from 6 months prior to admission.

Table A6: Robustness of Main Results: 138 HRR Sample

	Expenditures			Utilization		Quality	
	Total	Physician	Inpatient	Physician (RVUs)	Inpatient (DRG weights)	Same-day PCI	30-day Readmission Rate
Fraction Cowboy (unadjusted)	1628.390	-1747.423	3378.392	32.551*	0.139	0.007	0.013***
	(6488.361)	(1711.125)	(5101.198)	(17.942)	(0.088)	(0.023)	(0.003)
Fraction Comforter (unadjusted)	356.117	-144.606	1912.496	-25.071**	-0.139**	-0.041	-0.003
	(5713.534)	(1981.722)	(3932.035)	(11.973)	(0.069)	(0.027)	(0.003)
Fraction Low Followup (unadjusted)	-11290.640	-990.157	-9468.301	-70.677***	-0.174	0.097*	0.004
	(10480.894)	(3562.218)	(7225.064)	(25.301)	(0.194)	(0.057)	(0.006)
Fraction High Followup (unadjusted)	-25419.433***	-3867.767	-14683.226**	26.728	0.173	-0.132***	0.025***
	(9038.787)	(2701.902)	(6515.367)	(29.635)	(0.192)	(0.049)	(0.007)
Observations	133208	133208	133208	133208	133208	133208	133208
R^2	0.070	0.067	0.045	0.107	0.058	0.286	0.021
Mean	79346.84	19739.4	50130.97	309.71	3.25	.48	.03
Year Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Table presents results from an extension of Table 4 from Cutler, Skinner, Stern, and Wennberg (2019) using a sample of commercially insured patients hospitalized with AMI between 2012-2018. The sample is restricted to the 138 HRRs included in the CSSW sample. All outcomes are measured over 1 year after admission for the index hospitalization. Total Expenditures includes spending from physician, inpatient, and outpatient claims. Expenditures from physician claims and inpatient claims are shown separately. Utilization for physician claims is measured in terms of relative value units (RVUs) and utilization for inpatient claims is measured in terms of diagnosis related group (DRG) weights. "Same-day PCI" measures whether a patient received a PCI on the same day as admission. All regressions control for sex interacted with age bins, location of the AMI, insurance product type (e.g., HMO, PPO, POS), indicators for whether the plan covers mental health and prescription drug benefits, funding status (self-funded or fully insured), zip-code median household income, zip-code level measures of percent black, Asian, and Hispanic populations, year fixed effects, comorbidities at admission, and HCC dummies from 6 months prior to admission.

Table A7: Robustness of Price Results: 138 HRR Sample

	Physician Price ($/RVU)	Inpatient Price ($/DRG weight)
	(1)	(2)
Fraction Cowboy (unadjusted)	-8.089**	317.428
	(3.984)	(1735.745)
Fraction Comforter (unadjusted)	4.355	2008.126
	(4.921)	(1459.002)
Fraction Low Followup (unadjusted)	8.345	-2311.537
	(10.037)	(2586.372)
Fraction High Followup (unadjusted)	-14.340**	-4347.066*
	(6.962)	(2237.608)
Observations	132373	130660
R^2	0.026	0.013
Mean	52.23	16944.07
Year Fe	Yes	Yes

Notes: Sample consists of commercially insured patients hospitalized with AMI between 2012-2018. The sample is restricted to the 138 HRRs included in the CSSW sample. All outcomes are measured over 1 year after admission for the index hospitalization. "Physician Price" is the average of price per unit, calculated using provider claims. "Inpatient Price" is the average of price per unit, calculated using inpatient claims. All regressions control for sex interacted with age bins, location of the AMI, insurance product type (e.g., HMO, PPO, POS), indicators for whether the plan covers mental health and prescription drug benefits, funding status (self-funded or fully insured), zip-code median household income, zip-code level measures of percent black, Asian, and Hispanic populations, year fixed effects, comorbidities at admission, and HCC dummies from 6 months prior to admission.

