The Effect of Administrative Costs on Hospital Health Outcomes

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1 Introduction

The burden of Healthcare Administration on the United States economy has been well documented. Expenditures from hospitals alone accounted for 5.63% of GDP in 2010, and 25.32% of those costs are administrative (Himmelstein et al., 2014). It is also clear from existing literature that a large portion of these administrative activities go towards billing insurance companies. Billing Insurance Related (BIR) costs represented an estimated $471 billion system wide in 2012, of which hospitals accounted for $74 billion (Jiwani et al., 2014). The reason for the great deal of resources directed at the BIR activities is partially due to the response from insurers to a potential problem of physician moral hazard.

Because the medical professionals know a great deal more about the services they are providing, they have the opportunity to provide services that may not be necessary. The Fee-for-service payment scheme used by many insurers in the United States, including large public payers Medicaid and Medicare, provides potential incentives to abuse this information gap. There are incentives to provide unnecessary services as providers are paid for each service provided, thus they are able to increase revenue by billing more services. There is some evidence to support this supply induced demand in U.S. hospitals (Takaku and Yamaoka, 2019) as well as mental health services (Douven et al., 2015) and general practice services (Van Dijk et al., 2013) in the Netherlands, and hospitals in South Korea (Jung and Park, 2021). In response to this concern towards this moral hazard problem, insurers have moved toward claim processing and monitoring of provider's claims that ensures that the services billed are indeed medically necessary. The result is a complex and difficult billing process which creates a great deal of administrative work for providers and insurers alike.

The process of medical billing in Fee-For- Service uses code combinations from over 10,000 medical procedures (CPT Codes), 69,000 medical diagnosis (ICD 10 Dx Codes), and over 250,000 drug codes (NDC codes). The payer then will utilize this information to determine the individual coverage, medical necessity, and payment of the services indicated on a claim according to their own policies. These coverages will vary payor to payor, and in the case of Medicaid, will vary state to state. Often the coverage rules for these code combinations will also be updated year to year, and codes will be added to and removed from the national coding books. The complexity of the tasks involved with creating and reviewing these claims by providers requires a great deal of resources, and is often subject to limitations with cost effective technology. In addition to this coding, there are a variety of other kinds of monitoring efforts including utilization review, which is an exchange of medical documentation reviewed by insurers for medical necessity, credentialing processes to verify provider information, and claim audits. This system complexity forces hospitals in a trade-off between paying for additional administrative resources or simply absorbing the costs of the services.

Ultimately these administrative activities produce little to no value to healthcare provider beyond simply getting reimbursed for rendered services. If there

is also no positive benefit toward the quality of the healthcare for the patients then these BIR activities would meet the traditional economic definition of a transaction cost. From the existing literature, however, the impact of these BIR activities on patient health outcomes is unclear. A more streamlined reimbursement system could potentially reallocate the resources from these insurance billing related processes toward patient centered administrative services or investment in improvement of the equipment, facilities, and medical personnel of the hospital. On the contrary, it is also possible that the requirements set by payers requires a greater level of organization in patient record keeping and helps to ensure that patients are not taking risks for medically unnecessary procedures. This paper aims to offer a helpful first step in examining the relationship between BIR related costs and measures in several key hospital health outcomes. These variables will be discussed at length in the data section below.

2 Literature Review

Several studies have looked at the relationship of other cost measures with health outcomes, McKay and Deily (2008) observed no effect of cost inefficiency (Of all hospital costs, not just administration) on mortality rates and complications rates. Schreyögg and Stargardt (2010) found that there was a negative association between overall hospital costs and mortality and readmission rates for patients with acute myocardial infarction (AMI). This is relevant as AMI is one of the cohorts observed in our CMS health outcomes data. This paper looks to examine a previously underdeveloped and more specific role of costs in patient care by attempting to further isolate the effect of BIR costs on key hospital health outcomes and efficiency measures.

