A Comparison of U.S. Hospital Margins: Are Patient Revenues Sufficient to Pay for Health Care Services?

March 15, 2021

Washington, D.C.

DISTRICT ECONOMICS GROUP

Analytics & Insights

Table of Contents

List of Tables and Figures

A Comparison of U.S. Inpatient Hospital Profit Margins

Executive Summary

- Payments to hospitals for inpatient and outpatient services were sufficient to pay the direct costs of providing patient care with a 19.2 percent surplus, amounting to $260 billion, nationwide at general acute care hospitals that accepted Medicare in 2017. This margin varied by hospital type with for-profits averaging at 31.3 percent, non-profits at 24.1 percent, and governmental hospitals at 8.1 percent.
- Hospital markets with losses are concentrated in a few large markets and almost entirely occur among governmental hospitals.
- For-profit hospitals have the highest margin of sufficiency of net patient revenues to pay for the direct costs of hospital care, followed by non-profits, with governmental having the lowest margin of sufficiency of net patient revenues.
- For-profit hospitals are the most likely to be a part of a hospital network, locate in the highest income neighborhoods, have the highest proportion of patient payments from Commercial sources and the lowest proportion of patient payments through Medicaid, and the lowest amount of patient bad debt and charity care relative to patient revenues.
- Governmental hospitals are the least likely to be a part of a hospital network, most likely to locate in the lowest income neighborhoods, have the lowest proportion of patient payments from Commercial sources and the highest proportion of patient payment through Medicaid, and the highest amount of patient bad debt and charity care relative to patient revenues.
- There is almost no variation across hospitals for the commodity costs of patient care services from medical, surgical, and pharmaceutical supplies as a share of net patient revenues.
- There is wide variation across hospitals for the labor costs with governmental hospitals having the highest labor costs, followed by non-profit hospitals, with for-profit hospitals having the lowest labor costs.
- Very few hospitals rely primarily on Medicare payment, and for those that do, payments are generally not sufficient to pay for the costs of providing patient care.

The Sufficiency of Payments for Patient Services in U.S. Hospitals

Introduction

Are payments for inpatient and outpatient care received by hospitals in the United States sufficient to cover the direct costs of providing that care? In this paper we answer this question using a nationwide data set of short-term acute care hospitals for 2017.

To answer the question of sufficiency, we develop two new measures that focus exclusively on payments for patient services and the direct costs of providing these services. Our two measures, the gross sufficiency margin and the intermediate sufficiency margin, are similar to financial accounting measures for gross profit and operating margin but more narrowly defined to highlight the sufficiency of payments for patient care.[1] In general, we find that hospital patient revenues are sufficient to cover the direct costs of patient care, but with wide variation across hospitals. A main contribution of this research is that we can explain 25 percent of the variation in these sufficiency measures across most short-term acute care hospitals in the United States for 2017, mostly from factors that are not hospital and patient specific but are nationwide, state, and local measures.

This is not a paper about the pricing of hospital services or what hospitals charge for their services. It is an analysis of the payments that hospitals receive for providing services. Neither is this an analysis of hospital profitability. It is an analysis of the sufficiency of payments received for the direct costs of providing health care services.

The distribution of hospitals in the United States

Hospitals in the U.S. that accept Medicare are required to file annual reports with the Centers for Medicare and Medicaid Services (CMS) detailing its revenues and costs. We use these Medicare cost reports to determine whether payments for patient services are sufficient to pay for the care provided. Among these hospitals are for-profit hospitals, non-profit hospitals (some owned by church affiliated groups and some owned by universities), and non-profit hospitals that are owned by government entities (for example by a city, a county, or a special hospital district).

Of the 4,618 short-term acute care hospitals that accepted Medicare patients in 2017, 4,429 are analyzed in this paper.[2] As table 1 shows, of the 4,429 short-term acute care hospitals accepting

[1] Many hospitals in the United States have revenues from sources other than patient revenues such as investment portfolios, insurance activities, rental activities, clinical trial activities, and fundraising, donations, and government appropriations. In this paper we refer to these other sources of revenues as "*other income*" and are excluded from this analysis. These additional sources of revenue make it difficult to compare the sufficiency of payments received for health care services because in some cases they can be sizeable. At the same time, hospitals in the United States often have expenses unrelated to the direct provision of health care services, such as payments to a parent organization – a University or a corporation – that can significantly increase reported "costs" of a hospital and obscure the direct cost of providing for health care and these too are excluded from this analysis.

[2] The original data set included 4,618 short-term acute care hospitals. However, 189 hospital records were excluded due to data concerns: four hospitals were removed because they filed negative values for their net patient revenues, and the other filings dropped did not reflect a full year of data and were therefore not comparable with the rest of the cost reports. (4,618 -189 = 4,429) We identify short-term acute care hospitals if the entry on its CMS Medicare cost report worksheet S-2, Part 1, line 3, column 4 equals 1. Other hospitals that

Medicare and filing Medicare cost reports for 2017, 866 were for-profit (20%), 2,573 were non-profit (58%), and 990 were governmental (22%). Notably, of the 317 hospitals with net patient revenues greater than $600 million, only 13 were for-profit. Governmental hospitals are disproportionately small revenue hospitals located in rural areas. The fourth column of numbers in table 1 is labeled "data missing" because while each of the 4,429 hospitals included in this analysis filed Medicare cost reports, 100 of these reports did not provide an amount for net patient revenue and therefore, they could not be allocated to a size grouping.

Table 1. Counts of short-term acute care hospitals filing CMS Cost Reports for 2017.

Hospital Type	Net Patient Revenues				Total
	< $35 million	$35-$600 million	> $600 million	missing data	
For-profit	211	632	13	10	866
Non-Profit	592	1,692	244	45	2,573
Governmental	546	339	60	45	990
Total	1,349	2,663	317	100	4,429

Among the most important dimensions of this comparison are the size of a hospital in terms of patient revenue, and the ownership structure of a hospital as for-profit, non-profit, or governmental. We find that larger hospitals are more profitable than smaller hospitals. We also find that for-profit hospitals are more profitable than non-profit hospitals, which are more profitable than governmental hospitals. Moreover, on average, the smallest for-profit hospitals are more profitable than the largest governmental hospitals.

Gross and Intermediate sufficiency margins

This paper compares two measures of the sufficiency of payments for patient services for these hospitals based solely upon payments received for patient health care services provided and the direct costs for providing patient health care. These measures of sufficiency, a "gross sufficiency margin" and an "intermediate sufficiency margin" exclude other revenues listed in footnote 1. Using data from the CMS cost reports, table 1 shows the distribution by the size of revenues and the type of ownership of the hospitals, as for-profit, non-profit, or governmental.[3]

We construct three sources of payments for hospital patient services from the CMS cost reports and label these as Medicaid, Medicare, and Commercial. We include as part of Medicaid, payments made by the Children's Health Insurance Program (CHIP), Disproportionate Share Hospitals (DSH), and payments

identify by type of hospital as long-term care, cancer, psychiatric, rehabilitation, religious nonmedical health care institutions, children's, alcohol and drug, or "other" in their Medicare cost report filings are not included in this analysis. Posing a contrast to short-term acute care hospitals, ambulatory surgery centers (ASC), also known as "outpatient surgery centers" or "same day surgery centers" do not provide inpatient services, or emergency department services and do not – if standalone – file cost reports.

[3] By accepting Medicare as a payor for hospital services, each hospital regardless of ownership type, agrees to take "all patients" and provide a minimal amount of services at no charge, and to provide detailed cost reports of the hospital's revenues and costs of care. As a source of national data for all types of providers, these publicly available cost reports are the basis for most of the analysis in this research. Notably, CMS uses the financial, statistical, and descriptive information filed in these reports to set prospective payment rates.

under state or local government indigent care programs. CMS cost reports show payments for patient health care services through Medicaid or Medicare separately along with net patient revenues for all payments for patient services.[4] Payments from Medicare include direct payments from Medicare plus the copayments that the Medicare beneficiary is required to pay.[5] We calculate Commercial payments for each hospital by subtracting the payments for Medicaid, Medicare from each hospital's net patient revenues. This Commercial category includes payments from private insurance, unions, employers, and individuals (as copayments, deductibles, and payments by uninsured persons).

Thus, for this analysis, the sum of a hospital's payments from Medicare, Medicaid, and Commercial equals its net patient revenues. Regardless of the source of payment for patient health care services - from Medicare, Medicaid, or Commercial most hospitals in the U.S. can pay for patient care from the payments received for such care.

Each hospital's net patient revenue is the denominator for the gross and intermediate sufficiency margin calculations. Note that Medicare and Commercial payments do not include individual premium payments because these are not a part of a hospital's net patient revenue. Medicaid does not have premiums and when there are copayments, they are de minimis.

We create two sufficiency margin measures. The *gross sufficiency margin* measure is the sum of net patient revenue less the direct costs for medical, surgical, and pharmaceutical supplies, and less the direct cost of salaries and wages for labor and contract labor divided by net patient revenue. The indirect costs of salaries and wages such as pension benefits, insurance, payroll taxes, and other benefits such as child-care and tuition support, are excluded from the calculation of the gross sufficiency margin but brought back into our analysis in the section titled "**What can the intermediate margin pay for?**".[6] The direct and indirect costs of labor are central to the profitability of hospitals and these vary greatly between for-profit, non-profit, and governmental hospitals. The greatest single cost category for hospitals are labor costs, which include the salaries and wages for nurses, emergency department, and maintenance and support staff.[7] We label this measure *gross sufficiency margin* because the direct costs

[4] Net patient revenues are total patient revenues less any discounts and rebates, and are a measure of actual payments to a hospital for patient health care services.

[5] This data is provided on worksheet E-1, Part 1 of the Medicare Cost Reports. Medicare program liability/payments include total interim payments (paid to provider and payable on individual bills (either submitted or to be submitted to the intermediary for services rendered), and net settlement payments. This is done for both Inpatient Part A and Part B.

[6] The indirect costs associated with salaries and wages are poorly reported on CMS cost reports and would have reduced the 4,429 hospitals identified in table 1 as short-term acute care hospitals to 3,200. We view the almost 28% reduction in the number of observations too large to use these data for nationwide comparisons which is our primary goal. However, for the 3,200 hospitals reporting indirect labor costs, the amounts are significant and not distributed randomly. We discuss the sufficiency of net patient revenue to pay for indirect labor costs in the section "**What can the intermediate margin pay for?"**.

[7] Salary and wages labor costs come from worksheet A, column 1, line 200 on the Medicare costs reports. Line 200 column 1 shows the total wages and salaries across a detailed list of cost centers for each hospital including: general service cost centers not directly related to patient care such as administrative and general, pharmacy, and operation of plant; inpatient routine service cost centers such as Adults and Pediatrics Units and Intensive Care units; ancillary service cost centers such as operating rooms and laboratory facilities; outpatient service cost centers such as emergency and clinic; other reimbursable cost centers such as ambulance services; special purpose cost centers like organ acquisition; and non-reimbursable ones like gift shop and nonpaid workers. Because column 1 of worksheet A consists of direct salaries and wages, explicitly excluding wage-related contract labor cost for

of medical, surgical, and pharmaceutical supplies plus the wages and salaries of hospital staff is (weakly) analogous to the cost-of-goods-sold for the hospital provision of health care services. The gross sufficiency margin calculated may be larger than a gross profit measure due to excluding indirect labor costs such as pensions, benefits, and payroll taxes, and the costs of utilities, but it may also be smaller than a gross profit measure due to excluding each hospital's other income amounts (see footnote 1 for items of income included in other income).

Table 2 shows the average gross sufficiency margins by size and type of hospital, with the average across all hospitals of 32.12 percent. Table 2 shows two important findings. First, the proportionate cost of medical, surgical, and pharmaceutical supplies is remarkably similar across all sizes and types of hospitals. Perhaps as remarkable, the standard deviation around these group and population mean estimates are small (See Appendix table 1). Second, the variation in the gross sufficiency margin is driven by the direct costs of salary and wages. For each size category of hospital net-patient revenues, for-profit hospitals have lower direct labor costs as a share of patient revenues than non-profit hospitals, which in turn have lower direct labor costs as a share of net patient revenues than governmental hospitals. Appendix table 2 shows that governmental hospitals have higher direct labor costs on a per-bed basis when compared with either for-profit and non-profit.

Table 2. Gross sufficiency margin of short-term acute care hospitals filing CMS Cost Reports for 2017.

Size of Net Patient Revenues	Hospital Category	Gross Sufficiency Margin as Share of Net Patient Revenue	Medical, Surgical, and Pharmacy Expenses as Share of Net Patient Revenue	Labor (Including Contact Labor) as Share of Net Patient Revenue
Any	For-profits	41%	19%	39%
	Nonprofits	33%	19%	48%
	Governmental	21%	19%	59%
	All	32%	19%	49%
< $35 million	For-profits	33%	20%	48%
	Nonprofits	27%	17%	55%
	Governmental	18%	19%	63%
	All	24%	18%	57%
$35-$600 million	For-profits	44%	19%	37%
	Nonprofits	35%	20%	46%
	Governmental	25%	19%	56%
	All	36%	20%	45%
> $600 million	For-profits	49%	14%	37%
	Nonprofits	36%	22%	42%
	Governmental	29%	23%	49%
	All	35%	22%	43%

Note: Shares in rows may not sum exactly to 100% due to rounding.

services contracted by the hospital, the home office, or related organizations, this paper includes contract labor costs from worksheet S-3, part II column 2 which provides wage data for this component: direct patient care (line 11), top level management services (line 12), Physician-Part A Administrative (13), housekeeping (line 33), and dietary (line 35) contract labor. We exclude wage-related benefits from this measure of labor costs, such as pensions and insurances. These costs will be brought back into the analysis in the Discussion section of this paper.