Table A8: Robustness of Main Results: Physician Weights

	Expenditures			Utilization		Quality	
	Total	Physician	Inpatient	Physician (RVUs)	Inpatient (DRG weights)	Same-day PCI	30-day Readmission Rate
Fraction Cowboy (unadjusted)	8016.960	-1255.004	8090.099	41.637**	0.307***	-0.003	0.011***
	(7669.377)	(1883.231)	(5697.180)	(21.047)	(0.117)	(0.020)	(0.003)
Fraction Comforter (unadjusted)	-7019.141	-1268.392	-4180.893	-25.387*	-0.217***	-0.041**	-0.002
	(6388.413)	(2212.156)	(4225.123)	(13.277)	(0.080)	(0.020)	(0.002)
Fraction Low Followup (unadjusted)	8782.465	6684.958	239.271	-63.115**	0.014	0.121***	0.004
	(13599.317)	(5760.513)	(8039.042)	(29.744)	(0.186)	(0.043)	(0.005)
Fraction High Followup (unadjusted)	-15950.239	-2977.308	-5933.300	57.435	0.319	-0.132***	0.027***
	(13948.168)	(3719.406)	(10420.227)	(43.604)	(0.224)	(0.046)	(0.007)
Observations	174592	174592	174592	174592	174592	174592	174592
R^2	0.070	0.072	0.044	0.114	0.061	0.289	0.023
Mean	79152.84	19715.47	49921.84	306.46	3.22	.48	.02
Year Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Table presents results from an extension of Table 4 from Cutler, Skinner, Stern, and Wennberg (2019) using a sample of commercially insured patients hospitalized with AMI between 2012-2018. All outcomes are measured over 1 year after admission for the index hospitalization. Total Expenditures includes spending from physician, inpatient, and outpatient claims. Expenditures from physician claims and inpatient claims are shown separately. Utilization for physician claims is measured in terms of relative value units (RVUs) and utilization for inpatient claims is measured in terms of diagnosis related group (DRG) weights. "Same-day PCI" measures whether a patient received a PCI on the same day as admission. Regressions include weights for the number of physician survey respondents in each HRR. All regressions control for sex interacted with age bins, location of the AMI, insurance product type (e.g., HMO, PPO, POS), indicators for whether the plan covers mental health and prescription drug benefits, funding status (self-funded or fully insured), zip-code median household income, zip-code level measures of percent black, Asian, and Hispanic populations, year fixed effects, comorbidities at admission, and HCC dummies from 6 months prior to admission.

Table A9: Robustness of Price Results: Physician Weights

	Physician Price ($/RVU)	Inpatient Price ($/DRG weight)
	(1)	(2)
Fraction Cowboy (unadjusted)	-7.431	1569.277
	(4.564)	(1856.341)
Fraction Comforter (unadjusted)	0.151	36.201
	(5.429)	(1476.802)
Fraction Low Followup (unadjusted)	37.310	-284.607
	(24.215)	(2774.172)
Fraction High Followup (unadjusted)	-17.873*	-1764.523
	(9.992)	(3601.358)
Observations	173565	171383
R^2	0.041	0.012
Mean	52.37	16954.54
Year Fe	Yes	Yes

Notes: Sample consists of commercially insured patients hospitalized with AMI between 2012-2018. All outcomes are measured over 1 year after admission for the index hospitalization. "Physician Price" is the average of price per unit, calculated using provider claims. "Inpatient Price" is the average of price per unit, calculated using inpatient claims. Regressions include weights for the number of physician survey respondents in each HRR. All regressions control for sex interacted with age bins, location of the AMI, insurance product type (e.g., HMO, PPO, POS), indicators for whether the plan covers mental health and prescription drug benefits, funding status (self-funded or fully insured), zip-code median household income, zip-code level measures of percent black, Asian, and Hispanic populations, year fixed effects, comorbidities at admission, and HCC dummies from 6 months prior to admission.