The role of uncompensated care on patient health outcomes has been explored in the literature. Camilleri and Diebold (2019) used an IV approach for uncompensated care. The IV approach was used due to concerns that low-quality hospitals may only be able to attract low-income patients who are more likely to be uninsured leading to higher levels of uncompensated care. They also suggest other possible issues such as hospital culture. The potential endogeneity problem with uncompensated care will not be an issue in this paper as CMS measures uncompensated care specifically as those services in which the patient has liability to pay, not the insurer. Since we are interested in the unpaid costs due to complications with insurers, these would be unpaid costs that are insurer's liability. Data is available on the volume of visits for Medicare and Medicaid patients which we will use in the model to control for these potential patient selection issues. More information on this will be provided in the Methods section.

3 Data

There are two primary data sources that will be used in this paper, both from the Center for Medicaid and Medicare Services (CMS). U.S. hospitals are required to provide cost reports to CMS annually using the form CMS-2552-10. This form is broken up into several worksheets in which providers will give cost report details in a large number of categories. Unfortunately, isolating BIR costs from these reports is difficult as most of the pertinent BIR costs are reported together under a broad category "Administrative and General" and there are few other categories that are relevant to the BIR cost centers mentioned in previous studies (Kahn et al., 2005). These previous estimates also estimated that BIR costs accounted for between 6.6% and 10.8% of total revenue which accounts for a large portion of the total 20.6% of total revenue that was reported for Administrative costs in the same data-set. This indicates that likely a large portion of the variation in administrative costs can be attributed to variation in the BIR costs within that category, but the data will limit this paper from being able to provide clear causal evidence. It is also worth noting that the cost categories included in this paper will be more restrictive than those that have been used in the past to measure overall administrative costs. Several of the previous studies mentioned above measured administrative costs from Hospital cost reports using the cost assignment methodology from Woolhandler et al. (1993), which included things such as Nursing Administration and employee benefits. Previous estimates of BIR costs have used the estimated percentages from Kahn et al. (2005) and applied them to this broad administrative definition or to the size of overall revenue. Rather than rely on these estimates, we will only use the Hospital Cost Report categories that can be directly tied to high percentages of BIR activity, "Administrative and General" and "Medical Records and Library". This will yield estimates that are below the true level of administrative spending and perhaps also the true level of BIR costs, but this measure of administrative costs should vary more closely in relation to changes in BIR related burden.

From the same cost reports, there is also data available on unpaid costs for both Medicaid and Medicare patients. Medicare provides supplemental payment depending on the amount reported for Medicare Bad Debt, which is defined as cost share amounts for Medicare patients that were not collected. Medicare pays only for portions of this bad debt that meets a specific criteria in terms of the collection effort. These bad debts can include patients eligible for both Medicare and Medicaid where Medicaid is responsible for the cost-share amounts, but the dual eligible recipients are not included in the Medicaid costs so there should not be any duplication. The amount of these unpaid liabilities that were not reimbursable was used for the Medicare unpaid costs. Since claims that disputed with Medicare or denied due to administrative mistakes are not considered patient liability, they are not measured in this category. This means that the Medicare unpaid amount is likely also underestimated. The Medicaid unpaid costs reflects simply the difference between the amounts reported as Medicaid revenue and Medicaid costs. These two categories are combined and

used as proxy for the level of unpaid costs that providers prefer to go unpaid rather than apply additional administrative resources.

There, again, are some limitations to this method. The first is that it does not at all include private insurance patients which according the Census Bureau accounts for 66.5% of the population, compared to the 34.8% on public insurance. While this is the case, private insurance patients may not make up the majority of unpaid insurance liability and administrative burden. Gottlieb et al. (2018) showed that Medicaid has a greater administrative burden than other payers in a large sample of U.S. physicians. One of these measures, listed as "share of challenged revenue", which is costs that went unpaid or were recovered at an administrative cost greater or equal than the reimbursement was three times higher for Medicaid patients than private payers. Medicare was measured as only slightly more difficult than private payers in this study. There isn't a comparable study for hospitals, but our data from the 2019 Cost report does show that Hospitals are reporting that nearly 21% of Medicaid costs go unpaid which supports the idea that at Medicaid may represent a disproportionate amount of the hospitals unpaid insurance liabilities. Overall this variable should still work as a suitable proxy to capture some of the effect of hospitals substituting increases in unpaid costs rather than paying for increases in administrative costs.