The dependent variable for our analysis is the *intermediate sufficiency margin* which begins with the gross margin from table 2 and subtracts the costs of charity care, bad debt expense, interest expense, equipment rental and repairs and maintenance, and health information technology purchases. These additional direct costs, shown on table 3, reduce the gross sufficiency margin of for-profit hospitals by 10 percent, for non-profit hospitals by 9 percent, and for governmental hospitals by 13 percent. Across all hospital types, on average the reduction is 10 percent, from 32.12 percent to 22.13 percent.

Table 3. Intermediate sufficiency margin for the 4,329 short-term acute care hospitals filing CMS Cost Reports with non-missing net patient revenues for 2017.

Size of Net Patient Revenues	Hospital Category	Gross Sufficiency Margin as Share of Net Patient Revenue	Bad Debt Cost as Share of Net Patient Revenue	Charity Care Cost as Share of Net Patient Revenue	Interest Expense as Share of Net Patient Revenue	Equipment Rental and Repairs and Maintenance as Share of Net Patient Revenue	Health IT Purchases as Share of Net Patient Revenue	Intermediate Sufficiency Margin
Any	For-profits	41.30%	2.51%	3.11%	1.70%	1.88%	0.77%	31.33%
	Nonprofits	33.06%	2.22%	2.60%	1.33%	1.63%	1.17%	24.11%
	Governmental	21.28%	4.93%	3.26%	1.65%	1.65%	1.71%	8.08%
	All	32.12%	2.87%	2.84%	1.46%	1.66%	1.16%	22.13%
< $35 million	For-profits	32.54%	4.72%	3.19%	2.07%	2.59%	1.69%	18.28%
	Nonprofits	27.44%	3.69%	2.87%	1.33%	2.07%	3.22%	14.26%
	Governmental	18.13%	5.81%	2.62%	1.81%	1.69%	2.45%	3.75%
	All	24.47%	4.71%	2.80%	1.64%	1.93%	2.48%	10.91%
$35-$600 million	For-profits	44.07%	1.84%	3.08%	1.53%	1.76%	0.51%	35.35%
	Nonprofits	34.62%	1.88%	2.55%	1.35%	1.62%	0.96%	26.26%
	Governmental	25.09%	3.76%	3.89%	1.38%	1.60%	0.64%	13.82%
	All	35.65%	2.11%	2.85%	1.38%	1.64%	0.80%	26.87%
> $600 million	For-profits	49.18%	0.76%	3.12%	0.66%	1.46%	0.04%	43.14%
	Nonprofits	35.90%	1.08%	2.33%	1.19%	1.14%	0.57%	29.59%
	Governmental	28.53%	3.48%	5.28%	1.34%	1.66%	0.26%	16.51%
	All	35.05%	1.52%	2.93%	1.20%	1.25%	0.53%	27.62%

Note: in calculating the intermediate margins, the averages for these various costs are calculated within each category and then subtracted individually from the gross margins. It is important to note that these averages reflect the data available within each category. Because of the lack of consistent reporting in some of these costs, the resulting intermediate margins for each category are different than if the average was calculated across the intermediate margins at the hospital level.

Across all revenue sizes of hospitals, governmental hospitals spend a greater share of net patient revenues on bad debt and charity care than for-profit or non-profit hospitals (shaded columns). Moreover, this disparity *increases* with the size of the hospital net patient revenues. While the largest governmental hospitals, those with revenues greater than $600 million, show the largest proportions of bad debt and charity care among all hospitals, for-profits and non-profits with revenues greater than $600 million show the *smallest* proportions of bad debt and charity care among all hospitals. Keep in mind that the measure of net patient revenues for each hospital includes disproportionate share

payments under Medicare and Medicaid, as well as other Federal grant programs for serving rural and higher risk populations. Even with these additional sources of funds, we find this disparity is a significant driver of the spread in the intermediate sufficiency margins between governmental hospitals and for-profit and non-profit hospitals.

Unlike bad debt and charity care costs, the three other sources of hospital expenditures shown on table 3, health information technology (IT), interest expense, and rentals and repairs of equipment do not show any meaningful distinction as a share of hospital net patient revenues across for-profit, non-profit or governmental types. However, collectively these costs are larger for small hospitals than for large hospitals as would be expected.

The costs shown in tables 2 and 3 can be broken into commodity inputs and human factor inputs. Commodity inputs include the costs for medical, surgical, and pharmaceutical supplies and the costs for interest expense, information technology, and rental and equipment expense. Human factor inputs include labor and ability-to-pay measures like bad debt expense and the cost of charity care. The commodity inputs show small variations across hospitals whether by size of revenue or type of entity (See Appendix table III). On the other hand, the human factor inputs vary a great deal across hospital types and size.

The intermediate sufficiency margin is analogous to an operating margin that would focus exclusively on the direct costs of patient care and that is restricted in revenue to payments for patient care that would not include other income. An operating margin would begin with the intermediate sufficiency margin but also include indirect labor costs (pensions, insurance, payroll taxes, and other benefits), utilities, depreciation and amortization. We consider indirect labor costs in the "**What can the intermediate margin pay for?**" (discussed in detail in footnote 6). We also excluded the indirect costs of utilities due to poor reporting on the CMS cost reports.[8]

Data and variables

Table 4, below, lists each of the twenty variables used in our analysis of hospital intermediate sufficiency margins including the ranges and mean values. The table is organized by the level of aggregation for each variable, which this section discusses at length. Table 5 compares the mean values for each variable in the two models that we estimate, one that uses the CMS case mix variable, and one that omits it. For the most part table 5 shows that the mean values for the variables do not change significantly across the two models with the exception of the dummy variable for for-profit hospitals, the coverage of hospitals in states that adopted the Medicaid expansion under the Affordable Care Act, and the level of competition among hospitals within markets.

We explain the variation in hospital intermediate sufficiency margins by considering factors that vary with geographic coverage, in descending order, as: 1) nationwide; 2) state-specific; 3) rural or urban specific; 4) specific to a Core-based Statistical Area("CBSA), 5) specific to the 5-digit zip code in which a

[8] Utility costs would have reduced the number of observations by almost 500 and indirect labor costs by approximately 1200.

hospital is located, and finally 6) specific to the hospital.)[9] One of the goals for this research is to understand the extent of non-hospital-specific measures on the sufficiency of patient revenues.

Variables that are likely to have the greatest explanatory power of hospital intermediate sufficiency margins such as patient specific case mixes and the patient specific ability-to-pay information are not well reported on CMS cost reports.[10] We focus our analysis *away from patient specific measures* and ask how much of the intermediate margin can be explained by factors that mostly are outside of each hospital. The answer to that is about 25 percent.

Nationwide

The nationwide variables are specific to types of hospitals such as for-profit, or a non-profit with a church affiliation or a non-profit without a church affiliation, which in most cases means a university affiliation, or governmental. Early on in our analysis it became clear, as table 3 shows, that the intermediate sufficiency margins across "entity type" as for-profit, non-profit, or governmental had a clear ordering with for-profits the highest and governmental the lowest.

We also use a dummy variable for whether a hospital has total patient revenues less than $35 million. As table 1 shows, 1,349 hospitals are in this size category, spanning all entity types, and as table 3 shows, these low patient revenue hospitals also have the lowest intermediate margins.[11] These small hospitals are overwhelmingly rural hospitals but disproportionately governmental compared with non-profit and for-profit hospitals.

We create a dummy variable for hospitals using words such as "hip and knee", "orthopedic", "women", and "children" in the hospital title. We label these hospitals specialty hospitals. These specialty hospitals needed to identify on the CMS cost reports as short-term acute care hospitals (see footnote 2 for details). As a result, some very well know hospitals such as the Children's Hospital of Philadelphia and the St. Jude Children's Hospital, are not included in the data set. Of the 64 specialty hospitals in our data set, 45 are for-profit, 13 are non-profit, and 6 are governmental. We expect higher intermediate sufficiency margins on specialty hospitals because of medical procedures with higher payments such as knee and hip replacement surgery. Both models support this hypothesis.

Finally, we create a dummy for hospitals that identify as transplant centers in the CMS cost reports. We anticipate that both the specialty and the transplant hospital dummy variables would increase intermediate margins because these facilities are associated with specialized health care services that

[9] Core-based Statistical Areas are used by CMS to establish hospital wage indices that include both metropolitan statistical areas and micropolitan statistical areas, as well as rural areas.

[10] In a perfect world, access to patient details for each hospital providing medical conditions and information about payments from all sources for each patient would likely explain most of the intermediate margin. However, a narrow focus on only patient characteristics could miss the variation that is not specific to the hospital. In a health care system with universal coverage, universal access, and no patient billing, this patient information might be all that is necessary to understand a hospital's intermediate margin. But in a health care system without these characteristics, like the U.S., we show that a significant portion of the intermediate margin is influenced by factors beyond each specific hospital.

[11] For one of our models that uses a measure of Medicare patient case mix many of these small hospitals drop out of the estimation because many rural hospitals do not report these data.

often receive large patient payments. We find no support for this hypothesis, perhaps due to so few hospitals in the data set that identified as transplant hospitals.

The hospital type that does not specifically have a dummy variable is governmental, of which there are 945 of the possible 4,329 hospitals used to estimate the models. Therefore, as the omitted entity type, the coefficients for the for-profit and non-profit dummy variables should be interpretated as additions or subtractions from the intermediate sufficiency margin compared too governmental hospitals. A positive coefficient on the for-profit dummy variable means that relative to governmental hospitals, for-profit hospitals have a greater intermediate sufficiency margin.

State level

The state level variables test several policy relevant hypotheses. During 2017, 27 states had right-to-work laws that make union organization difficult.[12] Since hospital labor costs are a large component of the intermediate sufficiency margin, it is reasonable to ask whether this policy supports higher margins. Most for-profit hospitals locate in right-to-work states and have significantly lower direct labor costs than non-profit and governmental hospitals. [13] We find evidence that hospitals located in right-to-work states have larger intermediate sufficiency margins.

Another policy relevant state level variable is the portion of each state's population with income below 200 percent of the Federal poverty level (FPL) covered under the state Medicaid program. States vary widely on this measure from a high of 120 percent for Massachusetts to a low of 45.8 percent for Utah.[14] We expect that the greater the proportion of a state's population with income below 200 percent of the FPL that are eligible for state Medicaid coverage, the lower the intermediate sufficiency margin because this policy would increase the number of persons with state Medicaid, which generally pays less for patient health care than either Medicare or Commercial payers. We find strong evidence for this hypothesis.[15]

Another state level variable used is the United Health Foundation's America's Health Rankings composite measure of five dimensions of population health in each state.[16] This measure is normalized so that the U.S. average score is 0. A value less than 0 means that a state's population health ranking is lower than the national average and a positive value means that a state's health ranking is greater than the national average. The five dimensions are: 1) social and economic factors; 2) physical environmental factors; 3) clinical care; 4) population behaviors (such as tobacco use); and 5) health outcomes. This

[12] The 27 states with right-to-work laws during 2017 were: Alabama, Arizona, Arkansas, Florida, Georgia, Idaho, Indiana, Iowa, Kansas, Kentucky, Louisiana, Michigan, Mississippi, Nebraska, Nevada, North Carolina, North Dakota, Oklahoma, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, Wisconsin, West Virginia, and Wyoming. www.ncsl.org/research/labor-and-employment/right-to-work-laws-and-bills.aspx

[13] For example, of the 179 health care facilities (of which 175 are hospitals) operated by the for-profit Hospital Corporation of America during 2017, 161 are in states with right-to-work laws. See HCA Healthcare Inc., SEC form 10-K for fiscal year ending December 31, 2017, page 46.

[14] See www.kff.org/interactive/medicaid-state-fact-sheets/

15 Of the 27 states with right-to-work laws, only 6 provided state Medicaid coverage to its population with income below 200 percent of the FPL that was greater than the 71 percent national average. We do not explore this coincidence further in this analysis but observe that employment labor protections and state Medicaid coverage policies may be part of a broader state-level policy environment that could positively impact the intermediate sufficiency margin.

[16] See www.AmericasHealthRankings.org

variable is intended to provide some control for the overall population health of persons in a state and test the hypothesis that population health measured at a state level influences the intermediate margin. We anticipate that the sign of this variable would be negative because healthier populations require fewer hospitalizations, which would be fewer procedures and lower payments, but this variable is not significant in the models estimated.

Finally, we tested state specific features that might influence the intermediate margin. For example, five states had no for-profit hospitals including Alaska, Vermont, Delaware, Maine, and Minnesota. Additionally, Maryland operates short-term acute care hospitals in the state under a state budget as a pilot project towards controlling costs. We created dummy variables for each of these states. We found no impact on the intermediate sufficiency margin except for Minnesota. Minnesota has neither for-profit nor governmental hospitals, has a relatively high 85 percent of the population with income less than 200 percent of the FPL eligible for state Medicaid, and has a state sponsored health insurance plan for working uninsured Minnesota residents ("Minnesotacare"). The dummy variable for Minnesota is consistently positive and significant in our models. Hospitals in Minnesota had greater intermediate sufficiency margins compared with non-profits in other states.

Medicaid expansion

A third geographic distinction separates the 31 states and the District of Columbia participating in the expansion of Medicaid under the Affordable Care Act from the 19 states that did not during 2017.[17] We create two dummy variables for hospitals in the 31 states that elected the expansion, one for urban area hospitals and one for rural area hospitals. We expect that hospitals in states electing the Medicaid expansion under the Affordable Care Act would have greater intermediate sufficiency margins because it both reduces uncompensated care and encourages persons newly covered under the expansion to seek medical care. On the other hand, because Medicaid generally pays less than either Medicare or Commercial payers for patient care, it is possible that the state election could reduce the intermediate margin if the payments were not sufficient to pay for the direct costs of patient care. We find that the Medicaid expansion under the affordable care act improved hospital intermediate sufficiency margins.