Table A10: Robustness of Main Results: Continuously Enrolled

	Expenditures			Utilization		Quality	
	Total	Physician	Inpatient	Physician (RVUs)	Inpatient (DRG weights)	Same-day PCI	30-day Readmission Rate
Fraction Cowboy (unadjusted)	382.599	-1616.179	1651.730	16.717*	0.016	-0.018	0.003
	(3730.741)	(1060.595)	(2989.628)	(9.719)	(0.049)	(0.013)	(0.002)
Fraction Comforter (unadjusted)	3583.566	1927.396	2124.273	-15.423*	-0.107**	-0.026*	0.000
	(4063.821)	(1831.091)	(2458.601)	(8.040)	(0.045)	(0.014)	(0.002)
Fraction Low Followup (unadjusted)	4564.519	7103.884	-2241.115	-29.525**	0.097	0.048*	0.003
	(10862.212)	(5422.814)	(5405.915)	(13.408)	(0.114)	(0.027)	(0.006)
Fraction High Followup (unadjusted)	-12809.186*	-1403.716	-7664.830	24.583	0.223	-0.109**	0.023***
	(7512.253)	(2292.180)	(4833.403)	(20.089)	(0.137)	(0.044)	(0.006)
Observations	115293	115293	115293	115293	115293	115293	115293
R^2	0.085	0.081	0.047	0.128	0.068	0.288	0.015
Mean	78846.95	20390.81	47781.34	315.6	3.13	.5	.02
Year Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Table presents results from an extension of Table 4 from Cutler, Skinner, Stern, and Wennberg (2019) using a sample of commercially insured patients hospitalized with AMI between 2012-2018. The sample is restricted to patients who are continuously enrolled 12 months post-hospitalization. All outcomes are measured over 1 year after admission for the index hospitalization. Total Expenditures includes spending from physician, inpatient, and outpatient claims. Expenditures from physician claims and inpatient claims are shown separately. Utilization for physician claims is measured in terms of relative value units (RVUs) and utilization for inpatient claims is measured in terms of diagnosis related group (DRG) weights. "Same-day PCI" measures whether a patient received a PCI on the same day as admission. All regressions control for sex interacted with age bins, location of the AMI, insurance product type (e.g., HMO, PPO, POS), indicators for whether the plan covers mental health and prescription drug benefits, funding status (self-funded or fully insured), zip-code median household income, zip-code level measures of percent black, Asian, and Hispanic populations, year fixed effects, comorbidities at admission, and HCC dummies from 6 months prior to admission.

Table A11: Robustness of Price Results: Continuously Enrolled

	Physician Price ($/RVU)	Inpatient Price ($/DRG weight)
	(1)	(2)
Fraction Cowboy (unadjusted)	-5.473**	760.455
	(2.402)	(1261.319)
Fraction Comforter (unadjusted)	7.560**	1685.726*
	(3.797)	(989.076)
Fraction Low Followup (unadjusted)	21.751*	-686.695
	(11.956)	(2040.546)
Fraction High Followup (unadjusted)	-8.148*	-3456.934**
	(4.603)	(1724.922)
Observations	114656	113979
R^2	0.040	0.011
Mean	52.74	16712.59
Year Fe	Yes	Yes

Notes: Sample consists of commercially insured patients hospitalized with AMI between 2012-2018. he sample is restricted to patients who are continuously enrolled 12 months post-hospitalization. All outcomes are measured over 1 year after admission for the index hospitalization. "Physician Price" is the average of price per unit, calculated using provider claims. "Inpatient Price" is the average of price per unit, calculated using inpatient claims. All regressions control for sex interacted with age bins, location of the AMI, insurance product type (e.g., HMO, PPO, POS), indicators for whether the plan covers mental health and prescription drug benefits, funding status (self-funded or fully insured), zip-code median household income, zip-code level measures of percent black, Asian, and Hispanic populations, year fixed effects, comorbidities at admission, and HCC dummies from 6 months prior to admission.

Table A12: Robustness of Main Results: Rescaled Outcomes

	Expenditures			Utilization	
	Total	Physician	Inpatient	Physician (RVUs)	Inpatient (DRG weights)
Fraction Cowboy (unadjusted)	1182.541	-1221.772	1951.310	18.364**	0.037
	(3758.926)	(1012.968)	(2901.532)	(8.882)	(0.044)
Fraction Comforter (unadjusted)	2599.333	1841.169	1333.741	-13.710*	-0.112***
	(3805.121)	(1630.619)	(2369.383)	(7.313)	(0.041)
Fraction Low Followup (unadjusted)	1937.074	6836.465	-4098.619	-33.719***	0.006
	(9527.119)	(4669.578)	(4908.555)	(12.976)	(0.104)
Fraction High Followup (unadjusted)	-14119.266*	-1317.814	-8973.218*	29.828	0.162
	(7400.961)	(2349.533)	(4779.004)	(19.592)	(0.126)
Observations	174592	174592	174592	174592	174592
R^2	0.067	0.066	0.042	0.107	0.057
Mean	79152.84	19715.47	49921.84	306.46	3.22
Year Fe	Yes	Yes	Yes	Yes	Yes