Data on Medicaid and Medicare days will also be utilized from the CMS cost report data. These are defined as any outpatient visit or individual inpatient day utilized by a patient where the Medicaid or Medicare is the primary insurance coverage. This data will be used for adjustments of administrative costs and unpaid costs by patient volume. Only the Hospital Cost report for fiscal year 2019 was utilized for this study. Speciality hospitals such as Cancer, Psychiatric, Rehabilitation, and Children's hospitals were not included in the sample as billing requirements, reimbursements rates, availability of outpatient and inpatient services and cost structure can vary across these other hospital types. This leaves 4500 observations from the 2019 Hospital Cost report.

Data for health outcomes will also come from CMS. They have several large databases on health outcomes for Medicare recipients at US hospitals. The first outcome that we will be evaluating is the Hospital Unplanned Readmission Rate. This rate is a risk adjusted score that is calculated by using claims data to measure the number of patients seen at a hospital who were readmitted to any other hospital within 30 days. They then separate re-admissions to hospitals from planned and unplanned in several disease categories for patients in a given hospital and adjust these re-admission rates based on individual risks. They then create a hospital level score for rate of readmission using a logit probability model of the ratio of predicted re-admissions given hospital specific variation to the expected rate of readmission independent of hospital characteristics (Horwitz et al., 2012). The resulting score is below:

Score = (Estimates for Rate of Unplanned Readmissions/ Expected Rate of Readmissions Independent of Hospital Characteristics) x National Readmission Rate

Higher scores in this category indicate medical complications, poor quality care, and bad discharge planning to ensure patients are receiving appropriate secondary care. This score will provide a good measure of the quality of care for both inpatient and outpatient services at any given hospital as it includes re-admissions rates for both types of patients. This data is recorded for only Medicare recipients and these scores were measured for all participating hospitals between 07/01/2019 and 12/01/2019. There were 3303 hospitals that participated in this study and were also part of the 4500 taken from the 2019 Hospital Cost Report. According to CMS, there were 6210 hospitals in the United States in 2019, so the sample here covers 53% of the total hospital population.

CMS also offers several more quality measures for Emergency Department Care, including the percentage of patients who left the emergency department before being seen. This will be used as the second measure for this study as it is a measure of overcrowding and under-staffing, both of which can be directly traced to a lack of sufficient resources, and therefore a more direct link to the burden of administrative costs. Data for this percentage as well as score assigned to the Hospital's Emergency department volume were collected for all participating hospitals between 01/01/2019 and 12/31/2019.

Finally the last health measure that will be used is the Median time a patient spent in the Emergency department before leaving from the visit, which is another good measure of efficiency of the Emergency department. This outcome was measured between 07/01/2020 - 12/31/2020 which means that the COVID-19 pandemic may have had some effect on these measures, future uses of this measure could benefit from a pandemic related control. The emergency department volume was not measured again in the 2020 study. The 2020 study will be used with the 2019 Cost Report data for this paper as the 2020 Cost Reports have not been filed by a large number of hospitals at this point in time. Overall 2511 hospitals participated in the 2019 Emergency Department portion of the study and 3289 participated in the 2020 study. This brings the sample to 40% and 53% of the total population respectively.

4 Methods

We will use several control variables in our models, the first and potentially most important will be a categorical variable for revenue size, one for each 20th percentile. As you can see in Figure 1 below there appears to be significantly decreasing costs per visit with increasing scale.

A dummy variable will also be included to indicate if the Hospital is in a rural or urban county. This data was collected from the 2010 Census. The final control variable will be one for type of control: non-profit, government-owned, or private owned. The non-profit will be the ommitted reference group as the majority of hospitals are non-profit. The frequencies of control types