Core-Based Statistical Areas

A fourth geographic aggregation focuses on the Core-Based Statistical Area (CBSA) which includes both census bureau aggregation schemes for metropolitan statistical areas and micropolitan statistical areas. We use the CBSA to define a market area for hospitals. For each CBSA we construct a Hirschman Herfindahl index (HH) of the level of competition among all short-term acute care hospitals using each hospital's total net patient revenue as its measure of size. The index is the sum of the square of each hospital's share of total net patient revenue in a CBSA. For the 406 CBSAs with a single hospital, this index number equals 1 signifying no competition. In multi-hospital CBSAs, if each hospital has an identical amount of total net patient revenue, the index number would equal 1 divided by the number of hospitals in the market. As the number of hospitals in the market becomes very large and as hospital revenues are more equal, the HH index approaches 0. The largest CBSA is Los Angeles with a population

[17] Through 2017, 19 states had not adopted the Medicaid expansion under the Affordable Care Act. After 2017, 7 of these have adopted the expansion: Virginia, Maine, Idaho, Utah, Nebraska, Oklahoma, and Missouri. As of 2021 the twelve remaining states that do not participate in the Medicaid expansion are: Texas, Wyoming, South Dakota, Kansas, Wisconsin, Mississippi, Alabama, Florida, Georgia, South Carolina, North Carolina, and Tennessee.

of 13.3 million persons and 100 hospitals. The HH index based upon net patient revenues in each of these hospitals for Los Angeles is 0.029 indicating a very competitive market.[18] Other large CBSAs such as Chicago with a population of 9.5 million and Dallas with a population of 7.3 million have similar HH indexes of 0.027 and 0.029. Of the 28 largest CBSAs that we examine in the section titled "**Hospitals in large markets**" the smallest of these have populations greater than 2 million, such as Kansas City with 2.1 million, Columbus Ohio with 2.1 million, and Sacramento with 2.3 million have HH indexes of 0.108, 0.162, and 0.179, respectively. The lowest value for this index in the data set is 0.022. We expect markets with less competition to have larger intermediate sufficiency margins, and they do.

5-digit zip code level

The last unit of geographic aggregation is the 5-digit zip code of each hospital's address. Using federal individual income tax return data aggregated to the 5-digit zip code level we construct a ratio of the number of persons in households with adjusted gross income (AGI) greater than $100,000 to the number of persons in households with AGI less than $25,000 in the zip code of each hospital. The range of this variable has a low value of 0 where there are no tax returns filed with adjusted gross income greater than $100,000, to 15.676 indicating that for every 1 person in a household with AGI less than $25,000 there were 15.676 persons in households with AGI greater than $100,000. Households with AGI greater than $100,000 are more likely to have commercial insurance coverage while households with AGI less than $25,000 are more likely to have Medicaid coverage. Because 5-digit zip codes are relatively small geographic areas determined by the postal delivery capabilities of the local post-office, we assume that persons living in households within the same zip-code as a hospital are more likely to use that hospital for health care services.[19] Because commercial insurance generally pays more for hospital health care services than either Medicare or Medicaid, we expect the intermediate sufficiency margin to increase with this variable, and it does.

However, often government policy locates the provision of health care services to areas where health needs are unmet through market-based incentives. This means that governmental hospital facilities are often located, not based on potential profitability, but on the basis of an unmet need for health care services. On the other hand, for-profit hospitals *should* use market-based incentives to determine the location of hospitals. It is clear from the geographic matching of household income on tax returns to the locations of hospitals that for-profit hospitals locate in higher income neighborhoods with an average income of $68,870, and that governmental hospitals locate in lower-income neighborhoods with an average income of $56,906 (see table IV in the appendix). Not only is the average income lower in 5-digit zip codes where governmental hospitals are located, but the ratio of persons in high-income households

[18] For the Los Angeles CBSA, if all 100 hospitals had the same amount of net patient revenue, then the HH index would be 0.01, and no hospital would have market power over any other hospital.

[19] Tax returns, and the persons reported on tax returns, do not represent the entire population. Approximately 13 percent of the U.S. resident population is not accounted for on federal individual income tax returns filed each year. Most of these persons are elderly with social security as the principal source of income. Because most social security income is not subject to income tax, the elderly often do not have a requirement to file because their taxable income is below the filing requirement of $23,300 for a married couple over the age of 65 and $11,950 for a single person over the age of 65. Many lower income persons who do not have a requirement to file a tax return because their income is below the filing requirement do file because they can be eligible for the earned income tax credit, which is a refundable tax credit. See "The Income Tax Position of Persons Not Filing Returns for Tax Year 2005", by Joshua Lawrence, Michael Udell, and Tiffany Young, presented at the IRS Research Conference of 2012.

to low-income households is 56 percent greater in 5-digit zip codes where for-profit hospitals locate than in 5-digit zip codes where governmental hospitals locate (1.17 in 5-digit zip codes with for-profit hospitals versus 0.75 for governmental hospitals, see table IV in the appendix).

Hospital level

The 14 variables listed above do not make use of hospital specific information but instead address broader issues about population health and income, state rules around Medicaid availability and labor law, adoption of the Affordable Care Act, and competition among hospitals. The following 6 hospital specific variables rely upon hospital aggregate information reported in the CMS cost reports rather than patient specific information.

The first 3 variables are dummy variables for hospital affiliation with a network of hospitals. Approximately 2,048 of the 4,429 short-term acute care hospitals in our data set that accepted Medicare during 2017 were part of a hospital network with at least 5 member hospitals (see Appendix table V). To test the impact of network affiliation, we create three dummy variables for the size of networks. The 6 largest networks each have more than 50 hospitals and account for 553 hospitals. We create a dummy variable for these large network hospitals. The second network dummy variable is for hospitals affiliated with networks with more than 20 but fewer than 50 hospitals, and the third network dummy variable is for hospitals affiliated with networks with 5 or more hospitals but fewer than 20. Network affiliation strongly sorts along hospital entity lines. Of the 866 for-profit hospitals in our data set, 631 are affiliated with a network with 5 or more hospitals while 235 are not; non-profit hospitals are evenly divided as 1,286 affiliated with a network and 1,287 not affiliated, and for governmental hospitals only 131 are affiliated with a network while 859 are not. We expect network affiliation to be positively correlated with greater intermediate sufficiency margins, and that this benefit increases with the number of hospitals in a network. We find that network affiliation improves intermediate sufficiency margin, but no evidence that larger networks provide a greater benefit.

The bottom panel of appendix table V shows hospital affiliation with a network for CBSAs that have a single hospital. Many of these hospitals have revenues less than $35 million and are in rural areas. About half of the hospitals in single-hospital CBSAs are affiliated with a network, and for these hospitals the average intermediate sufficiency margin is 32.33 percent while for the hospitals not affiliated with a network it is 19.43 percent. Most of the network affiliated hospitals are for-profit, so it may be that both network affiliation and the entity specific effect measured by the dummy variable for for-profit combine to provide this disparity.

A fourth hospital specific dummy variable is for hospitals with large emergency department patient use. Emergency departments are often the front door of the hospital for many outpatients with, on average, almost 90 percent of emergency department cases being treated as outpatient care, and 10 percent being admitted for inpatient care. [20]This is especially true for areas served by hospitals with large uninsured populations who, lacking primary care physicians, use the emergency department as the point of contact for health care. Additionally, hospitals that serve areas with large uninsured populations will tend to have larger charity care costs and larger bad debt expenses. Because payments for outpatient care are less than inpatient care, and because hospitals that serve large uninsured

[20] See table 24, National Hospital Ambulatory Medical Care Survey: 2017 Emergency Department Summary Tables, https://www.cdc.gov/nchs/data/nhamcs/web_tables/2017_ed_web_tables-508.pdf.

populations have greater costs for charity care and bad debts, high outpatient care use through the emergency department can be expected to reduce intermediate sufficiency margins.

While the CMS cost reports do not directly provide a count of emergency department discharges, we can exploit the stable relationship between the commodity costs of health care – the medical, surgical, and pharmaceutical costs included in the gross sufficiency margin - to infer the level of emergency department use indirectly in the following manner. Appendix Table III shows a stable relationship between the commodity costs of health care and net patient revenues across hospital size and entity type. If the commodity costs of the emergency department are a large proportion of net patient revenue, then this would indicate high use of the emergency department. We set this dummy variable equal to one when the emergency department commodity costs are greater than 10 percent of a hospital's net patient revenues. Greater use of the emergency department should reduce the intermediate sufficiency margin, and we find strong support for this hypothesis.

The fifth hospital specific variable focuses on the proportion of hospital inpatient days covered under Medicaid and CHIP (the Children's Health Insurance Program). The greater the number of hospital inpatient days paid through Medicaid, the lower the expected intermediate sufficiency margin because Medicaid pays less than Medicare or Commercial for most inpatient care.

Hospital case mix index

The sixth and final hospital specific variable uses the case mix index reported by CMS for some hospitals.[21] The case mix index measures both the complexity of inpatient cases and the resources necessary to provide health care for them. The index is used to calculate payments to hospitals under Medicare and Medicaid.[22] The case value assigned for the case mix index depends not only on the underlying patient medical issues and resources committed to that care in a hospital, but also on the quality and care of documentation for each case expended by a hospital. Hospitals that commit fewer resources to careful documentation will tend to have lower case mix indexes than a hospital committing greater resources and care to case documentation. Some research has shown that hospital case mix indexes are higher for for-profit hospitals than for governmental, and at least a part of this may be the result of greater efforts on coding and documenting inpatient cases.[23]

[21] The case-mix index for discharges occurring in federal fiscal year 2017 is provided for some hospitals in the CMS FY 2019 Wage Index Files, Table 2 Final Rule. The available case-mix index values are merged with our data set by provider identification number. The wage index file can be found at: https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/Wage-Index-Files-Items/FY-2019-Wage-Index-Home-Page.

[22] As an example, for the treatment of Chronic Obstructive Pulmonary Disease, or COPD, the case index number, or diagnosis related group (DRG) is 192 if the patient exhibits no complications and is code 190 if the patient exhibits complications. Across all hospitals in North Carolina that accepted Medicare in 2017, the average payment by Medicare for code 192 was $4,508 but for code 190, for patient cases with complications, the average payment was $7,019. For Commercial payers, the average payment for code 192 was $5,159 and for code 190 $9,774. Using case mix codes for conditions with complications results in higher payments to the hospital. The data for this example are from 2017 CMS Medicare Provider Analysis and Review (MEDPAR) inpatient data; North Carolina Medicaid and Commercial data from North Carolina Department of Health and Human Services Transparency in Healthcare Costs Dataset, 10/1/2016-9/30/2017.

[23] See "Impact of Hospital Variables on Case Mix Index as a Marker of Disease Severity", Carmen M. Mendez, Darrell W. Harrington, Peter Christenson, and Brad Spellberg, Population Health Management, February 2014, pp.

The case mix index provided by CMS reflects only Medicare inpatient discharges and not Medicaid or Commercial discharges. CMS does not require case mix indexes to be reported for small, rural hospitals which can impart an "urban" bias to the measure. Table 5 compares how the means of our chosen variables change when we limit the sample to hospitals that are able to be matched with a CMS Medicare case mix index. The small hospital exclusion pares 1,218 observations, or almost 30 percent, from our data set. A disproportionately large number of these hospitals without a Medicare case mix reported are small, rural area, governmental hospitals.[24] However, our largest concern about the case mix index is that more than half of all inpatient discharges are not paid for under Medicare, and these cases are not included.

To use the case mix index reported by CMS, we need to make the strong assumption that each hospital's case mix index for Medicare discharges is indicative of the overall case mix for all discharges for that hospital. We cannot test this assumption with the data we have.

With these caveats, we consistently find that the case mix index provides useful information about the sufficiency of hospital payments for patient care, with larger indexes from patient procedures with complications improving the intermediate sufficiency margin.

Finally, the case mix index reported was highly correlated with the other 19 independent variables listed above, so much so that the condition number calculated using a singular value decomposition was a high value of 58, indicating substantial multicollinearity in the data set.[25] To address this multicollinearity, we transform the case mix index reported on CMS cost reports into a modified case mix index that is devoid of any correlation with the remaining 19 independent variables. We regress the case mix index on the remaining 19 independent variables, which has an R-square of 0.38, and use the residuals from this regression in place of the case mix index. We call this new variable the modified case mix index. By using the modified case mix index, the condition number of the data matrix was reduced from 58 to 33. If there is any information content remaining in the modified case mix index then the coefficient would be statistically significant. We expect that higher modified case mix indexes would result in greater intermediate sufficiency margins because of greater payments to hospitals. We find strong evidence for this in the model that includes the modified case mix index.

---

[23] Moreover, for-profit hospitals have an incentive to "up-code" case indexes because it results in greater payments for inpatient services which can lead to greater profits.

[24] The percentage of for-profit hospitals increases from 18.1% in the model without Medicare case mix to 23.8% in the model with Medicare case mix, while the percentage of hospitals that are non-profit stays around 60% in both models, and the percentage of hospitals that are governmental decreases from 22.2% to 13.3%. The sample with Medicare case mix includes hospitals that are more urban than the sample without Medicare case mix. This change is apparent in the variables that interact state Medicaid expansion with a dummy for urban or rural. Hospitals in urban areas located in states with Medicaid expansion make up 32.8% of the sample without Medicare case mix and 45.3% of the sample with Medicare case mix. Likewise, the fraction of hospitals in rural areas located in states with Medicaid expansion decreases from 29.3% in the full sample to 16.2% in the sample that reports Medicare case mix.

[25] The condition number is the ratio of the largest eigenvalue to the smallest eigenvalue of a matrix. In this case the matrix is the data set of 20 variables. As a rough guide, when the condition number of a data matrix exceeds 40, the stability of estimated coefficients using ordinary least squares becomes challenged and it is not uncommon to observe variables with the "wrong" signs or "too large" or with the deletion of just a few observations both sign and magnitude "flips".

Table 4. Variables used in analysis.