Notes: Table presents results from an extension of Table 4 from Cutler, Skinner, Stern, and Wennberg (2019) using a sample of commercially insured patients hospitalized with AMI between 2012-2018. All outcomes are measured over 1 year after admission for the index hospitalization. Outcomes are rescaled to account for the number of months a patient was continuously enrolled post-hospitalization. Total Expenditures includes spending from physician, inpatient, and outpatient claims. Expenditures from physician claims and inpatient claims are shown separately. Utilization for physician claims is measured in terms of relative value units (RVUs) and utilization for inpatient claims is measured in terms of diagnosis related group (DRG) weights. "Same-day PCI" measures whether a patient received a PCI on the same day as admission. All regressions control for sex interacted with age bins, location of the AMI, insurance product type (e.g., HMO, PPO, POS), indicators for whether the plan covers mental health and prescription drug benefits, funding status (self-funded or fully insured), zip-code median household income, zip-code level measures of percent black, Asian, and Hispanic populations, year fixed effects, comorbidities at admission, and HCC dummies from 6 months prior to admission.

Table A13: Robustness of Main Results: Ln Outcomes

	Expenditures			Utilization	
	Total	Physician	Inpatient	Physician (RVUs)	Inpatient (DRG weights)
Fraction Cowboy (unadjusted)	0.006	-0.058	0.036	0.062**	0.006
	(0.048)	(0.038)	(0.061)	(0.026)	(0.013)
Fraction Comforter (unadjusted)	0.041	0.052	0.036	-0.053**	-0.030***
	(0.047)	(0.052)	(0.055)	(0.024)	(0.011)
Fraction Low Followup (unadjusted)	-0.011	0.203*	-0.086	-0.111**	0.032
	(0.097)	(0.118)	(0.096)	(0.044)	(0.026)
Fraction High Followup (unadjusted)	-0.239**	-0.026	-0.218**	0.083	0.018
	(0.101)	(0.082)	(0.109)	(0.056)	(0.035)
Observations	174366	173377	172750	173565	173274
R^2	0.077	0.078	0.059	0.104	0.101
Mean	10.93	9.49	10.42	5.43	.9
Year Fe	Yes	Yes	Yes	Yes	Yes

Notes: Table presents results from an extension of Table 4 from Cutler, Skinner, Stern, and Wennberg (2019) using a sample of commercially insured patients hospitalized with AMI between 2012-2018. All outcomes are measured in logs, over 1 year after admission for the index hospitalization. Total Expenditures includes spending from physician, inpatient, and outpatient claims. Expenditures from physician claims and inpatient claims are shown separately. Utilization for physician claims is measured in terms of relative value units (RVUs) and utilization for inpatient claims is measured in terms of diagnosis related group (DRG) weights. "Same-day PCI" measures whether a patient received a PCI on the same day as admission. All regressions control for sex interacted with age bins, location of the AMI, insurance product type (e.g., HMO, PPO, POS), indicators for whether the plan covers mental health and prescription drug benefits, funding status (self-funded or fully insured), zip-code median household income, zip-code level measures of percent black, Asian, and Hispanic populations, year fixed effects, comorbidities at admission, and HCC dummies from 6 months prior to admission.