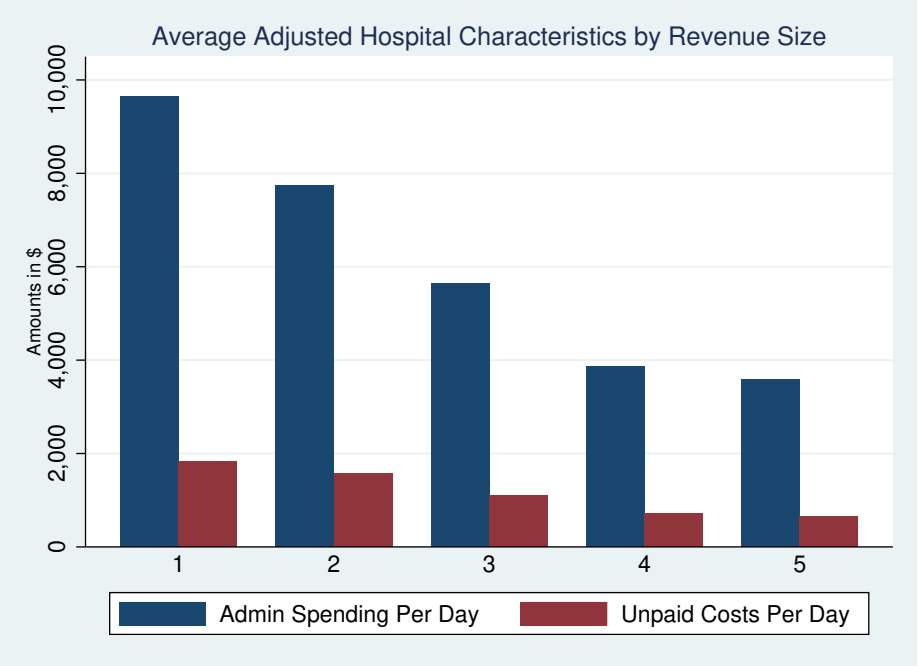

Figure 1: Average Adjusted Hospital Characteristics by Revenue Size

can viewed in Table 3. These controls are in line with the key co-variates with administrative costs in McKay et al. (2008) and are listed as relevant controls in the health outcome studies previously cited. Finally we will be taking fixed effects across states. This is primarily to account for differences in the state's Medicaid program as requirements and reimbursement can vary across states. This also a number of key differences between states that expanded Medicaid with the Affordable Care Act, and those that did not. This includes effects to patient mix Kaufman et al., 2016, levels of uncompensated care Dranove et al., 2016, and overall hospital revenue Moghtaderi et al., 2020 among other factors.

There will be two different models estimated for the first health outcome variable, unplanned readmission rate.

$$R_{ij} = \beta_0 + \beta_1 A_{ij} + \beta_2 U_{ij} + \beta_3 C_{ij} + \epsilon_{ij}$$

Where R_{ij} = Readmission Rate score for the individual Hospital i in state j, A_{ij} = The Level of Administrative Spending adjusted by number of Medicare and Medicaid days. U_i = the level of unpaid public insurance costs also adjusted by the same patient volume, and C_{ij} is the vector of control variables for Hospital i.

The next model will be a binary probit model for the "success" outcome of the hospital being worse than the national average in unplanned readmission

rate. Marginal effects will be observed with respect to both of the dependent variables of interest, administrative spending and unpaid costs. The same control variables as the previous model are used, but because there are a large number of states with no observations of hospitals with worse than average readmission rates (See Table 5), there was an impact on sample size as those observations were necessarily dropped due to there being no within state variation. The model was also run without state controls for comparison.

The following model will be used for the first emergency department outcome of interest:

$$L_{ij} = \beta_0 + \beta_1 A_{ij} + \beta_2 U_{ij} + \beta_3 C_(ij) + \epsilon_{ij}$$

L_ij is the percentage of patients that left the emergency department before being seen at hospital i in state j. The changes to the right side of this equation includes the added categorical control variable for emergency department volume.

The final model is for the other emergency department efficiency outcome:

$$T_{ij} = \beta_0 + \beta_1 A_{ij} + \beta_2 U_{ij} + \beta_3 C_{ij+\epsilon_{ij}}$$

T_ij is the median time in spent in the emergency department for hospital i in state j. This model is run both with and without the control for emergency department volume, as it is a very relevant control, but restricts the sample size to only the hospitals that participated in both the 2019 and 2020 study, resulting in reductions in sample size from 3400 to 2486.