Nationwide				
Variable	Description	N	Range	Mean
Dummy.For-Profit	Dummy variable for for-profit hospitals.	4429	(0,1)	0.196
Dummy.Non-Profit.Church	Dummy variable for church-affiliated nonprofit hospitals.	4429	(0,1)	0.119
Dummy.Non-Profit.Other	Dummy variable for non-church-affiliated nonprofit hospitals.	4429	(0,1)	0.462
Dummy.Revenues<$35Mil	Dummy variable for if hospitals have net patient revenues between $0 and $35 million.	4329	(0,1)	0.312
Dummy.Specialty.Hospital	Dummy variable for if a hospital specializes in a particular field (ex: hip and knee, orthopedic, women and children).	4429	(0,1)	0.014
Dummy.Transplant.Center	Dummy variable for if a hospital operates a transplant center.	4429	(0,1)	0.046
Statewide				
Variable	Description	N	Range	Mean
Dummy.Right.to.Work	Dummy variable identifying whether a hospital is located in a right to work state. (1)	4429	(0,1)	0.622
Health.Outcome.Ranking	Ranking scheme from America's Health Rankings. For each state, it is the weighted sum of the number of standard deviations its core outcomes (in behavorial health, mortality, and physical health) are from the national average. (2)	4422	(-0.373, 0.283)	-0.030
Dummy.Minnesota	Dummy variable identifying if a hospital is located in Minnesota.	4429	(0,1)	0.028
Medicaid.Coverage	Calculated as the share of the state population enrolled in Medicaid over the share of the state population below 200% federal poverty level. (3)	4429	(0.458, 1.200)	0.712
Medicaid Expansion and Rural/Urban Level				
Variable	Description	N	Range	Mean
Dummy.RuralxMedicaid.Expansion	Interaction between a dummy variable for if a hospital identifies as rural and a dummy variable for if a hospital is located in a state with expanded Medicaid.	4429	(0,1)	0.284
Dummy.UrbanxMedicaid.Expansion	Interaction between a dummy variable for if a hospital identifies as urban and a dummy variable for if a hospital is located in a state with expanded Medicaid.	4429	(0,1)	0.347
CBSA or Zip Code Level				
Variable	Description	N	Range	Mean
CBSA.Market.Competition.Index	A Herfindahl-Hirschmann index of market competition within a CBSA, based upon a hospital's share of the net patient revenues in the CBSA. Rural CBSAs with a single hospital are assigned a market index value of 1, indicating no competition.	4428	(0.022, 1.000)	0.519
Zip.Code.Income.Disparity.Ratio	The ratio of exemptions on returns with AGI greater than $100,000 to exemptions on returns with AGI less than $25,000 in a hospital's zip code. (4)	4345	(0.000, 15.676)	1.164

Hospital Level				
Variable	Description	N	Range	Mean
Medicaid.Days%	Share of a hospital's total days that are for patients insured by Medicaid and Chip.	4411	(0.000, 0.869)	0.087
Dummy.Emergency>10%.Net.Patient.Revenue	Dummy variable identifying if a hospital's emergency department nonsalary costs are greater than 10% as a share of the hospital's net patient revenues.	4150	(0,1)	0.040
Dummy.Network.5-20.hospitals	Dummy variable identifying if a hospital is part of a network consisting of greater than 5 and less than or equal to 20 hospitals.	4429	(0,1)	0.208
Dummy.Network.20-50.hospitals	Dummy variable identifying if a hospital is part of a network consisting of greater than 20 and less than or equal to 50 hospitals.	4429	(0,1)	0.111
Dummy.Network.> 50.hospitals	Dummy variable identifying if a hospital is part of a network consisting of greater than 50 hospitals.	4429	(0,1)	0.125
Medicare.Case.Mix	Federal Fiscal Year 2017 hospital case mix indexes for medicare discharges, reflecting a hospital's mixture and clinical complexity of patients. Data from the Center from Medicare and Medicaid Services FY 2019 Acute Impatient Final Rule and Correction Notice.	3156	(0.684, 4.340)	1.618
Modified.Medicare.Case.Mix	Calculated by regressing the FedFY2017.casemix.indexes variable on the remaining independent variables in the model. The ModCase.Mix2 variable is the residual value, for each hospital, from this regression. Used to improve condition number of data set for regression estimation while still contributing hospital specific information about Medicare patient case mix.	2854	(-1.001, 2.715)	0

Notes:
(1) The 28 states with right-to-work laws in 2017 were: Alabama, Arizona, Arkansas, Florida, Georgia, Idaho, Indiana, Iowa, Kansas, Kentucky, Louisiana, Michigan, Mississippi, Nebraska, Nevada, North Carolina, North Dakota, Ohio, Oklahoma, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, West Virginia, Wisconsin and Wyoming.
(2) The health.outcome.ranking variable takes a health outcome score for each state and measures how many standard deviations away the state outcomes are from the national average. A score of 0 represents the national average. A postive score means the health outcomes in that state are better than average. A negative score means the health outcomes in that state are worse than the national average. The health outcome score for each state is based on measures of behaviorial health (depression, alcohol use, mental distress, drug use), mortality (drug deaths, premature death, suicide), physical health (frequent physical distress, high health status, low birthweight, and chronic conditions like arthritis, asthma, cancer, cardiovascular disease, chronic kidney disease, chronic obstructive pulmonary disease, and diabetes), and risk factors (high blood pressure, high cholesterol, obesity).See www.AmericasHealthRankings.org
(3) The proportion of each state's population below 200 pecent of the federal poverty level that is covered under state medicaid is from the Kaiser Family Foundation analysis of state Medicaid enrollment for 2017, https://www.kff.org/interactive/medicaid-state-fact-sheets.
(4) The ratio of exemptions on individual income tax returns with adjusted gross income (AGI) greater than $100,000 to returns with adjusted gross income below $25,000 is from https://www.irs.gov/statistics/soi-tax-stats-individual-income-tax-statistics-2017-zip-code-data-soi. This ratio compares the number of persons living in high income households to the number of persons living in low income households in the same 5-digit zip code where the hospital is located. Nationwide, about 73 million exemptions (or 25 percent of all exemptions on filed tax returns) were reported on individual tax returns with AGI greater than $100,000, and the same amount on returns with AGI less than $25,000. (See Table 1.4, All Returns: Sources of Income, Adjustments, and Tax Items by Size of Adjusted Gross Income, Tax Year 2017, at https://www.irs.gov/statistics/soi-tax-stats-individual-statistical-tables-by-size-of-adjusted-gross-income). However, about 42 million persons were not accounted for on filed income tax returns mostly because their income was below the tax return filing requirement (out of a population of approximately 323 million), and the vast majority of these persons had income consisting almost entirely of social security income that was not subject to income tax. The ratio calculated does not account for the number of persons in each 5-digit zip code that were non-filers.

Table 5. Comparison of model variables in estimation samples

Data aggregation	Variable	With Medicare Case Mix (2,854 observations)	Without Medicare Case Mix (4,072 observations)
Full Sample	Intermediate Sufficiency Margin	0.265	0.246
Nationwide	Intercept	1.000	1.000
	Dummy.For-Profit	0.238	0.181
	Dummy.Non-Profit.Church	0.144	0.126
	Dummy.Non-Profit.Other	0.483	0.471
	Dummy.Revenues<$35Mil	0.104	0.306
	Dummy.Specialty.Hospital	0.008	0.008
	Dummy.Transplant.Center	0.058	0.040
rural/urban Medicaid expansion	Dummy.RuralxMedicaid.Expansion	0.162	0.293
	Dummy.UrbanxMedicaid.Expansion	0.453	0.328
State	Dummy.Right.to.Work	0.607	0.628
	Health.Outcome.Ranking	-0.040	-0.031
	Medicaid.Coverage	0.722	0.709
	Dummy.Minnesota	0.016	0.030
CBSA	CBSA.Market.Competition.Index	0.400	0.529
zip code, 5 digit	Zip.Code.Income.Disparity.Ratio	1.289	1.137
Hospital	Medicaid.Days%	0.094	0.085
	Dummy.Emergency>10%.Net.Patient.Revenue	0.017	0.037
	Dummy.Network.5-20.hospitals	0.243	0.213
	Dummy.Network.20-50.hospitals	0.110	0.097
	Dummy.Network.> 50.hospitals	0.166	0.132
	Modified.Medicare.Case.Mix	0.001	---

Model estimation of hospital intermediate sufficiency margin – Is there a forest beyond the trees?

To highlight the importance beyond each patient's underlying health conditions and issues presented for hospital care, the two models estimated tell us that as much as 25 percent of the sufficiency of patient payments to cover the costs of hospital care can be explained by forces outside of the hospital. Thus, the forest – the non-patient specific information about a hospital – has substantial predictive power on hospital sufficiency margins. The "trees" in this analogy is patient specific information that we do not use. Moreover, the two models tell similar stories even though the first model, by eliminating 1,218 hospitals most of which are rural and small, has a decidedly urban and large hospital profile while the second including these 1,218 has a more balanced nationwide hospital profile. Our preferred model, because of the greater nationwide coverage, is the model that does not use the modified case mix variable.

What are the big takeaways?

First, Medicaid matters. In general, the greater the population access to state Medicaid, and the greater the number of Medicaid inpatient discharges, the lower intermediate sufficiency margin. Helping to offset this drag on the sufficiency margin is state adoption of the expansion of Medicaid under the Affordable Care Act.

Second, for-profit hospitals have much greater intermediate sufficiency margins than non-profit or governmental hospitals. For-profit hospitals locate much more frequently in right-to-work states and in neighborhoods with higher incomes, are more likely to be specialty hospitals providing medical procedures that have high reimbursement rates such as knee and hip or orthopedic procedures, and are more likely to be affiliated with a network of hospitals.

Third, heavy use of a hospital's emergency department also reduces the intermediate sufficiency margin.

Results by level of aggregation of variables

The nationwide variables tell us that, relative to governmental hospitals, for-profit and non-profit hospitals have larger sufficiency margins, with for-profits larger than non-profits. As expected, small hospitals with net patient revenues less than $35 million have much lower margins than hospitals with greater net patient revenues. From table 1 we know that all entity types are represented in this size range but note that the dummy variables for for-profit and non-profit hospitals there are hospitals *essentially offset the reduction in margin*.

We find that specialty hospitals, which are mostly surgical specialty hospitals, and mostly for-profit, also increase the intermediate sufficiency margin. However, hospitals identified as transplant hospitals do not.

Hospitals located in the 31 states that adopted the expansion of Medicaid under the Affordable Care Act by 2017 had improved intermediate sufficiency margin, and for the model without the modified case mix index, this benefit was almost twice as large for rural hospitals as for urban hospitals. For the model that includes the modified case mix index, the sample loses 1,218 observations, most of which are small hospitals in rural areas. In this model, the rural/urban disparity goes away but a strong improvement to the sufficiency margin remains. These findings might support a hypothesis that hospital sufficiency margins would improve with universal care, even if paid at Medicaid rates.

Of the state-level variables, two stand out.

First, the proportion of the state population below 200 percent of the federal poverty level ("the FPL") that are eligible under state law for Medicaid has a negative impact on the sufficiency margin in both models. States that covered a greater proportion of the population below 200 percent of the FPL show lower sufficiency margins than that states with less generous Medicaid coverage. At one extreme, Utah covered 45.8 percent of this population while Massachusetts covered 120 percent. The average coverage across all states was 74 percent. This result, at first, seems incompatible with the result that states that expanded Medicaid under the Affordable Care Act had increased sufficiency margins. However, because most states that adopted the Medicaid expansion under the Affordable Care Act also covered a higher proportion of their population that was under 200 percent of the FPL, the expansion of

Medicaid served to offset some the reduction to each hospital's margin that occurred due to state Medicaid coverage.

Second, of five states without for-profit hospitals (Alaska, Maine, Vermont, Delaware, and Minnesota) only Minnesota was significant. Minnesota not only covers a high percentage of the state population with income below 200 percent of the FPL – 85 percent – but the state also has adopted the Medicaid expansion under the Affordable Care Act *and* the state offers insurance coverage for uninsured workers. All of Minnesota's 92 hospitals are non-profit and have higher intermediate sufficiency margins than other non-profits. Moreover, as table 10 shows, no hospital in Minnesota had a negative intermediate sufficiency margin for 2017.

States that had right-to-work laws showed slightly higher intermediate margins in the model without the modified case mix index, but no effect in the model that used the modified case mix index. We believe this is largely the result of the elimination of 1,218 hospitals from mostly rural states that tend to have right-to-work laws.

The last state level variable, the health.outcome.ranking which is an index of overall population health, was not significant in either model.

The variable measured at the CBSA level is a Hirschman-Herfindahl index of market competition based upon the variation in hospital net patient revenues across all hospitals in a CBSA. In the model that included the modified case mix index this variable was positive and significant. A higher value of this variable means a less competitive market, and in this case, greater intermediate sufficiency margin. This is consistent with economic theory that less competition increases profits, although the effect is not large. For the model that does not include the modified case mix index, we find no effect from market competition. This is likely the result of many small rural hospitals having small intermediate sufficiency margins yet the highest value for the HH index, equal to 1.

The 5-digit zip code variable constructed from individual income tax returns is strongly significant. This lends support to the idea that hospitals that locate among higher income neighborhoods have larger intermediate margins. We believe this measure is a good proxy for the proportion of the local population that has Commercial insurance which pays more for hospital services than either Medicare or Medicaid. Hospital location matters for the intermediate sufficiency margin. It should not be surprising that governmental hospitals, often located as a policy decision to provide health care to underserved areas, have lower margins as a result.