Table A14: Robustness of Price Results: Ln Outcomes

	Physician Price ($/RVU)	Inpatient Price ($/DRG weight)
	(1)	(2)
Fraction Cowboy (unadjusted)	-0.090**	0.025
	(0.036)	(0.063)
Fraction Comforter (unadjusted)	0.107**	0.069
	(0.043)	(0.055)
Fraction Low Followup (unadjusted)	0.256**	-0.119
	(0.113)	(0.105)
Fraction High Followup (unadjusted)	-0.116	-0.244**
	(0.077)	(0.112)
Observations	173158	171383
R^2	0.054	0.021
Mean	3.89	9.53
Year Fe	Yes	Yes

Notes: Sample consists of commercially insured patients hospitalized with AMI between 2012-2018. All outcomes are measured in logs, over 1 year after admission for the index hospitalization. "Physician Price" is the average of price per unit, calculated using provider claims. "Inpatient Price" is the average of price per unit, calculated using inpatient claims. All regressions control for sex interacted with age bins, location of the AMI, insurance product type (e.g., HMO, PPO, POS), indicators for whether the plan covers mental health and prescription drug benefits, funding status (self-funded or fully insured), zip-code median household income, zip-code level measures of percent black, Asian, and Hispanic populations, year fixed effects, comorbidities at admission, and HCC dummies from 6 months prior to admission.

Table A15: Robustness of Main Results: Adding Controls

	Expenditures			Utilization		Quality	
	Total	Physician	Inpatient	Physician (RVUs)	Inpatient (DRG weights)	Same-day PCI	30-day Readmission Rate
Fraction Cowboy (unadjusted)	1387.790	-1149.686	2121.596	20.771**	0.038	-0.012	0.002
	(3775.860)	(1017.618)	(3027.252)	(8.276)	(0.045)	(0.011)	(0.002)
Fraction Comforter (unadjusted)	2478.987	1766.486	1203.111	-11.486*	-0.118***	-0.023*	-0.001
	(3711.452)	(1503.449)	(2487.411)	(6.889)	(0.043)	(0.013)	(0.002)
Fraction Low Followup (unadjusted)	1353.231	6223.236	-4493.790	-27.751**	-0.019	0.054**	0.002
	(9079.513)	(4270.159)	(5066.236)	(13.562)	(0.103)	(0.023)	(0.005)
Fraction High Followup (unadjusted)	-11543.747	-13.200	-9115.827*	33.130*	0.135	-0.095**	0.019***
	(7092.250)	(2049.770)	(4933.672)	(18.272)	(0.131)	(0.041)	(0.006)
Observations	173957	173957	173957	173957	173957	173957	173957
R^2	0.067	0.065	0.042	0.103	0.058	0.287	0.019
Mean	79131.71	19712.12	49912.6	306.61	3.22	.48	.02
Year Fe	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cardiologists Per Capita	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Insurer HHI	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Table presents results from an extension of Table 4 from Cutler, Skinner, Stern, and Wennberg (2019) using a sample of commercially insured patients hospitalized with AMI between 2012-2018. All outcomes are measured in logs, over 1 year after admission for the index hospitalization. Total Expenditures includes spending from physician, inpatient, and outpatient claims. Expenditures from physician claims and inpatient claims are shown separately. Utilization for physician claims is measured in terms of relative value units (RVUs) and utilization for inpatient claims is measured in terms of diagnosis related group (DRG) weights. "Same-day PCI" measures whether a patient received a PCI on the same day as admission. All regressions control for sex interacted with age bins, location of the AMI, insurance product type (e.g., HMO, PPO, POS), indicators for whether the plan covers mental health and prescription drug benefits, funding status (self-funded or fully insured), zip-code median household income, zip-code level measures of percent black, Asian, and Hispanic populations, year fixed effects, comorbidities at admission, and HCC dummies from 6 months prior to admission.

Table A16: Robustness of Price Results: Adding Controls

	Physician Price ($/RVU)	Inpatient Price ($/DRG weight)
	(1)	(2)
Fraction Cowboy (unadjusted)	-5.838**	645.557
	(2.370)	(1185.818)
Fraction Comforter (unadjusted)	6.665**	1346.913
	(3.286)	(932.250)
Fraction Low Followup (unadjusted)	20.295**	-1053.430
	(10.224)	(1879.590)
Fraction High Followup (unadjusted)	-8.680*	-2831.341*
	(4.428)	(1641.017)
Observations	172932	170760
R^2	0.037	0.011
Mean	52.35	16946.2
Year Fe	Yes	Yes
Cardiologists Per Capita	Yes	Yes
Insurer HHI	Yes	Yes

Notes: Sample consists of commercially insured patients hospitalized with AMI between 2012-2018. All outcomes are measured in logs, over 1 year after admission for the index hospitalization. "Physician Price" is the average of price per unit, calculated using provider claims. "Inpatient Price" is the average of price per unit, calculated using inpatient claims. All regressions control for sex interacted with age bins, location of the AMI, insurance product type (e.g., HMO, PPO, POS), indicators for whether the plan covers mental health and prescription drug benefits, funding status (self-funded or fully insured), zip-code median household income, zip-code level measures of percent black, Asian, and Hispanic populations, year fixed effects, comorbidities at admission, and HCC dummies from 6 months prior to admission.