5 Results

Regardless of the controls included, there was a statistically significant negative effect of administrative spending on unplanned readmission rates in both the regression and probit models. This significance was at the 99% level in every case. The marginal effect from the probit model is shown in Table 1 below, and the full model results can be viewed in Table 7.

Although they may have statistical significance, they show very little economic significance. The results above suggest that hospitals would need to spend an additional $1000 per Medicaid/Medicare patient in order to reduce the probability of being Worse than the National Average by .1 percentage points. That would be a nearly 16% increase in administrative spending per patient for the average hospital in the middle tier of total revenue for a very small relative improvement in readmission rates. In addition, the fixed effects model with full controls suggested that an additional $10,000 would need to be spent per patient on administration to reduce readmission rates by .5 percentage points. Variance inflation factor tests were run on the fully controlled regression model and did not yield scores higher than two for the variables of interest, so there

Table 1: Marginal Effects on Probability of Being Worse than Average in Unplanned Readmissions

	(With State Controls)	(Without State Controls)
Admin Costs per Day	-0.0000139***	-0.00000989***
	(0.00000389)	(0.00000236)
Unpaid Costs per Day	0.00000510	0.00000400***
	(0.00000364)	(0.00000147)
N	1866	3083
r2		
r2_p		

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

are no multicollinearity concerns with these predictions. Unpaid costs were not statistically significant when state controls were implemented in any of the models. This is likely due to the Medicaid costs making up the vast majority of this category, and as mentioned previously there is a strong correlation with these costs across states. Full results for the fixed effect models are in Table 6.

The results for the amount of patients who left before being seen was not statistically significant in all of the models. This can likely be largely explained by the lack of significant variation in this outcome as all hospitals were between 0% and 1.90% with the average being significantly close to zero. This is likely not a good measure to be utilized for future studies. Full results can be viewed in Table 8.

The final health outcome, Median time spent in the emergency department, did yield significant results for administrative spending or unpaid costs in the model controlled for Emergency Department Volume and adjusted by Medicaid/Medicare day. There were statistically significant results once the Medicaid/Medicare patient day adjustment was removed and maintaining controls for Emergency Department Volume. This may indicate that there is a relationship between a patient mix with more Medicaid and Medicare patients that is not being unobserved through unpaid costs or state effects. Even if relevant, the magnitude of the coefficient is still economically insignificant. Results for this health outcome are in Table 9.

6 Conclusions

The observed results support the hypothesis that the BIR costs match the traditional economic definition of a transaction costs. If these are indeed transaction costs, then combined with the fact that they are decreasing with scale there is evidence to support that these BIR activities may play a role in escalating the pace of market consolidation of hospitals. Previous examinations of market consolidation in healthcare, have suggested potentially mixed results for patients, with Lindrooth et al. (2018) and Tsai and Jha (2014) suggesting that this could lead to better health outcomes, but also higher costs.

Our models suggest that the cost which would be required to achieve any improvement in these health outcomes through administrative spending in the selected categories would not be viable for most hospitals. To improve these health outcomes, they would likely be better utilized elsewhere. There is also, however, no evidence here to support that the cost burden from these activities are negatively impacting the health care of patients. Although we have already acknowledged that the amounts for both administrative costs and unpaid costs are likely under-estimates, it is possible that the cost burden is simply not of great enough in relative magnitude to have significant impact hospital operations and their ability to provide quality care. As seen in Figure 2, the cost centers utilized for this study represented a relatively insignificant portion of total revenue, the level of administrative costs were about 4% of average total revenue and the average level of unpaid costs at about 1% of total revenue.

While small in relative terms, it is still not a negligible amount of resources being utilized in these areas, approximately $149.9 billion in administrative costs and $25.2 billion in unpaid costs in 2019. It's possible that instead of compromising the quality of their healthcare, instead this cost burden on hospitals from BIR activities is pushed forward to patients. The literature could benefit from future research analyzing the relationship between these costs and the price paid by consumers for healthcare.

Without measuring the impact on healthcare costs, the results of this study alone are ultimately insufficient to provide meaningful insight to policy makers, but hopefully may provide useful insight to improve the direction of research in this area.