The hospital specific variables are all significant in both models. The three dummy variables for affiliation with a hospital network are all significant and positive. In the model with the modified case mix index, the values of the three network dummy variables, while each positive and significant, decline in value as the size of the network increases. This is surprising because we expected that larger networks would have larger sufficiency margins from realizing efficiencies of scale. It may be that the benefit of larger hospital networks on the intermediate margin is partially being reflected in the strong positive coefficient of the modified case mix index. For the model without the modified case mix index, the three dummy variables for the size of hospital networks are significant and of similar size. This too is surprising because we find no evidence of scale economies from larger hospital networks. Under either model, any hospital network affiliation improves intermediate margin sufficiency. It is noteworthy, as the table in Appendix V shows, that 73 percent of for-profit hospitals are affiliated with a network; 50 percent of

non-profit hospitals; and only 13 percent of governmental hospitals. Would creating a hospital network for governmental hospitals improve sufficiency margins?

The last dummy variable that is hospital specific is for hospitals with large non-wage costs associated with the emergency department.[26] We find strong negative effects on hospital intermediate margins when a hospital has large emergency department costs. We also find, more broadly, that an increase in the number of hospital days for Medicaid inpatients decreases hospital intermediate margins. Apart from a hospital being located in a state that adopted the Medicaid expansion under the Affordable Care Act, exposure to Medicaid patients reduces hospital intermediate margins. For this reason, we note that Medicaid discharges from governmental hospitals averaged 10.5 percent of patient discharges but 8.3 percent for non-profits and 7.5 percent for for-profits (see Appendix table IV).

The final model variable, the modified case mix index, is positive and significant in the one model using it. The greater the number of hospital discharges with complex cases paid through Medicare, the greater this index number and the greater the intermediate margin.

Which model is preferable?

Both models fit the hospital data well with R-squareds of 0.25. However, the model without the modified Medicare case mix is our preferred specification because of the greater nationwide coverage of short-term acute care hospitals and the inclusion of many more small, rural hospitals. Moreover, the high degree of collinearity between the Medicare case mix index and the 19 other independent variables forced the use of a creative transformation of the variable that resulted in no greater explanation of hospital intermediate margins than the larger data set without the case mix measure.

[26] The non-wage costs of emergency departments are mostly the commodity costs of providing care. As Appendix table III shows, these commodity costs as medical, surgical, and pharmaceutical costs are remarkably stable as a share of net patient revenue across all hospital entity types and sizes. We exploit this stability to infer that emergency departments with greater non-wage costs had greater patient volume.

Table 6. Estimation of intermediate sufficiency margin for short-term acute care hospitals accepting Medicare during CY 2017. (1)

		With Medicare Case Mix			Without Medicare Case Mix		
Data aggregation	Variable	Coefficient		"Robust" standard error calculated t-statistic	Coefficient		"Robust" standard error calculated t-statistic
Nationwide	Intercept	0.1878	***	[6.0]	0.2057	***	[7.8]
	Dummy.For-Profit	0.1915	***	[10.0]	0.1365	***	[8.7]
	Dummy.Non-Profit.Church	0.1151	***	[5.3]	0.0941	***	[5.8]
	Dummy.Non-Profit.Other	0.1031		[6.1]	0.0732	***	[7.0]
	Dummy.Revenues<$35Mil	-0.1248	***	[-9.0]	-0.0843	***	[-11.0]
	Dummy.Specialty.Hospital	0.0875	*	[2.2]	0.0931	**	[3.1]
	Dummy.Transplant.Center	0.0192		[1.3]	0.0065		[0.4]
rural/urban Medicaid expansion	Dummy.RuralxMedicaid.Expansion	0.0391	***	[3.5]	0.0799	***	[8.4]
	Dummy.UrbanxMedicaid.Expansion	0.0455	***	[4.6]	0.0435	***	[4.9]
State	Dummy.Right.to.Work	0.0158		[1.7]	0.0176	*	[2.1]
	Health.Outcome.Ranking	-0.025		[-0.9]	0.0318		[1.4]
	Medicaid.Coverage	-0.1449	***	[-4.8]	-0.1309	***	[-5.0]
	Dummy.Minnesota	0.0885	***	[4.8]	0.097	***	[7.9]
CBSA	CBSA.Market.Competition.Index	0.0386	**	[2.9]	0.0194		[1.6]
zip code, 5 digit	Zip.Code.Income.Disparity.Ratio	0.0149	***	[6.8]	0.0152	***	[7.1]
Hospital	Medicaid.Days%	-0.1512	*	[-2.5]	-0.0906	*	[-2.1]
	Dummy.Emergency>10%.Net.Patient.Revenue	-0.3424	***	[-4.9]	-0.2672	***	[-7.1]
	Dummy.Network.5-20.hospitals	0.0639	***	[6.5]	0.0609	***	[7.1]
	Dummy.Network.20-50.hospitals	0.0555	***	[4.3]	0.0539	***	[4.8]
	Dummy.Network.> 50.hospitals	0.0416	**	[3.0]	0.0612	***	[4.7]
	Modified.Medicare.Case.Mix	0.0755	***	[4.8]	-		-
	N. obs.	2,854			4,072		
	R squared	0.2551			0.2354		
	F statistic	48.5			65.7		
	singular value decomposition condition number	33.4			30.3		

*** p < 0.001; ** p < 0.01; * p < 0.05.

Notes:

(1) The short-term acute care hospital intermediate sufficiency margin is defined as 1 - (costs for wages and salaries of employees, contractors, medical supplies, pharmaceutical supplies, surgical supplies, interest expense, IT expense, bad debt expense measured at cost, charitable care measured at cost, and maintenance and repairs)/(net patient revenues). The mean values of this intermediate sufficiency margin by size and tax entity type are shown on table 3.

(2) The absence of heteroskedasticity for both was rejected for both models using White's test, provided in the R package "skedastic" with the white_lm() command. Robust standard errors (SE) were implemented using the "sandwich" package, adjusting the variance-covariance matrix by the "HC1" method which multiples the squared residuals of the model by (the number of observations)/(the number of observations – the number of coefficients).

Variables with greatest influence on intermediate sufficiency margins

With the short-term acute care hospitals grouped by entity type and size, it may be difficult to determine how each variable influences the intermediate sufficiency margin. To discover how the model variables impact the different types of hospitals, we create the following measure of influence on the sufficiency margin.

Each coefficient estimate represents the predicted change in the intermediate margin from a one unit change in the independent variable. For a dummy variable with values of either 0 or 1, the estimated coefficient represents the predicted intermediate margin for the average hospital in the group of hospitals which have that dummy variable equal to 1. For example, the estimated coefficient on Dummy.For.Profit of 0.1915 (in the model with case mix) means that an average for-profit hospital has an intermediate sufficiency margin that is 0.1915 points larger than an average hospital that is not for profit. Likewise, the estimated coefficient on our dummy for small hospitals (Dummy.Revenues<$35Mil) of -0.1248 means that the average small hospital has an intermediate sufficiency margin that is 0.1248 points smaller than an average medium or large hospital. The model also includes continuous variables measured as a percent, like Medicaid.Days%, which measures the share of a hospital's total inpatient days that are for patients insured by Medicaid and CHIP. This implies that a 1 percentage point increase in the share of Medicaid inpatient days leads to a decrease in predicted profit margin by 0.1512 points. If all of the independent variables in our model were measured in the same units, we could make inferences about which variables have the largest impact on the predicted intermediate sufficiency margin by directly comparing the magnitudes of the coefficients. We cannot make such inferences from our model coefficients because we have discrete dummy variables, continuous variables measured as a percentage, and index variables that measure the CBSA market competition, the statewide health outcome ranking, and the Medicare case mix.

So which variables in the two models contribute the most towards explaining hospital intermediate sufficiency margins?

To answer this, we construct a measure of the share of the predicted intermediate sufficiency margin that arises from each independent variable. We first calculate the predicted intermediate sufficiency margin for each hospital *i* by multiplying the estimated coefficients β times the independent variables for each hospital x_{ki} and then summing according to equation (1) below, where *k* represents the number of variables in the model:

$$predicted.margin_i = \beta_0 + \beta_1 x_{1i} + \cdots + \beta_k x_{ki} \quad (1)$$

Next, we compute the proportion of the predicted margin for hospital *i* attributable to independent variable x_k by multiplying the independent variable by the estimated coefficient and dividing by the predicted intermediate sufficiency margin. This is shown in equation (2). We calculate these proportions for each of our model variables for every hospital in our dataset.

$$proportion_{ki} = \frac{\beta_k x_{ki}}{predicted.margin_i} \quad (2)$$

By construction, the sum of the proportions for each of the independent variables across a hospital will total 1.[27]

Table 7 contains the mean values of these proportions across all hospitals in our sample for each of the independent variables. Each number represents the proportion of the predicted intermediate sufficiency margin that can be explained by that independent variable. We removed hospitals with predicted intermediate sufficiency margins near 0. Since each proportion is divided by the predicted margin, including these very small predicted margins lead to proportions that approach infinity.[28] Table 7 shows predicted proportions for each independent variable in our models both with and without the Medicare case mix variable. For example, the for-profit dummy variable explains 12.4% of the predicted intermediate sufficiency margin in the model with Medicare case mix and 6.9% of the predicted intermediate sufficiency margin in the model without Medicare case mix. To calculate these proportions, we multiplied the coefficient on Dummy.For.Profit (0.1915 in the model with Medicare case mix and 0.1365 in the model without) times the value of variable Dummy.For.Profit for each hospital, divided by the predicted intermediate sufficiency margin, and then calculated the mean proportion over all hospitals.

Which variables contribute the most to explaining the sufficiency margin? Beyond the intercept, which contributes the most, the second most influential variable is not a nationwide variable but the state level variable proportion of the state population below 200 percent of the FPL covered under state Medicaid. The next three most influential variables are nationwide: the dummy variable for non-profits other than church affiliated, the dummy variable for small hospitals, and the dummy variable for for-profits. Next are the two variables for the expansion of Medicaid under the Affordable Care Act, the income tax variable of the ratio of persons in households with AGI greater than $100,000 to households with AGI less than $25,000, the competitiveness of the hospital market within a CBSA, the number of Medicaid hospital days, the high-cost emergency departments and small hospital networks and the dummy variable for non-profits that are church affiliated, and large hospital networks with more than 50 hospitals, the hospital networks with between 20 and 50 hospitals, and finally the Medicare case mix index.

The variables in Table 7 can be grouped by the data aggregation level noted in the left most column. We present these aggregated results for a variety of hospital types on Table 8. The aggregated mean proportions in the shaded lines of Table 7 correspond to the amount on Table 8 in the columns in the column labeled “All Hospitals”. Average predicted shares in each column sum up to 1. Results for the model with Medicare case mix are in the top panel.

Most of the predicted intermediate sufficiency margin for each of the hospital subsets can be explained by variables in the “Nationwide” category, which includes dummies for entity type and size as well as the intercept. Variables in the rural/urban Medicaid expansion, CBSA, zip code, and Hospital specific aggregate categories each account for small positive proportions of predicted intermediate margin in

[27] The larger the estimated proportion, in absolute terms, the greater the contribution of that variable to the estimated intermediate margin. This calculation helps us to understand, apart from statistical significance of an estimated parameter, how significant is the contribution of the variable to the predicted dependent variable.
[28] Our trimming procedure involved removing hospitals with a predicted intermediate margin between -1.5% and 1.5% from the calculation of the average. We removed 33 hospitals from the model with Medicare case mix and 16 hospitals from the model without Medicare case mix.

the model with Medicare case mix. State variables lead to negative predicted proportions of intermediate margin due to large effect from the state-wide Medicaid enrollment variable. Most of the hospital specific variables lead to positive proportions of predicted intermediate margin. The variables for emergency services as a share of net patient revenues and the three hospital network dummies all contribute to positive proportions of predicted margin. The share of Medicaid days decreases the proportion of predicted margin by 6.8% in the model with Medicare case mix and 3.6% in the model without. The modified case mix also contributes a negative proportion of predicted margin.[29] Over all of our hospitals, the sum of these hospital specific proportions is positive.

The next six columns of Table 8 contain the average predicted proportions for hospitals broken out by entity type and hospital size. Importantly, with this analysis we see that the model variables contribute in different amounts to the predicted intermediate sufficiency margin depending upon entity type. Across all six groups, the state specific variables lead to negative predicted intermediate margins. This effect is greatest for Governmental and Small hospitals where large state Medicaid enrollments reduce predicted intermediate margins by -0.808 and -0.554, respectively. State variables have the smallest impact on for-profit hospitals (-0.235). Medicaid expansion, on the other hand, has a positive proportion of predicted intermediate margin for all six hospital groups. Zip code income matters least for the predicted margin of for-profit hospitals and most for governmental hospitals. Hospital specific variables contribute an overall negative proportion of predicted margin for governmental hospitals. Governmental hospitals are less likely to be a member of hospital network so the negative proportions from Medicaid days outweighs the hospital network dummy variables.

[29] This may seem counterintuitive at first because the Medicare case mix index reported in the CMS cost reports is always a positive number. However, we transform the Medicare case mix index to reduce multicollinearity in the data set as the residual from an ordinary-least-squares regression with a mean value of 0, and many values that are negative. Thus, the range of values of the modified case mix has both positive and negative amounts and contains only information about the hospital that is not otherwise included in the remaining 19 independent variables.

Table 7. Proportion of intermediate sufficiency margin explained by independent variables.