Table A17: Benchmarking Coefficients: Robustness Specifications

	Total Expenditures	Physician Expenditures	Inpatient Expenditure	Physician Utilization	Inpatient Utilization	Physician Prices	Inpatient Prices
Panel A: Cowboy Share							
CSSW	17%	17%	17%	17%	17%	0%	0%
Main Estimates	1.7% (-7.7% - 11.0%)*	-5.9% (-15.7% - 3.9%)*	4.2% (-7.6% - 16.1%)*	6.0% (0.5% - 11.5%)*	1.3% (-1.5% - 4.0%)*	-10.2% (-19.1% - -1.3%)*	3.8% (-9.9% - 17.5%)
PPO Sample	6.5% (-11.6% - 24.7%)	-4.4% (-17.9% - 9.1%)*	9.8% (-13.7% - 33.4%)	5.2% (-6.6% - 16.9%)*	7.3% (0.9% - 13.7%)*	-10.0% (-19.2% - -0.9%)*	-1.4% (-24.5% - 21.8%)
Age 55-64	2.8% (-6.7% - 12.2%)*	-4.5% (-15.0% - 6.0%)*	5.3% (-6.7% - 17.4%)	7.0% (0.5% - 13.4%)*	1.6% (-2.1% - 5.3%)*	-10.6% (-19.9% - -1.4%)*	3.3% (-10.6% - 17.1%)
138 HRR Sample	2.1% (-14.1% - 18.2%)	-8.9% (-26.0% - 8.3%)*	6.7% (-13.4% - 26.9%)	10.5% (-0.9% - 22.0%)	4.3% (-1.1% - 9.6%)*	-15.5% (-30.6% - -0.4%)*	1.9% (-18.4% - 22.1%)
Physician Weights†	10.1% (-8.9% - 29.2%)	-6.4% (-25.2% - 12.4%)*	16.2% (-6.3% - 38.7%)	13.6% (0.1% - 27.1%)	9.5% (2.4% - 16.7%)*	-14.2% (-31.3% - 3.0%)	9.3% (-12.3% - 30.8%)
Continuously Enrolled	0.5% (-8.8% - 9.8%)*	-7.9% (-18.2% - 2.3%)*	3.5% (-8.9% - 15.8%)*	5.3% (-0.8% - 11.4%)*	0.5% (-2.6% - 3.6%)*	-10.4% (-19.3% - -1.4%)*	4.6% (-10.3% - 19.4%)
Rescaled Outcomes	1.5% (-7.8% - 10.8%)*	-6.2% (-16.3% - 3.9%)*	3.9% (-7.5% - 15.4%)*	6.0% (0.3% - 11.7%)*	1.2% (-1.5% - 3.9%)*		
Ln Outcomes (x 100)	0.6% (-8.8% - 10.0%)*	-5.8% (-13.2% - 1.7%)*	3.6% (-8.4% - 15.6%)*	6.2% (1.1% - 11.3%)*	0.6% (-1.9% - 3.1%)*	-9.0% (-16.2% - -1.9%)*	2.5% (-9.9% - 14.8%)
Adding Controls	1.8% (-7.6% - 11.1%)*	-5.8% (-16.0% - 4.3%)*	4.3% (-7.7% - 16.2%)*	6.8% (1.5% - 12.1%)*	1.2% (-1.6% - 4.0%)*	-11.2% (-20.1% - -2.2%)*	3.8% (-10.0% - 17.6%)
Panel B: High Follow-Up Share							
CSSW	36%	36%	36%	36%	36%	0%	0%
Main Estimates	-17.8% (-36.2% - 0.6%)*	-5.8% (-28.1% - 16.5%)*	-19.9% (-39.7% - -0.1%)*	10.2% (-2.1% - 22.5%)*	4.5% (-3.4% - 12.5%)*	-15.9% (-33.6% - 1.8%)	-18.7% (-38.3% - 0.9%)
PPO Sample	-30.9% (-63.3% - 1.5%)*	-19.8% (-66.4% - 26.8%)*	-30.1% (-64.1% - 3.8%)*	-25.4% (-68.2% - 17.4%)*	7.7% (-11.1% - 26.5%)*	-13.9% (-39.6% - 11.7%)	-27.2% (-63.6% - 9.1%)
Age 55-64	-16.7% (-35.2% - 1.8%)*	-5.2% (-29.1% - 18.7%)*	-18.1% (-37.4% - 1.3%)*	11.1% (-0.7% - 22.9%)*	5.4% (-3.9% - 14.7%)*	-17.2% (-35.7% - 1.4%)	-18.2% (-37.9% - 1.5%)