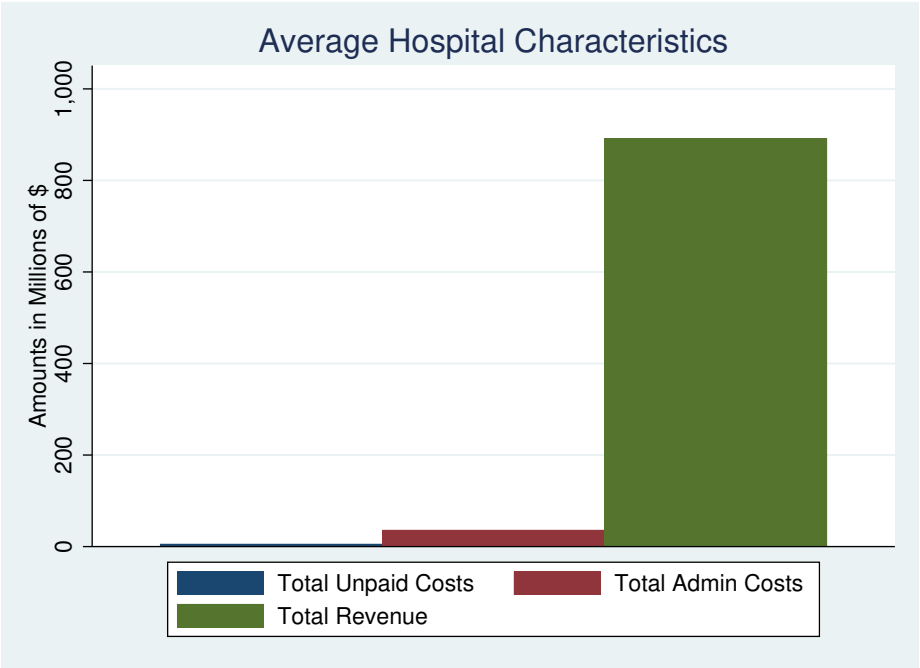

Figure 2: Average Hospital Characteristics

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7 Appendix

Table 2: Summary Statistics for Hospital Characteristics

	Sum	Mean	SD	Min	Max	N
Admin Costs (In Millions)	149,872	36.61	62.23	0	850	4,094
Unpaid Costs	25,252	6.17	19.35	0	417	4,094
Total Revenue	3,654,111	892.55	1,627.69	0	29,390	4,094
	Sum	Mean	SD	Min	Max	N
Admin Costs Per Medicaid/Medicare Day (In $)	24,539,660	5,994.05	12,062.08	0	421,268	4,094
Admin Costs Per Medicaid/Medicare Day (In $)	4,134,268	1,115.26	3,476.84	0	98,402	3,707
Medicare and Medicaid Days	42,602,846	10,406.17	16,663.34	0	204,660	4,094

Table 3: Percentage Frequency of Control Variable by Revenue Size

	(1)					
Revenue Size	1	2	3	4	5	Total
Non-Profit	6.36	7.93	9.65	18.83	16.03	11.97
Private Owned	42.91	62.83	75.70	71.18	70.78	65.14
Government Owned	50.73	29.24	14.65	9.99	13.18	22.89
Rural	66.23	57.00	42.49	30.31	22.45	43.01
Urban	33.77	43.00	57.51	69.69	77.55	56.99

Table 4: Summary Statistics for Health Outcomes

	Mean	SD	Min	Max	N
Readmission Rate	15.47	0.64	11.50	20.10	3,747.00
Left Percent	0.00	0.04	0.00	1.90	2,743.00
Median Time Spent in ED	147.83	44.85	54.00	761.00	3,699.00

Table 5: Percent of Observations for Worse than National Average in Readmission Rates