Data aggregation	Variable	With Medicare Case Mix	Without Medicare Case Mix
Nationwide	Intercept	0.821	0.862
	Dummy.For-Profit	0.124	0.069
	Dummy.Non-Profit.Church	0.056	0.038
	Dummy.Non-Profit.Other	0.199	0.130
	Dummy.Revenues<$35Mil	-0.100	-0.136
	Dummy.Specialty.Hospital	0.002	0.002
	Dummy.Transplant.Center	0.005	0.001
	Total	1.107	0.967
rural/urban Medicaid expansion	Dummy.RuralxMedicaid.Expansion	0.028	0.093
	Dummy.UrbanxMedicaid.Expansion	0.085	0.055
	Total	0.113	0.148
State	Dummy.Right.to.Work	0.041	0.046
	Health.Outcome.Ranking	0.004	-0.005
	Medicaid.Coverage	-0.459	-0.387
	Dummy.Minnesota	0.004	0.010
	Total	-0.409	-0.336
CBSA	CBSA.Market.Competition.Index	0.077	0.046
	Total	0.077	0.046
zip code, 5 digit	Zip.Code.Income.Disparity.Ratio	0.071	0.064
	Total	0.071	0.064
Hospital	Medicaid.Days%	-0.068	-0.036
	Dummy.Emergency>10%.Net.Patient.Revenue	0.027	0.061
	Dummy.Network.5-20.hospitals	0.052	0.044
	Dummy.Network.20-50.hospitals	0.020	0.018
	Dummy.Network.> 50.hospitals	0.020	0.024
	Modified.Medicare.Case.Mix	-0.007	---
	Total	0.043	0.111
	Total	1.0	1.0

Figures 1 and 2 depict the components of predicted intermediate sufficiency margin by hospital type and size. In the model with the modified case mix variable, the overall average predicted intermediate sufficiency margin is 0.266. For-profit hospitals have the largest predicted intermediate margin (0.349) while small and governmental hospitals have the smallest predicted intermediate margins at 0.103 and 0.102. Nationwide variables, shaded in dark blue, make up the largest share of predicted intermediate sufficiency margin for all hospital types and sizes. This should be expected because the nationwide variables segregate hospitals by entity type, and therefore provide entity type mean values for the intermediate sufficiency margin. State variables reduce intermediate sufficiency margin. For governmental hospitals, the hospital specific variables (green bar) also reduce predicted margin. Average predicted margin is larger for small and governmental hospitals in the model without Medicare case mix. As previously discussed, including Medicare case mix in the models disproportionately removes small and governmental hospitals from our sample. Including these hospitals in our sample as in the model without Medicare case mix, we can see that these omitted hospitals have larger predicted margins.

Table 8. Proportion of predicted intermediate sufficiency margin explained by independent variables, by hospital type and size.

	With Medicare Case Mix						
Data aggregation	All Hospitals	For-Profit Hospitals	Non-Profit Church Hospitals	Non-Profit Other Hospitals	Governmental Hospitals	Small Hospitals	Medium and Large Hospitals
Nationwide	1.107	1.000	1.003	1.114	1.378	0.887	1.132
rural/urban Medicaid expansion	0.113	0.055	0.103	0.126	0.174	0.091	0.115
State	-0.409	-0.235	-0.325	-0.408	-0.808	-0.554	-0.393
CBSA	0.077	0.036	0.044	0.061	0.235	0.252	0.056
zip code, 5 digit	0.071	0.043	0.065	0.078	0.098	0.054	0.073
Hospital	0.043	0.100	0.110	0.029	-0.077	0.270	0.017
Total	1.0	1.0	1.0	1.0	1.0	1.0	1.0

	Without Medicare Case Mix						
Data aggregation	All Hospitals	For-Profit Hospitals	Non-Profit Church Hospitals	Non-Profit Other Hospitals	Governmental Hospitals	Small Hospitals	Medium and Large Hospitals
Nationwide	0.967	0.917	0.917	0.970	1.029	0.820	1.031
rural/urban Medicaid expansion	0.148	0.066	0.143	0.160	0.193	0.189	0.131
State	-0.336	-0.213	-0.282	-0.320	-0.501	-0.368	-0.322
CBSA	0.046	0.020	0.027	0.037	0.096	0.083	0.030
zip code, 5 digit	0.064	0.048	0.059	0.069	0.070	0.056	0.068
Hospital	0.111	0.163	0.136	0.083	0.113	0.220	0.063
Total	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Figure 1

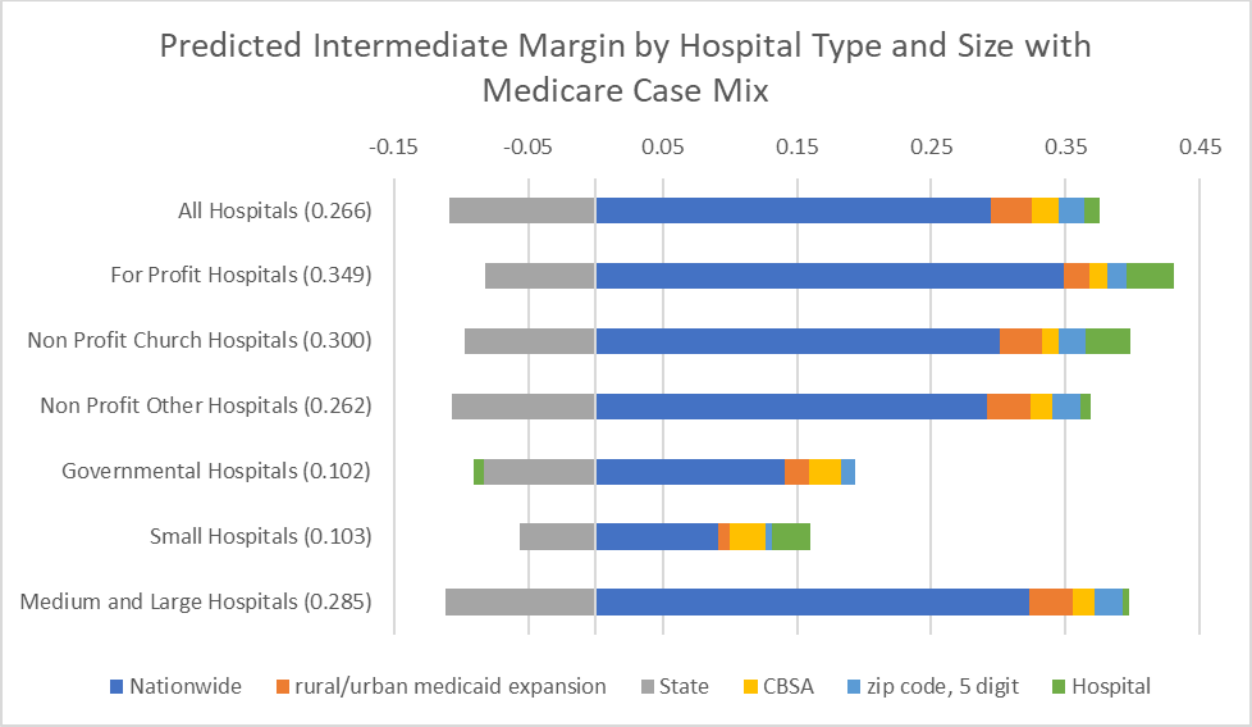
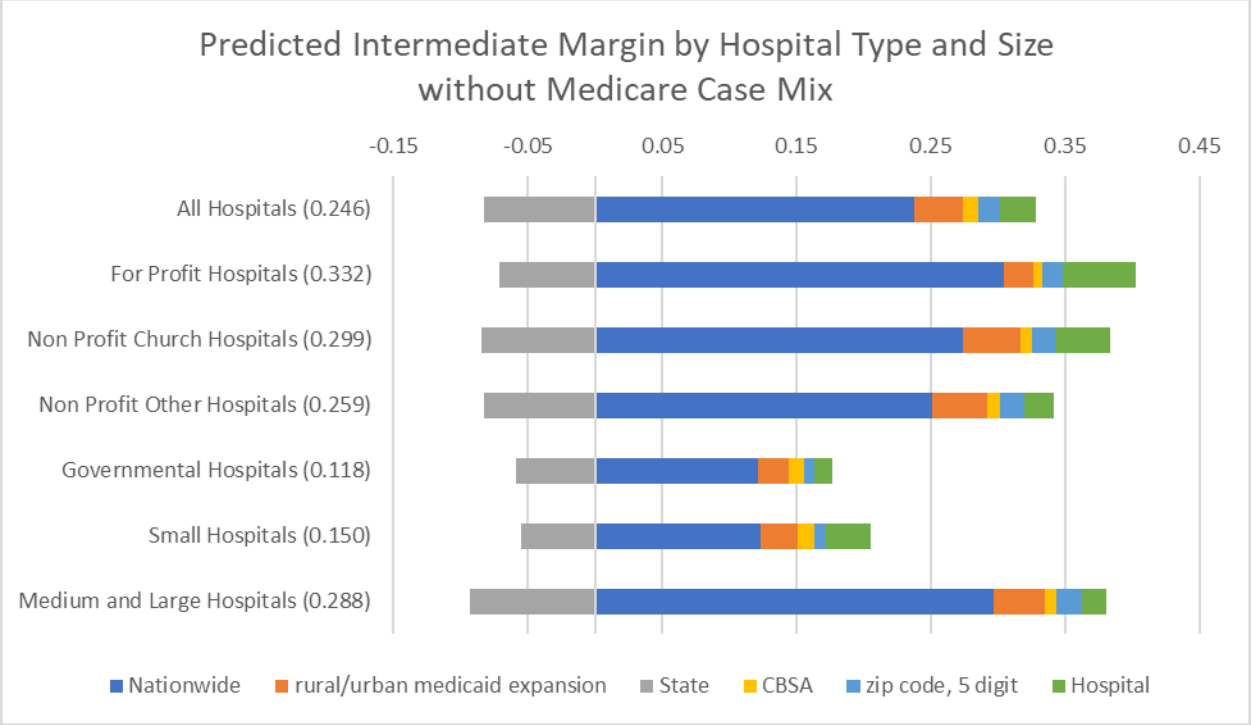


Figure 2



Hospitals with predominantly Medicare patients or Medicare revenues

We consider the 187 hospitals where Medicare inpatient discharges were at least 75 percent of total discharges, and the 4 hospitals where Medicare revenues were at least 75 percent of total patient revenue.

Hospitals with at least 75 percent of inpatient discharges paid through Medicare

Table 9 Part A shows that about 95 percent of these hospitals (177 of 187) have net patient revenues less than $35 million. The rest of the hospitals fall into the $35 - $600 million net patient revenues range, with none reporting an amount greater than $600 million.[30]

There is a clear urban/rural divide amongst these predominantly Medicare discharge hospitals. Of the 187 hospitals, 169 identified as rural and 18 identified as urban, or 90 percent and 10 percent, respectively. Analyzing this by net patient revenues size rather than hospital type further clarifies the split. The urban predominantly Medicare hospitals are disproportionately in the $35 - $600 million net patient revenues size category, with 40 percent (7 of 18) of them in that range. In this size range, furthermore, the urban hospitals outnumber the rural in a ratio of 3.5 to 1. The rural predominantly Medicare hospitals are overwhelmingly in the less than $35 million net patient revenues size category. It contains at least 98% of them (166 of 169), and a rural to urban ratio of approximately 15:1. Four upper mid-west states, Kansas, Nebraska, North Dakota and South Dakota, account for one-half of the 187 hospitals. The largest number of predominantly Medicare hospitals are located in Kansas at 37, followed by North Dakota and Nebraska each with 20, and then South Dakota which has 18. Kansas' count alone comprises 20 percent of all predominantly Medicare hospitals included in this paper's analysis.

There are also clear differences by type of hospital with for-profits accounting for approximately 9 percent of the predominantly Medicare patient hospitals with nonprofits and governmental hospitals totaling to 47 percent and 44 percent, respectively. The governmental hospitals consistently have the lowest average intermediate sufficiency margin. Of note, while the average intermediate sufficiency margins for each revenue and hospital type category are positive, as seen in the second to last column of the table, 20 of the 187 hospitals, or approximately 11 percent, had negative intermediate sufficiency margins as a share of net patient revenues when analyzed at individual hospital level: 6 for-profits, 7 nonprofits, and 7 governmental hospitals. This amounts to $12,623,956 dollars of negative margin and $928,625,087 dollars of positive margin in total for this subgroup. The ratio of negative to positive intermediate sufficiency margin for these 20 hospitals is 0.014, whereas the nationwide ratio is 0.041

[30] See Note 1 of Table 9 for detail on why one rural governmental hospital is unaccounted for in analysis that references the net patient revenues size categories, including the later calculations on hospitals with negative intermediate margins.

Table 9 - Part A. Hospitals with a Medicare discharge share equal to or greater than 75 percent, 2017.

Size of Net Patient Revenues	Hospital Type	Count (1)	Share of Size Category	Urban/Rural Split	Count in Network >= 5 Hospitals	Share of Hospital Type in Network >= 5 Hospitals	Average Intermediate Sufficiency Margin (2)	Total Net Patient Revenue (3) ($M)
Any	For-profits	17	9.09%	6 / 11	9	52.94%	17.76%	203
	Nonprofits	88	47.06%	5 / 83	27	30.68%	22.84%	1,385
	Governmental	82	43.85%	7 / 75	3	3.66%	16.25%	1,289
	All	187		18 / 169	39	20.86%	19.51%	2,876
< $35 million	For-profits	16	9.04%	5 / 11	8	50.00%	15.21%	162
	Nonprofits	85	48.02%	4 / 81	27	31.76%	21.79%	894
	Governmental	76	42.94%	2 / 74	3	3.95%	15.74%	764
	All	177		11 / 166	38	21.47%	18.60%	1,820
$35-$600 million	For-profits	1	11.11%	1 / 0	1	100.00%	58.65%	41
	Nonprofits	3	33.33%	1 / 2	0	0.00%	52.76%	490
	Governmental	5	55.56%	5 / 0	0	0.00%	23.99%	525
	All	9		7 / 2	1	11.11%	37.43%	1,056
> $600 million	For-profits	0	-	-	-	-	-	-
	Nonprofits	0	-	-	-	-	-	-
	Governmental	0	-	-	-	-	-	-
	All	0	-	-	-	-	-	-

(1) The governmental hospital counts of the net patient revenues categories do not total to the value for governmental in the top panel due to one hospital missing a value for its net patient revenues. This affects the rural split count as well, with 169 total rural hospitals but only 168 accounted for in revenue size categories.
(2) It is important to note the counts in the calculation of these averages. For the $35 - $600 million net patient revenue size category, the averages are taken across a small number of hospitals. For example, for the for-profits, there is only one hospital included so the average will be the intermediate margin of that one hospital.
(3) This is summed over hospitals that provided a value for their net patient revenues on Worksheet G-3, line 3 on the Medicare cost reports.