138 HRR Sample	-32.0% (-54.6% - -9.5%)*	-19.6% (-46.7% - 7.5%)*	-29.3% (-55.0% - -3.6%)*	8.6% (-10.3% - 27.6%)*	5.3% (-6.3% - 17.0%)*	-27.5% (-53.8% - -1.1%)*	-25.7% (-51.8% - 0.5%)
Physician Weights†	-20.2% (-54.8% - 14.5%)*	-15.1% (-52.2% - 22.0%)*	-11.9% (-53.0% - 29.2%)*	18.7% (-9.3% - 46.8%)	9.9% (-3.8% - 23.6%)*	-34.1% (-71.7% - 3.4%)	-10.4% (-52.2% - 31.4%)
Continuously Enrolled	-16.2% (-35.0% - 2.5%)*	-6.9% (-29.0% - 15.2%)*	-16.0% (-36.0% - 3.9%)*	7.8% (-4.7% - 20.3%)*	7.1% (-1.5% - 15.7%)*	-15.4% (-32.6% - 1.7%)	-20.7% (-41.0% - -0.4%)*
Rescaled Outcomes	-17.8% (-36.1% - 0.6%)*	-6.7% (-30.1% - 16.8%)*	-18.0% (-36.8% - 0.9%)*	9.7% (-2.9% - 22.3%)*	5.0% (-2.7% - 12.8%)*		
Ln Outcomes (x 100)	-23.9% (-43.8% - -3.9%)*	-2.6% (-18.8% - 13.6%)*	-21.8% (-43.2% - -0.4%)*	8.3% (-2.7% - 19.4%)*	1.8% (-5.2% - 8.8%)*	-11.6% (-26.7% - 3.5%)	-24.4% (-46.5% - -2.3%)*
Adding Controls	-14.6% (-32.2% - 3.1%)*	-0.1% (-20.5% - 20.4%)*	-18.3% (-37.7% - 1.2%)*	10.8% (-0.9% - 22.5%)*	4.2% (-3.8% - 12.3%)*	-16.6% (-33.2% - 0.1%)	-16.7% (-35.8% - 2.4%)

Notes: Table benchmarks our coefficients on commercial expenditures, utilization, and prices, relative to those found in Table 4 of Cutler, Skinner, Stern, and Wennberg (2019). Note that in CSSW's analysis, "Spending measures are adjusted for differences across regions in prices," which in the Medicare context are generated by formula-driven cost indices rather than provider-insurer negotiations. The implication is that their analyses of expenditures map directly into quantities, whereas our measures of inpatient and outpatient expenditures can be meaningfully decomposed into utilization indices (e.g., the number of Relative Value Units or the sum of DRG weights) and price indices (e.g., dollars per Relative Value Unit and dollars per DRG weight. All coefficients are presented in terms of percent effects relative to the mean value of the outcome. Estimates are presented with their 95% confidence intervals in terms of percent effects relative to the mean value. * indicates when the confidence interval rules out the corresponding effect size from Cutler, Skinner, Stern, and Wennberg (2019), presented in the first row of each panel. The specifications with physician weights, indicated with a †are compared to estimates from a physician weighted specification in Cutler, Skinner, Stern, and Wennberg (2019). Here, the effect size on expenditure and utilization we benchmark against are 25% for cowboy share and 49% for high follow-up share.