	(1)		
	0 colpct	1 colpct	Total colpct
AK	0.50	0.00	0.49
AL	2.09	0.00	2.05
AR	1.91	0.00	1.88
AZ	1.39	0.00	1.37
CA	7.28	7.46	7.28
CO	1.94	0.00	1.91
CT	0.65	0.00	0.64
DC	0.15	0.00	0.15
DE	0.15	0.00	0.15
FL	3.77	19.40	4.03
GA	3.30	1.49	3.27
HI	0.47	0.00	0.46
IA	2.68	0.00	2.64
ID	0.97	0.00	0.95
IL	3.97	7.46	4.03
IN	2.23	1.49	2.22
KS	3.18	1.49	3.15
KY	2.19	8.96	2.30
LA	2.51	1.49	2.49
MA	1.24	10.45	1.39
MD	1.04	0.00	1.03
ME	0.74	0.00	0.73
MI	2.98	4.48	3.00
MN	2.71	0.00	2.66
MO	2.66	1.49	2.64
MS	1.96	2.99	1.98
MT	1.07	0.00	1.05
NC	2.36	1.49	2.34
ND	0.99	0.00	0.98
NE	2.09	0.00	2.05
NH	0.65	1.49	0.66
NJ	1.42	7.46	1.51
NM	1.02	0.00	1.00
NV	0.82	1.49	0.83
NY	2.31	10.45	2.44
OH	3.38	0.00	3.32
OK	2.71	2.99	2.71
OR	1.37	0.00	1.34
PA	3.55	4.48	3.57
RI	0.25	0.00	0.24
SC	1.37	0.00	1.34
SD	1.07	0.00	1.05
TN	2.43	0.00	2.39
TX	7.42	1.49	7.33
UT	1.09	0.00	1.07
VA	1.79	0.00	1.76
VT	0.32	0.00	0.32
WA	1.89	0.00	1.86
WI	2.56	0.00	2.52
WV	0.89	0.00	0.88
WY	0.55	0.00	0.54
Total	100.00	100.00	100.00

Table 6: Hospital Administrative Costs on Rates of Unplanned Readmissions

	(OLS) readmission	(FE1) readmission	(FE2) readmission	(FE3) readmission
Admin Costs per Day	-0.00000884***	-0.00000554***	-0.00000525***	-0.00000496***
	(0.00000185)	(0.00000183)	(0.00000183)	(0.00000183)
Unpaid Costs per Day	0.0000110**	0.00000651	0.00000631	0.00000529
	(0.00000502)	(0.00000487)	(0.00000487)	(0.00000488)
Revenue Size 1	0	0	0	0
	(.)	(.)	(.)	(.)
Revenue Size 2	-0.0885**	-0.0861**	-0.0798*	-0.0682*
	(0.0415)	(0.0410)	(0.0411)	(0.0414)
Revenue Size 3	-0.130***	-0.139***	-0.127***	-0.106**
	(0.0410)	(0.0410)	(0.0414)	(0.0424)
Revenue Size 4	-0.0127	-0.0908**	-0.0722*	-0.0396
	(0.0407)	(0.0414)	(0.0422)	(0.0436)
Revenue Size 5	-0.00450	-0.110***	-0.0884**	-0.0595
	(0.0409)	(0.0420)	(0.0431)	(0.0443)
Urban			-0.0513**	-0.0498**
			(0.0229)	(0.0229)
Government Owned				0.139***
				(0.0401)
Private Owned				0.0971***
				(0.0328)
_cons	15.57***	15.60***	15.61***	15.50***
	(0.0365)	(0.0371)	(0.0377)	(0.0502)
N	3455	3455	3455	3455
r2	0.0148	0.00545	0.00691	0.0106

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Hospital Administrative Costs on Probability of Worse than Average Unplanned Readmissions

	(State Controls) Worse Than Average	(No State Controls) Worse Than Average
Admin Costs per Day	-0.000216***	-0.000222***
	(0.0000586)	(0.0000496)
Unpaid Costs per Day	0.0000792	0.0000897***
	(0.0000562)	(0.0000321)
Revenue Size 1	0	0
	(.)	(.)
Revenue Size 2	-1.293***	-1.208***
	(0.429)	(0.361)
Revenue Size 3	-1.159***	-1.087***
	(0.282)	(0.254)
Revenue Size 4	-0.324**	-0.292**
	(0.140)	(0.123)
Revenue Size 5	0	0
	(.)	(.)
Urban	-0.202	-0.171
	(0.146)	(0.124)
Government Owned	0.158	0.0235
	(0.294)	(0.254)
Privately Owned	0.190	0.210
	(0.214)	(0.184)
_cons	-1.757***	-1.069***
	(0.477)	(0.251)
N	1866	3083
r2		
r2_p	0.201	0.160