Approximately 21 percent of the predominantly Medicare patient hospitals (39 of 187) are in networks comprised of five or more hospitals. Of the 39 hospitals in networks, for-profit hospitals make up 23 percent (9 of 39), nonprofit hospitals make up 69 percent (27 of 39), and governmental hospitals make up 8 percent (3 of 39). However, about half or 53 percent of the for-profits, 31 percent of the nonprofits, and 4 percent of the governmental hospitals are in networks with at least 5 hospitals, indicating that the for-profits are the most likely type to be in a network, a result masked by their overall share of 23 percent of network hospitals. In contrast, governmental hospitals are the least likely to be in such networks. In combination with the finding that governmental hospitals consistently have the lowest intermediate margins, this further supports the model's findings that network membership increases a hospital's intermediate sufficiency margin.

What can we say about the distribution of revenues for these predominantly Medicare patient hospitals? On average, Medicare accounts for *only* 24.8 percent, Medicaid for 7.6 percent and Commercial for 67.6 percent of a hospital's net patient revenues for this group. This distribution is consistent across the different types of hospitals, with each averaging a share between 24 and 28 percent for Medicare, between 6 and 11 percent for Medicaid, and between 61 and 69 percent for

Commercial. Notably, these revenue shares for the patient categories are disproportionate to their respective discharge shares. While on average Medicare and Commercial account for 25 and 68 percent of a hospital's net patient revenues, they account for 83 and 14 percent of a hospital's discharges, respectively. We conclude from this analysis that a high proportion of Medicare patients is associated with strong intermediate sufficiency margins but *this is not the result of Medicare payments but rather large Commercial payments*.

Table 9 Part B answers the second part of the Medicare hospital question – what are intermediate sufficiency margins in hospitals with at least 75 percent of net patient revenue through Medicare? There are only four hospitals, nationwide, that fall into this predominantly Medicare revenues category: one for-profit located in Georgia, as well as one non-profit and two governmental hospitals all located in Texas. Both Georgia and Texas have right-to-work laws and did not expand Medicaid under the Affordable Care Act by 2017, and within these states, all four hospitals are located in zip codes with relatively low average total incomes, ranging from $42,593 to $49,356. Aside from these similarities, the for-profit hospital is rather unique in this set: it is the only hospital of the four to have a positive intermediate sufficiency margin and the only one to belong to a network with at least 5 hospitals. With only 4 hospitals meeting the 75 percent net patient revenue from Medicare test it is difficult to draw conclusions. This is even more so because the intermediate margin for the lone for-profit hospital is a large positive 58.65 percent while the intermediate margins for the 2 non-profits and lone governmental are very negative.

Table 9 – Part B. Hospitals with a Medicare net patient revenue share equal to or greater than 75 percent, 2017.

Hospital Category	Count	Urban/Rural Split	Net Patient Revenues Range	Count in Network >= 5 Hospitals	Average Intermediate Sufficiency Margin	Total Net Medicare Revenue ($)	Total Net Patient Revenue ($)
For-profits	1	1 / 0	$35 – $600 million	1	58.65%	31,810,512	40,662,093
Nonprofits	1	1 / 0	$35 – $600 million	0	-312.72%	93,178,367	78,465,628
Governmental	2	0 / 2	<= $35 million	0	-220.89%	1,852,080	1,823,643
All	4	2 / 2		1	-173.96%	126,840,959	120,951,364

Hospitals in large markets

In this section, we examine the intermediate sufficiency margin by hospital type nationwide and across the 28 largest CBSAs in terms of population, and draw contrasts with the smallest single hospital CBSA markets nationwide and with Minnesota. The 28 largest CBSAs account for 128.7 million of the 325 million persons in the U.S. (almost 40 percent). The 406 smallest CBSAs, each with a single hospital, account for 22 million people, or 7 percent of the U.S. population. We focus on two measures in each group of CBSAs: the per-capita dollar amount of the intermediate sufficiency margin among hospitals with positive margins, and among hospitals with negative margins. Nationwide the per-capita amount of the intermediate sufficiency margin for hospitals with positive margin was $834, and for hospitals with negative margin, -$34.

Table 10 presents the intermediate sufficiency margin in millions of dollars by type of hospital for each entity type separately for hospitals with positive margins and negative margins. To facilitate these comparisons, the top panel for the entire United States shows that of the 4,428 hospitals in our dataset,

309 hospitals have a negative intermediate sufficiency margin. Governmental hospitals comprise 55% of these loss hospitals (171) and 85% of the total dollars (9.2 billion out of 11 billion). Nationwide, per-capita intermediate margin is $834 for hospitals with a positive intermediate sufficiency margin and -$34 for hospitals with a negative intermediate sufficiency margin.

In the second panel of Table 10, we restrict the sample to hospitals in the 28 largest CBSAs, each with a population greater than 2 million. These 28 CBSAs cover 40% of the U.S. population, 40% of all positive intermediate sufficiency margin, and 73% of all negative intermediate sufficiency margins (8 billion out of 11 billion). The hospitals with losses are mostly governmental, 38 out of 69 hospitals with a loss. The per-capita intermediate margin among positive margin hospitals is $813, and the negative margin is -$63.

However, the losses in the largest 28 CBSAs are concentrated in just four CBSAs with very large losses: Dallas, Houston, San Antonio, and Miami. These four CBSA's, with 22.8 million people (7 percent of the U.S. population) have 42 percent of the nationwide intermediate sufficiency margin losses. Of the $4,527 million in negative intermediate sufficiency margin in these four CBSAs, almost all, $4,485, is in governmental hospitals. These large losses result in an enormous per-capita loss margin of -$154. The per-capita intermediate sufficiency margin among hospitals with a positive margin is $654, significantly below the nationwide average of $834. Only 5 out of 107 for-profit hospitals in these four large loss CBSAs has a negative intermediate sufficiency margin. These four CBSAs have a disproportionately large number of for-profit hospitals (50% vs 19.5% nationwide and 28% in the 28 largest CBSAs) with a disproportionately large share of the net patient revenues in the CBSAs. We might be tempted to draw a conclusion that CBSAs with disproportionately large for-profit revenues tend to also have disproportionately large governmental hospital losses, but that might not be the case as two large CBSAs, Austin, Texas and Las Vegas, Nevada, also have for-profit hospitals with disproportionately large shares of net patient revenues, but these CBSAs have very small negative amounts of intermediate sufficiency margin (-$5 for Las Vegas and $0 for Austin).

The per-capita amount of positive intermediate sufficiency margin of $654 among the Dallas, Houston, San Antonia, and Miami CBSAs is almost the same as the $660 margin among the 406 hospitals in single hospital CBSA markets shown in the third panel. The populations are nearly identical in size between the 4 large CBSAs with 22.8 million and the 406 single-hospital CBSAs 22 million. However, the negative margin in these single hospital CBSAs is only -$7 per capita compared to -$154.

The fourth panel shows a special case where four large CBSAs contain no governmental hospitals: Tampa, Orlando, Philadelphia, and Pittsburgh. None of the hospitals in these four CBSA's have a loss, and the per-capita positive intermediate sufficiency margin of $1,051 is larger than the national average of $834. The final panel shows hospitals in Minnesota where there are also no governmental hospitals but in addition, also no for-profit hospitals. As in the four CBSA's without governmental hospitals, none of the hospitals in Minnesota have a negative intermediate sufficiency margin and the per-capita intermediate sufficiency margin is $884, just slightly greater than the nationwide average of $834. Many of Minnesota's 92 hospitals, serving a population of 5.8 million, are in rural areas.

Table 10. The intermediate sufficiency margins by positive and negative amounts in large CBSAs

Geographic Group	Hospital Category	Hospitals with Loss		Hospitals with Gain	
		Count	Intermediate Sufficiency Margin ($M)	Count	Intermediate Sufficiency Margin ($M)
United States population 325.0 million	For-profit	33	-139	833	44,486
	Non-profit, church	18	-419	508	40,358
	Non-profit, other	87	-1,192	1,960	152,652
	Governmental	171	-9,247	818	33,511
	Total	309	-10,997	4,119	271,006
	Per Capita Margin		-34		834
28 Largest CBSAs population 128.7 million	For-profit	7	-49	283	18,974
	Non-profit, church	4	-43	132	14,286
	Non-profit, other	20	-582	476	58,281
	Governmental	38	-7,389	86	13,090
	Total	69	-8,063	977	104,632
	Per Capita Margin		-63		813
CBSAs with large losses: Dallas, Houston, San Antonio, and Miami population 22.8 million	For-profit	5	-41	102	7,517
	Non-profit, church	1	0	8	801
	Non-profit, other	12	0	47	5,592
	Governmental	19	-4,485	16	1,029
	Total	37	-4,527	173	14,940
	Per Capita Margin		-198		654
CBSAs with no governmental hospitals: Tampa, Orlando, Philadelphia, and Pittsburgh population 14.0 million	For-profit	0	0	31	1,583
	Non-profit, church	0	0	8	604
	Non-profit, other	0	0	73	12,557
	Governmental	0	0	0	0
	Total	0	0	112	14,745
	Per Capita Margin		0		1,051
Single Hospital CBSAs population 22.0 million	For-profit	1	-5	57	1,591
	Non-profit, church	0	0	38	1,789
	Non-profit, other	3	-13	206	8,888
	Governmental	17	-136	84	2,220
	Total	21	-154	385	14,489
	Per Capita Margin		-7		660
Minnesota Hospitals population 5.6 million	For-profit	0	0	0	0
	Non-profit, church	0	0	11	1,160
	Non-profit, other	0	0	81	3,759
	Governmental	0	0	0	0
	Total	0	0	92	4,919
	Per Capita Margin		0		884

What can the intermediate margin pay for?

While hospitals' direct salaries and wages are incorporated into the intermediate sufficiency margin, the indirect wage-related labor costs are not. This is in part to focus these margins on the adequacy of payments – in this paper, net patient revenues – and to maintain nationwide coverage of the data set.

Wage-related costs include retirement costs such as 401k employer contributions; plan administrative costs such as 401k plan administration fees as well as the legal, accounting, and management fees for pension plans; health insurance costs such as purchased or self-funded health insurance and workers' compensation insurance; taxes such state or federal payroll taxes; and other costs such as employee benefits for deferred compensation, family leave, child-care, and tuition reimbursement. These types of benefits and costs were not included in the intermediate sufficiency margin due to data availability: with 3,142 observations for individual hospital wage-related costs in the data set, including these costs would have greatly reduced the model sample sizes and challenge a key goal of the analysis to perform a nationwide analysis of short-term acute care hospitals.

However, these non-wage labor costs are substantial in size, and the question remains, "After taking into account the direct costs of providing patient care, including direct salaries and wages, medical, surgical, and pharmacy supplies, charity care, bad debt, and other components detailed throughout the paper, can these non-wage labor and other costs be paid for with the remaining revenues?"

To address this question, we examine the net patient revenues and intermediate sufficiency margin for the 3,142 hospitals that provided information in indirect labor costs in the CMS cost reports. We also consider the extent to which the sufficiency margin could absorb emergency department costs among hospitals with negative intermediate sufficiency margins, and the costs of utilities, and the costs of depreciation. There are 184 hospitals with large emergency department non-salary costs and negative intermediate sufficiency margins. The totals for and counts included in calculating each element are provided in table 11.

Table 11. Nationwide sufficiency of net patient revenue

Cost or Revenue Component	Total	Count of Hospitals
total net patient revenues	$851,868,719,480	3142
total intermediate sufficiency margin	$251,192,352,662	3142
total wage-related costs (1)	$87,006,540,648	3142
plant operations non-salary costs (2)	$13,545,160,417	2759
depreciation expense (3)	$39,935,070,061	3113
emergency department non-salary costs of hospitals with negative intermediate margins (4)	$659,042,040	184
remaining margin	$110,046,539,496	
remaining margin as share of net patient revenues	12.92%	

(1) These wage-related costs are detailed in the Medicare Cost Reports on Worksheet S-3, Part IV – Wage Related Costs. Core wage-related costs are detailed in lines 1-23 and totaled in line 24, column 1. A hospital's wage related costs other than core costs are provided starting on line 25 of the same worksheet, and subscripted if needed. These two types of wage-related costs are summed.
(2) Plant operation non-salary costs are detailed in the Medicare Cost Reports on Worksheet A in line 7 of column 2. These costs reflect direct expenses incurred in the service of hospital utility systems such as heat, light, water, air condition and air treatment; additionally, expenses from maintaining general cleanliness and sanitation of the hospital.
(3) Depreciation expense is provided in the Medicare Cost Reports on Worksheet A-7, Part III, titled "Reconciliation of Capital Costs Centers," in line 3 of column 9.
(4) Emergency room non-salary costs are detailed in the Medicare Cost Reports on Worksheet A, line 91 "Emergency", column 2. Worksheet A provides a hospital's salary and other costs by cost center.

The net intermediate sufficiency margin for the 3,142 hospitals of $251 billion was 29 percent of net patient revenue. Not only was this amount sufficient to pay for the $87.7 billion of non-wage labor costs, but also the non-labor costs of emergency departments in hospitals with negative margins, the utilities costs of hospitals, and the depreciation costs. After covering these costs there remains $110 billion of intermediate sufficiency margin, or 12.9 percent of net patient revenue.

Conclusion

In this paper we use over 4,000 short-term acute care hospitals that file CMS cost reports to examine the sufficiency of payments for patient services. Overall, we find that payments, whether through Medicaid, Medicare, or Commercial sources are sufficient to pay for the direct expenses of hospital care and provide a margin of 19.2 percent of the net patient revenue.

However, we find substantial shortfalls in net patient revenues in a few large CBSA markets, and overwhelmingly these revenue shortfalls occur in governmental hospitals.