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Hospital Administrative Costs on Percentage of People Leaving ER Without Being Seen

	(1) Percentage Left	(2) Percentage Left	(Unadjust) Percentage Left
Admin Costs per Day	-2.46e-08	-2.51e-08	
	(2.09e-08)	(2.09e-08)	
Unpaid Costs per Day	8.28e-08	8.29e-08	3.59e-08
	(5.95e-08)	(5.95e-08)	(4.50e-08)
Revenue Size 1	0	0	0
	(.)	(.)	(.)
Revenue Size 2	0.000690	0.000694	0.000717
	(0.000532)	(0.000533)	(0.000532)
Revenue Size 3	-0.000187	-0.0000977	-0.0000543
	(0.000542)	(0.000589)	(0.000589)
Revenue Size 4	-0.000254	-0.000119	-0.0000717
	(0.000559)	(0.000696)	(0.000697)
Revenue Size 5	-0.000333	-0.000235	-0.000228
	(0.000564)	(0.000797)	(0.000821)
Privately Owned	0.0000788	0.0000748	0.000101
	(0.000445)	(0.000446)	(0.000445)
Government Owned	-0.000315	-0.000328	-0.000301
	(0.000537)	(0.000539)	(0.000540)
Urban	-0.000318	-0.000317	-0.000322
	(0.000294)	(0.000294)	(0.000294)
ED Volume Score 1		0	0
		(.)	(.)
ED Volume Score 2		-0.000185	-0.000157
		(0.000486)	(0.000485)
ED Volume Score 3		-0.000144	-0.000118
		(0.000638)	(0.000637)
ED Volume Score 4		-0.0000840	-0.000103
		(0.000695)	(0.000707)
Total Admin Costs			8.02e-13
			(2.55e-12)
_cons	0.000520	0.000535	0.000350
	(0.000642)	(0.000644)	(0.000625)
N	2560	2560	2560
r2	0.00435	0.00441	0.00388

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9: Hospital Administrative Costs on Median Time Patients Spent In Emergency Department Before Leaving

	(1) MedianTime	(2) MedianTime	(3) MedianTime
Admin Costs per Day	-0.000120*	-0.0000714	
	(0.0000617)	(0.000107)	
Unpaid Costs per Day	-0.000427*	-0.000251	
	(0.000227)	(0.000352)	
Revenue Size 1	0	0	0
	(.)	(.)	(.)
Revenue Size 2	9.733***	6.790**	7.828***
	(2.330)	(2.761)	(2.460)
Revenue Size 3	29.25***	22.03***	22.92***
	(2.405)	(3.011)	(2.697)
Revenue Size 4	48.25***	35.44***	33.47***
	(2.457)	(3.508)	(3.208)
Revenue Size 5	67.58***	51.40***	42.18***
	(2.509)	(3.989)	(3.801)
Privately Owned	-3.815**	-2.625	-1.836
	(1.864)	(2.183)	(2.026)
Government Owned	7.303***	8.332***	6.839***
	(2.278)	(2.667)	(2.474)
Urban	3.131**	1.341	0.683
	(1.319)	(1.455)	(1.367)
ED Volume Score 1		0	0
		(.)	(.)
ED Volume Score 2		13.20***	13.49***
		(2.381)	(2.243)
ED Volume Score 3		14.19***	14.54***
		(3.118)	(2.948)
ED Volume Score 4		18.90***	12.95***
		(3.398)	(3.275)
Total Admin Costs			0.000000145***
			(1.37e-08)
Total Unpaid Costs			-2.88e-08
			(3.66e-08)
_cons	114.6***	112.9***	109.4***
	(2.733)	(3.272)	(2.789)
N	3400	2486	2653
r2	0.294	0.321	0.366

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$