We also find that factors beyond the hospital door account for a significant portion of the variation among hospitals in the intermediate sufficiency margin. Among these factors that reduce the sufficiency of net patient revenues are generous state Medicaid coverage, and whether a hospital has net patient revenues less than $35 million. At the same time, inside the hospital, an increasing number of Medicaid discharges reduces the sufficiency of net patient revenues.

We find convincing evidence that the type of hospital entity matters. For-profit hospitals have the greatest intermediate margin sufficiency, followed by non-profits not affiliated with a religious institution, followed by non-profits affiliated with a religious institution. Governmental hospitals have the lowest sufficiency margins and they are also located in the poorest neighborhoods, have the greatest share of Medicaid discharges and smallest share of Commercial discharges. If there is a single formula from this research for how to improve a hospital's intermediate sufficiency margin, it would be to reduce Medicaid cases and increase Commercial payer cases. This is what for-profit hospitals do.

In addition, we find that hospital affiliation with a network of hospitals improves the intermediate sufficiency margin. For-profit hospitals have the greatest rate of network affiliation at 73 percent, followed by non-profits at 50 percent, and governmental at only 13 percent. Could increased network affiliation among governmental hospitals improve their intermediate sufficiency margins?

We also find that state government policy matters. States that provide limited access to state Medicaid, embrace right-to-work laws, and adopt the Medicaid expansion under the Affordable Care Act all improve hospital intermediate sufficiency margins. At the same time, almost no state that provides limited access to state Medicaid adopted the Medicaid expansion under the Affordable Care Act. Our models indicate that the Medicaid expansion largely offset the negative drag on hospital intermediate sufficiency margins that broader access to state Medicaid creates.

Appendix

Appendix I. Average and standard deviation of components of gross sufficiency margin.

Size of Net Patient Revenues	Hospital Category	Gross Sufficiency Margin as Share of Net Patient Revenue	Standard Deviation of Gross Margin as Share of Net Patient Revenue	Medical, Surgical, and Pharmacy Expenses as Share of Net Patient Revenue	Standard Deviation of Medical, Surgical, and Pharmacy Expenses as Share of Net Patient Revenue	Labor (Including Contact Labor) as Share of Net Patient Revenue	Standard Deviation of Labor (Including Contact Labor) as Share of Net Patient Revenue
Any	For-profits	41.30%	17.93%	19.37%	9.82%	39.33%	14.60%
	Nonprofits	33.06%	16.41%	19.36%	8.37%	47.59%	14.91%
	Governmental	21.28%	26.87%	19.40%	11.42%	59.32%	22.23%
	All	32.12%	20.52%	19.37%	9.40%	48.51%	17.96%
< $35 million	For-profits	32.54%	25.11%	19.83%	12.21%	47.63%	21.29%
	Nonprofits	27.44%	17.49%	17.37%	7.81%	55.19%	16.45%
	Governmental	18.13%	27.11%	19.17%	12.03%	62.70%	22.33%
	All	24.47%	23.66%	18.48%	10.46%	57.05%	20.47%
$35-$600 million	For-profits	44.07%	13.69%	19.33%	8.94%	36.61%	10.24%
	Nonprofits	34.62%	16.13%	19.73%	8.59%	45.66%	13.77%
	Governmental	25.09%	26.73%	19.15%	10.82%	55.76%	21.50%
	All	35.65%	18.22%	19.56%	8.99%	44.80%	15.35%
> $600 million	For-profits	49.18%	13.90%	13.83%	4.18%	36.98%	11.43%
	Nonprofits	35.90%	12.05%	21.64%	7.12%	42.46%	11.94%
	Governmental	28.53%	20.95%	22.90%	8.23%	48.57%	18.96%
	All	35.05%	14.76%	21.55%	7.42%	43.39%	13.75%

Note: Shares in rows may not sum exactly to 100% due to rounding.

Appendix II. Mean and median labor cost per staffed bed by hospital size and type.

Size of Net Patient Revenues	Hospital Category	Mean Labor (Including Contact Labor) Per Bed	Median Labor (Including Contact Labor) Per Bed
Any	For-profits	$419,648	$340,175
	Nonprofits	$650,821	$546,818
	Governmental	$697,040	$514,203
	All	$616,113	$499,655
< $35 million	For-profits	$333,577	$262,214
	Nonprofits	$457,797	$395,346
	Governmental	$463,891	$387,469
	All	$440,804	$370,848
$35-$600 million	For-profits	$441,666	$358,982
	Nonprofits	$689,313	$569,705
	Governmental	$939,438	$694,949
	All	$662,266	$528,290
> $600 million	For-profits	$576,277	$404,894
	Nonprofits	$818,885	$698,186
	Governmental	$952,143	$907,972
	All	$834,158	$714,067

Appendix III. Commodity component costs (medical. surgical, and pharmaceutical Supplies; repairs and rental expense, interest expense, and IT purchases) as a share of net patient revenues by hospital size and type, 2017.

Size of Net Patient Revenues	Hospital Category	Average Share of Net Patient Revenues
Any	For-profits	20.35%
	Nonprofits	20.86%
	Governmental	21.21%
	All	20.84%
< $35 million	For-profits	21.13%
	Nonprofits	18.85%
	Governmental	21.15%
	All	20.14%
$35-$600 million	For-profits	20.21%
	Nonprofits	21.27%
	Governmental	20.76%
	All	20.95%
> $600 million	For-profits	14.27%
	Nonprofits	22.93%
	Governmental	24.23%
	All	22.82%

An innovative feature of this paper is merging IRS Statistics of Income (SOI) data, tabulated using individual income tax returns for tax year 2017, with the CMS cost report filings by ZIP code. The SOI data is segmented by state, then by zip code, and then by groupings of adjusted gross income (AGI) size: under $25,000, between $25,000 and $50,000, $50,000 to $75,000, $75,000 to $100,000, $100,000 to $200,000, and greater than $200,000. Below are tabulations built upon the SOI data's number of returns, number of exemptions, number of returns filing total income, and total income amount at the ZIP code level.[31] While the SOI data may not fully represent the U.S. population, they do provide each hospital with an informative localized measure of surrounding population income.

Appendix IV. Average tax return income measures and payor mix for inpatient services by hospital days, 2017.

Size of Net Patient Revenues	Hospital Category	Average Tax Return Income in Hospital Zip Code (1)	Average Ratio of Exemptions with AGI >100K to Exemptions with AGI < 25K (2)	Average Bed Utilization	Average Medicaid/ CHIP Days as Share of Total Hospital Days	Average Medicare Days as Share of Total Hospital Days	Average Commercial Days as Share of Total Hospital Days
Any	For-profits	$68,870	1.17	42.80%	7.54%	38.81%	53.65%
	Nonprofits	$70,670	1.32	49.70%	8.32%	42.60%	49.07%
	Governmental	$56,906	0.75	37.34%	10.51%	50.41%	39.08%
	All	$67,307	1.16	45.59%	8.66%	43.61%	47.73%
< $35 million	For-profits	$63,353	0.95	22.68%	5.01%	49.75%	45.24%
	Nonprofits	$55,354	0.80	28.02%	5.90%	58.44%	35.66%
	Governmental	$53,272	0.66	27.54%	6.63%	61.54%	31.82%
	All	$55,769	0.77	26.99%	6.06%	58.36%	35.58%
$35-$600 million	For-profits	$69,504	1.23	48.91%	8.39%	35.54%	56.07%
	Nonprofits	$71,465	1.39	53.53%	8.99%	39.61%	51.40%
	Governmental	$60,444	0.85	48.18%	12.54%	40.07%	47.39%
	All	$69,608	1.29	51.75%	9.30%	38.70%	52.00%

(1) This measure is the average household income across hospitals based on their zip code. It is calculated at the individual hospital level by weighting the average income in its zip code's AGI groupings by their share of total zip code returns.

[31] In the SOI ZIP code data, available for download at https://www.irs.gov/statistics/soi-tax-stats-individual-income-tax-statistics-2017-zip-code-data-soi, these fields are N1 (number of returns), N2 (number of exemptions), N02650 (number of returns with total income), and A02650 (total income amount). Also, it is important to note that ZIP codes with less than 100 returns and those identified as a single building or nonresidential ZIP code are categorized as "other" at the state level and filed in the SOI data set under "99999." Therefore, some hospitals were not able to be merged on zip code.

Appendix Table V. The distribution of hospital network affiliation by size and entity type.

Hospital Type	Net Patient Revenues and Network Status							
	< $35 million		$35-$600 million		> $600 million		missing	
	In Network >= 5 Hospitals	Not in Network >= 5 Hospitals	In Network >= 5 Hospitals	Not in Network >= 5 Hospitals	In Network >= 5 Hospitals	Not in Network >= 5 Hospitals	In Network >= 5 Hospitals	Not in Network >= 5 Hospitals
For-profit	114	97	504	128	12	1	1	9
Non-Profit	235	357	892	800	117	127	42	3
Governmental	33	513	44	295	14	46	40	5
Total	382	967	1440	1223	143	174	83	17

Note: This table does not reflect the within network/organization distribution. For example, 6 hospitals identified as being part of Lafayette General in their filed Medicare Cost Reports, 4 of which were non-profit and 2 of which were governmental. In this table, the 2 governmental hospitals and the 4 governmental hospitals will both be in the counts for "In Network > 5 Hospitals" based on the total number of hospitals in the network rather than the counts by type of hospital in the network.

Appendix VI - Part A. Payor mix for inpatient services by hospital days for networks based on aggregation up to the network level, 2017.

Largest Networks/Organizations	Number of Hospitals Identifying as Part of Network	Type of Hospitals (1)	Average Zip Code Income of Hospitals	Average Intermediate Sufficiency Margin of Hospitals	Bed Utilization for Network	Medicaid/ CHIP Days Share of Total Days for Network	Medicare Days Share of Total Days for Network	Commercial Days Share of Total Days for Network
HCA	145	For-profit	$74,007	42.32%	67.19%	6.65%	30.30%	63.05%
CHS/COMMUNITY HEALTH SYSTEMS	120	For-profit	$58,953	31.75%	46.38%	9.90%	37.37%	52.73%
ASCENSION HEALTH	91	Nonprofit	$74,049	31.27%	60.68%	6.52%	33.31%	60.16%
CATHOLIC HEALTH INITIATIVES	72	Nonprofit	$70,807	31.73%	60.40%	7.03%	35.36%	57.61%
TENET HEALTHCARE CORPORATION	61	For-profit	$75,705	29.21%	55.15%	9.52%	26.87%	63.61%
LIFEPOINT HEALTH	64	For-profit	$53,922	31.86%	38.36%	10.47%	41.50%	48.03%
TRINITY HEALTH	44	Nonprofit	$63,737	24.62%	64.75%	8.97%	33.27%	57.77%
PRIME HEALTHCARE INC	42	For-profit	$68,553	28.94%	44.95%	10.58%	35.48%	53.94%
INDIAN HEALTH SERVICE (2)	40	Governmental	$48,381	-	29.19%	48.18%	27.82%	24.00%
PROVIDENCE HEALTH & SERVICES	36	Nonprofit	$73,906	34.34%	64.18%	9.13%	31.41%	59.46%
KAISER FOUNDATION	35	Nonprofit	$90,721	38.70%	54.60%	1.96%	3.77%	94.27%
QUORUM HEALTH CORPORATION	29	For-profit	$49,153	36.55%	34.47%	14.62%	35.01%	50.37%
DIGNITY HEALTH	34	Nonprofit	$84,714	28.65%	60.72%	10.99%	29.09%	59.92%
UNITYPOINT HEALTH	31	Nonprofit	$59,042	27.35%	54.53%	19.74%	35.79%	44.47%
SUTTER HEALTH	25	Nonprofit	$118,852	35.32%	57.77%	10.78%	33.19%	56.04%
MERCY	31	Nonprofit	$62,047	15.44%	54.99%	14.14%	32.55%	53.31%
UNIVERSAL HEALTH SERVICES	27	For-profit	$70,580	39.69%	63.64%	10.21%	28.86%	60.93%
BANNER HEALTH	26	Nonprofit	$55,743	33.54%	61.30%	33.70%	24.32%	41.98%
UPMC HEALTH SYSTEM	24	Nonprofit	$62,479	32.03%	63.99%	3.60%	26.09%	70.31%
ADVENTHEALTH	24	Nonprofit	$53,987	30.03%	65.61%	5.65%	31.62%	62.73%
SANFORD	23	Nonprofit	$59,770	29.03%	55.52%	23.46%	41.81%	34.73%

(1) Some networks are comprised of more than one type of hospital. The predominant type of hospital is detailed in this column. For example, CHS/Community Health Systems INC is filed for 118 for-profits and 2 non-profits in the CMS data and so, it is listed as for-profit in this table.

(2) None of the hospitals part of the Indian Health Service provide data on their net patient revenues so no intermediate sufficiency margins could be calculated.

Appendix VI - Part B. Payor mix for inpatient services by hospital days for hospitals located in single-hospital CBSAs based on averaging across individual hospitals, 2017.

Network Status	Number of Hospitals	Average Zip Code Income	Average Intermediate Margin	Average Bed Utilization	Average Medicaid/ CHIP Days Share of Total Days	Average Medicare Days Share of Total Days	Average Commercial Days Share of Total Days
In a Network	212	$54,337	32.33%	44.89%	10.89%	43.30%	45.81%
Not in a Network	195	$54,756	19.14%	41.43%	10.58%	44.78%	44.64%

Contact Information

Michael Udell

Managing Member, District Economics Group, LLC

Cell: (408) 562 6479 michael.udell@districteconomics.com

Lori Stuntz

Principal, District Economics Group, LLC

Cell: (202) 527 2116 lori.stuntz@districteconomics.com

Danielle Sockin

Senior Analyst, District Economics Group, LLC

Cell: (845) 709 5361 danielle.sockin@districteconomics.com

District Economics Group

www.districteconomics.com